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Heterogeneous effects of blood pressure screening

Fabrice Kämpfen* University College Dublin

Irene Mosca Maynooth University

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Abstract

This is the first study that investigates the heterogeneous effects of blood pressure (BP) screening on subsequent changes in BP in a high-income country. We use data from clinical health assessments carried out in 2010 (baseline) and 2014 (follow-up) as part of a nationally-representative longitudinal study on ageing in Ireland. We employ a Regression Discontinuity Design (RDD) by comparing outcomes at follow-up on either side of the BP cutoff that separates normal to abnormal BP at baseline. We find that the BP screening reduces BP at follow-up among those who at baseline do not report a previous hypertension diagnosis, with larger and more precisely estimated effects for males, middle-age individuals (as opposed to older individuals) and individuals without public health insurance coverage. However, we find no effects when we include in the analysis individuals who at baseline report a previous hypertension diagnosis. Overall, our analysis suggests that the effectiveness of the screening likely depends on whether the information on the outcome of the screening provided to individuals is new to them or not.

Keywords: Health screening |Hypertension | Blood pressure | Undiagnosed individuals | Non-communicable diseases |Regression discontinuity design | Ireland | High-income Country

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*E-mail address:fabrice.kampfen@ucd.ie.

1 Introduction

Hypertension, or high blood pressure, is the principal risk factor for cardiovascular disease (CVD) (Stanaway *et al.*, 2018), which in turn is the largest contributor to the global burden of disease (Vos *et al.*, 2020). According to recent estimates (Zhou *et al.*, 2021a) every year around 8.5 million deaths worldwide are attributable to hypertension. Globally, 34% of men and 32% of women aged 30 to 79 suffer from this condition. However, hypertension is often undetected, with many individuals suffering from this condition not experiencing noticeable symptoms. Awareness rates around the globe are low, with only around 49% of men and 59% of women with hypertension being aware of their condition (Zhou *et al.*, 2021b).

In Ireland, around 38% of men and 27% of women aged 30 to 79 suffer from hypertension. Only 48% of men and 54% of women suffering from this condition are aware of their hypertension status (Zhou *et al.*, 2021b). Ireland has the lowest hypertension awareness rates of all high-income English speaking countries.[1] For women, the hypertension awareness rate is also the lowest in Europe. For men, it is the third lowest, after Albania (28%) and Estonia (47%) (Zhou *et al.*, 2021b). Awareness of hypertension is a crucial first step for individuals to seek care and achieve long lasting blood pressure (BP) control. Early detection is vital to prevent complications. Once hypertension is detected, there are two well-established strategies to lower BP: lifestyle interventions, such as salt reduction, healthy diet, moderate alcohol consumption, smoking cessation, and regular physical exercise, and drug treatment (Williams *et al.*, 2018).

The finding that around half of adults with hypertension in Ireland are unaware of their condition leads to the natural question of whether hypertension screening can be effective at increasing awareness and in turn at lowering BP and reducing hypertension prevalence rates in Ireland. Addressing this question is particularly important in the Irish context for at least two reasons. The first reason is that Ireland is the only western European country without universal coverage for primary care, with approximately 58% of the population paying the full out-of-pocket cost of a general practitioner (GP) visit (OECD *et al.*, 2019). Still, GPs play a key role in the Irish health care system as most often they are the first point of call for interactions with the health service. GPs provide a wide range of services in relation to diagnosis, treatment, and management of health problems, and act as gatekeepers for secondary care (Ma *et al.*, 2020). The second reason is that in Ireland there is no national programme for CVD risk assessment similar to those in place in countries such as Belgium, Germany, Luxembourg, and Switzerland

[1] These include Australia, Canada, Ireland, New Zealand, the United Kingdom and the United States of America.

(Murphy *et al.*, 2016).

With this background in mind, this paper investigates whether hypertension screening leads to changes in BP using data from the first (2010) and third (2014) waves of The Irish Longitudinal Study on Ageing (TILDA) (Whelan and Savva, 2013). TILDA is a nationally representative sample of community-dwelling individuals aged 50 or older in Ireland and their partners of any age. One unique feature of TILDA is that each respondent is offered an in-depth health assessment which is carried out by a trained and qualified nurse. The health assessment is carried out at baseline (wave 1), and again 4 years later (wave 3). Respondents' systolic blood pressure (SBP) and diastolic blood pressure (DBP) are measured at both baseline and follow-up. At the end of the assessment, the nurse who has undertaken the assessment provides feedback to the respondent on whether his/her measured BP is normal (below a BP cutoff) or abnormal (above a BP cutoff). The cutoff that separates normal to abnormal BP is 140 mmHg for SBP and 90 mmHg for DBP.

We follow the literature (Chen *et al.*, 2019; Ciancio *et al.*, 2021; Dai *et al.*, 2022; Kämpfen *et al.*, 2023; Pedron *et al.*, 2022; Sudharsanan *et al.*, 2020; Zhao *et al.*, 2013) and estimate the causal effect of hypertension screening on BP using a Regression Discontinuity Design (RDD) approach. Effects are estimated by comparing outcomes at follow-up on either side of the BP cutoff at baseline. The design allows causal impact to be estimated in the absence of explicit randomisation. Causal identification relies on the assumption that respondents in a narrow range around the cutoff that separate the normal to the abnormal BP range are similar on average in both observed and unobserved characteristics such that an outcome would evolve smoothly and continuously through the cutoff if no such cutoff were to exist. Any discontinuity in the outcome at the cutoff can then be attributed to the causal effect of crossing the normal BP range cutoff.

Following Chen *et al.* (2019), Ciancio *et al.* (2021), and Sudharsanan *et al.* (2020), we employ a unidimensional RDD in the first instance. With this approach, we estimate treatment effects which are frontier-specific —systolic or diastolic—. However, this approach has a number of limitations, primarily a substantial reduction in both information and statistical power due to the exclusion of a sizeable number of observations in each unidimensional RDD. To address the limitations of the unidimensional approach, we then follow Pedron *et al.* (2022) and Kämpfen *et al.* (2023), and adopt a binding-score RDD strategy, which essentially relies on a centering approach that leverages the changes in treatment status at both systolic and diastolic BP cutoffs simultaneously. Given the high rates of hypertension unawareness in Ireland, the main

focus of our analysis are on undiagnosed individuals, i.e., individuals who at baseline do not report a previous hypertension diagnosis. For completeness, we also carry out a comparative analysis for the entire sample of TILDA respondents with valid BP measurements at baseline and follow-up. The entire sample includes individuals who at baseline either report (32.7%) or do not report (67.3%) a previous diagnosis of hypertension.

The results of our analysis show that screening reduces BP among undiagnosed individuals. Estimates are large and precisely estimated. To illustrate, estimates from the binding-score RDD approach show that individuals at the cutoff experience a drop in SBP of 5.3 mmHg (p-value=0.027) relative to individuals just below the cutoff. A similar effect on SBP is estimated from the discontinuity at the systolic frontier (-5.5 mmHg, p-value=0.062) and at the diastolic frontier (-6.1 mmHg, p-value=0.113). Effects on DBP are sizable as well: individuals just above the cutoff experience a decrease in DBP that ranges between 3.2 mmHg (p-value=0.044) and 4.3 mmHg (p-value=0.022). However, these effects do not translate into a statistically significant decrease in the probability of being hypertensive at follow-up. For the full sample that includes both diagnosed and undiagnosed individuals, we find no evidence that screening reduces BP four years later. Estimated effects are consistently negative, but they are imprecise and not close to conventional levels of statistical significance.

We also document important heterogeneity effects among undiagnosed individuals with larger effects for males, middle-aged respondents (as opposed to older respondents), and individuals who are not eligible to public health care. For instance, when considering the SBP frontier only, undiagnosed males experience a drop in SBP and DBP of about 8.3 mmHg (p-value=0.043) and 6.7 mmHg (p-value=0.009), respectively. The corresponding drops for females are much smaller (-2.2 mmHg and -0.8 mmHg, respectively) and not precisely estimated (p-value=0.630 and p-value=0.774, respectively). Even larger differences emerge when focusing on the effects of the screening on middle-aged vs older adults. Along the SBP frontier, middle-aged individuals just above the cutoff have lower SBP (-12.9 mmHg, p-value=0.002) and DBP (-10.1 mmHg, p-value$<$0.001) at follow-up relative to those just below the cutoff. In contrast, screened older adults just above the cutoff do not experience any change in their BP characteristics. Our analysis does not reveal any heterogeneity by educational attainment.

This paper contributes to various strands of the literature. First, existing evidence on the effects of BP screening is mixed and clear differences emerge between High-Income Countries (HICs) and Low- and Middle-Income Countries (LMICs). While studies from HICs such as Germany (Pedron *et al.*, 2022) and the United Kingdom (Rodriguez-Lesmes, 2021) find that

BP screening does not have any effect on BP at follow-up, studies from LMICs such as Malawi (Ciancio *et al.*, 2021), South Africa (Sudharsanan *et al.*, 2020), and China (Chen *et al.*, 2019) conclude that BP screening does reduce BP at follow-up. Knowledge and awareness of hypertension status is typically lower in LMICs than in HICs (Lloyd-Sherlock *et al.*, 2014; Mohanty *et al.*, 2021, 2022), suggesting that (low) awareness is likely a key determinant of the effectiveness of BP screening. Our study from Ireland shows that among undiagnosed individuals —and thus likely to be unaware of their condition—, BP screening leads to improvements in BP characteristics that are consistent with evidence from LMICs (Chen *et al.*, 2019; Ciancio *et al.*, 2021; Sudharsanan *et al.*, 2020). This is in line with the literature that documents that health information and news have no impact if irrelevant or useful only for a short period of time (Ciancio *et al.*, 2024).

Our second contribution is that we document heterogeneous effects of BP screening by key socio-demographic groups. Previous research in Ireland has shown that, compared to women and older adults, men and middle-aged adults are less likely to use health care services and preventive care (Barry *et al.*, 2009; Central Statistics Office, 2016). Existing evidence from Ireland has also shown that public patients have more healthcare utilisation (especially more GP visits) than private patients, even when differences in health needs between the two groups of patients are accounted for (Ma and Nolan, 2017). The analysis of this paper indicates that those who typically have fewer interactions with the healthcare services, i.e., men, middle-aged adults, and those without public health care eligibility, are more likely to benefit from the BP screening. Our third contribution is that compared to most previous studies the information provided to respondents in TILDA is closer to how it would be provided in an actual screening programme. This is because in TILDA BP is measured by trained and qualified nurses who provide oral and written feedback to the respondents at the time of the screening.

The remainder of this paper is structured as follows. Section 2 provides a description of the institutional setting, the data and the variables employed in the analysis. Section 3 presents the econometric specifications and Section 4 presents the results. Section 5 concludes.

2 Context and Data

2.1 Institutional setting

Ireland remains the only western European country without universal coverage for primary care, with eligibility to public health care varying according to residency, age, and socioeconomic status. Residents with an income below a defined threshold or with certain medical conditions (32 % of the population in 2021 according to OECD *et al.* (2021)) are eligible for a Medical Card, which provides access to primary care and hospital services free of charge and medicines with limited co-payments. Some other population groups (10 % of the population) have access to a GP Visit Card that covers GP charges but does not cover the costs of medicines or hospital fees. The income thresholds for the GP visit card are 50% higher than for the full medical card (Ma and Nolan, 2017). In 2015, automatic eligibility for a GP visit card was extended to all children under 6 years of age, and all those aged 70+ (Connolly *et al.*, 2023). In 2023, it was extended to children aged 6 and 7. The remaining population (58%), who hold neither a Medical Card nor a GP Visit Card, must cover the costs of accessing GP services themselves (OECD *et al.*, 2021). Costs per GP visit are about EUR 40-65 (OECD *et al.*, 2019).

In Ireland there is no national programme for CVD risk assessment similar to those in place in countries such as Belgium, Germany, Luxembourg, and Switzerland (Murphy *et al.*, 2016). In 2019, a Chronic Disease Management (CDM) Programme was introduced for the management and treatment of specified chronic diseases, including cardiovascular disease. This programme provides additional funding for GPs for the management and treatment of the specified chronic diseases. However, only two groups of people can avail of the programme. The first group consists of those with full public eligibility for GP services, i.e., those with a medical or GP visit card. The second group consists of those already diagnosed with specified chronic diseases.

2.2 Sample

The data used in this paper come from The Irish Longitudinal Study on Ageing (TILDA), which is a nationally representative sample of community-dwelling individuals aged 50 or older in Ireland and their partners of any age (Kearney *et al.*, 2011; Whelan and Savva, 2013). The survey collects detailed information on the economic, health, and social aspects of the respondents' lives in a series of data collection waves once every two years. The study is

harmonised with other international longitudinal studies of ageing, including the Health and Retirement Study (HRS) in the US, the Survey of Health, Ageing and Retirement in Europe (SHARE), and the English Longitudinal Study on Ageing (ELSA).

In TILDA, data are collected via computer-aided personal interviewing (CAPI), a self-completion questionnaire (SCQ) which is designed to collect more sensitive information and a nurse-led clinical health assessment in a dedicated health centre. If unable or unwilling to travel to the dedicated health centre, respondents are offered a shorter, modified assessment in their own home. BP is measured in all assessments, whether carried out in the dedicated health centre or in the respondent's home. All assessments are carried out by qualified and trained nurses.

In this paper, we use data collected in the health assessments carried out in wave 1 (2010) and wave 3 (2014) (Donoghue *et al.*, 2018).[2] The benchmark sample consists of undiagnosed individuals for whom we have valid BP measurements at both assessments in wave 1 and wave 3 (N=2,752). Undiagnosed individuals are those who at wave 1 interview answered "*No*" to the question "*Has a doctor ever told you that you have high blood pressure or hypertension?*".[3]

2.3 Blood pressure (BP) screening and study protocol

BP is measured by a nurse according to a standard protocol. After a period of rest, a digital automated oscillometric BP monitor with an arm cuff (22-42 cm) is used to measure BP in one arm, at heart height, while the respondent is seated comfortably in an upright position. BP is recorded twice while seated with a timed interval of 1 minute between readings. The mean systolic and diastolic readings are obtained from these two measurements (Murphy *et al.*, 2016).

At the end of the health assessment, TILDA respondents receive feedback on a number of possible health issues, including BP.[4] The feedback sheet is given to respondents by the nurse who has carried out the assessment. Respondents are notified about the reference range of normal BP and the interpretation of their measured BP, which is given as "normal" —less than 140/90 mmHg for systolic and diastolic, respectively—, or "abnormal" otherwise.[5] The nurses

[2]The third health assessment, originally planned for 2020, was postponed until wave 6 (2022) due to the occurrence of the Covid-19 pandemic. Data from wave 6 are not available to us.

[3]The full sample that we use for our comparative analysis includes 4,093 respondents, of whom around 32.7% (N=1,341) report a previous doctor diagnosis of hypertension.

[4]They also receive information on their measured height and weight, bone density and visual acuity.

[5]The feedback form for the health assessments conducted in the dedicated TILDA health centre and at home can be found in Appendix Figures A.1 and A.2, respectively. Note that the abnormal BP range for people with diabetes is different (135/85 mmHg for systolic and diastolic, respectively). Our benchmark sample

are trained to deal with abnormal results and respond to any queries relating to the results that a respondent has received. If there is uncertainty or concern on the part of the nurses, they are instructed to contact the TILDA Health Assessment Manager to discuss the matter further. Participants are also noted that those with undesirable results may be at higher risk of some diseases and may wish to consider appropriate lifestyle changes. Participants with high BP are also recommended to have their BP checked again by their own doctor (Kenny *et al.*, 2010).

2.4 Outcome variables

Our outcomes of interest are derived from BP measurements. We consider four outcome variables. The first two capture changes in mean SBP and mean DBP, respectively, between baseline and follow-up. The third outcome variable captures changes in mean arterial pressure (MAP), which is a time-weighted average of the arterial pressure over the whole cardiac cycle (Kundu *et al.*, 2017).[6] The fourth outcome variable is indicator of hypertension derived from those measurements, $\mathbb{1}(\text{mean SBP} \geqslant 140 \vee \text{mean DBP} \geqslant 90)$.

2.5 Descriptives

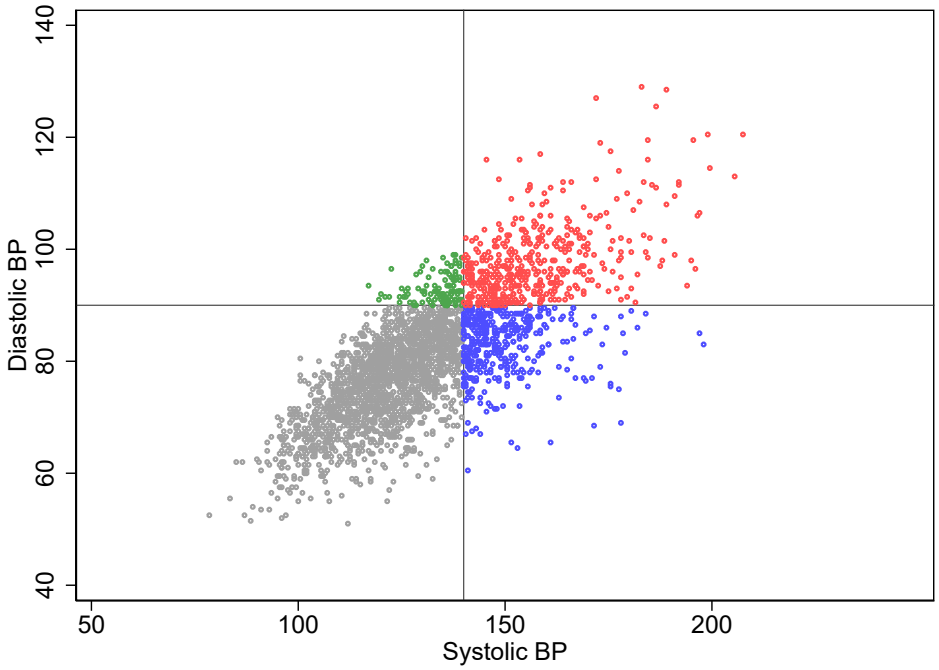
Figure 1 is a scatter plot of the mean DBP measurements against the mean SBP measurements at baseline for undiagnosed respondents. Respondents with a mean DBP of at least 90 mmHg or a mean SBP of at least 140 mmHg are outside the normal range. Blue dots correspond to respondents who have (only) SBP outside the normal range. Green and red dots correspond to individuals with diastolic (only) and both systolic and diastolic BP outside the normal range, respectively. Grey dots correspond to individuals who will serve as controls in our causal identification strategy.

Descriptive statistics of baseline characteristics (top panel), outcome variables (middle panel), and control variables (bottom panel) are presented in Table 1. The top panel of Table 1 shows that the mean SBP and DBP at baseline are equal to about 131 and 82 mmHg,

therefore excludes individuals (N = 104, or 3.64% of the sample) who at baseline report a previous diabetes diagnosis. In the results section, we show that our results are robust to the inclusion of these individuals.

[6] MAP is calculated as follows: $MAP = DBP + 1/3(SBP - DBP)$ (DeMers and Wachs, 2019). The cardiac cycle is the period of time that begins with contraction of the atria and ends with ventricular relaxation. The period of contraction that the heart undergoes while it pumps blood into circulation is called systole. The period of relaxation that occurs as the chambers fill with blood is called diastole. SBP and DBP are indicators of changes in blood flows through the blood vessels. However, they do not provide information on cardiac output, which is the amount of blood the heart pumps in one minute. In contrast, MAP does provide information on cardiac output. MAP has been shown to be an independent predictor of CVDs (GE HealthCare, 2023).

Figure 1: Scatter plot of the systolic and diastolic BP at baseline – undiagnosed individuals



Notes: N=2,752. The x-axis (y-axis) shows average systolic (diastolic) BP at baseline. Blue, green, and red dots identify respondents who are above the systolic (only), diastolic (only), and both systolic and diastolic thresholds (systolic = 140 mmHg, diastolic = 90 mmHg). Grey dots identify responds who are below both thresholds at baseline. The sample includes only individuals who at baseline do not report a previous hypertension diagnosis.

respectively. Mean MAP is equal to 98 mmHg. Daytime MAP between 96 mmHg and 104 mmHg is usually indicative of stage-1 hypertension and values above 104 mmHg correspond to stage-2 hypertension (Melgarejo *et al.*, 2021). About 30.2% of respondents have a mean SBP at or above the 140 mmHg threshold, that is outside the normal range (blue and red dots in Figure 1). This compares to 20.2% of respondents with a mean DBP at or above the respective 90 mmHg threshold (green and red dots in Figure 1). On the basis of the comparison of the mean SBP and DBP with the respective thresholds, a total of 34.4% of respondents can be classified as hypertensive. The middle panel of Table 1 shows that BP characteristics of TILDA respondents remain stable over time, as on average SBP, DBP, and MAP change by 0.1, -1.1, and -0.6 mmHg between baseline and follow-up, respectively. At follow-up, around 32.6% of respondents can be classified as hypertensive, compared to 34.4% at baseline. The bottom panel of Table 1 shows that 55% of the overall sample are female and the average age is equal

Table 1: Descriptive statistics – undiagnosed individuals

	Mean	Std. dev.	p10	p90	Obs
		Baseline characteristics			
SBP	131.331	18.769	109	156	2752
DBP	81.178	10.865	67.5	95.5	2752
MAP	97.895	12.677	82.667	114.333	2752
Hypertension[a]	0.344	0.475	0	1	2752
Above SBP cutoff	0.302	0.459	0	1	2752
Above DBP cutoff	0.202	0.402	0	1	2752
		Outcomes			
Change in SBP	0.140	16.607	-19.5	19.5	2752
Change in DBP	-1.084	10.153	-13.5	10.5	2752
Change in MAP	-0.676	11.581	-14.667	12.667	2752
Hypertension[a]	0.326	0.469	0	1	2752
		Controls (at baseline)			
Female	0.550	0.498	0	1	2752
Age	60.751	8.003	51	73	2749
Age above 80	0.027	0.161	0	0	2749

Notes: SBP, DBP, and MAP stand for systolic blood pressure, diastolic blood pressure, and mean arterial pressure, respectively. [a]: Hypertension is a dichotomous variable that = $\mathbb{1}$(Mean DBP $\geqslant$ 90 $\vee$ Mean SBP $\geqslant$ 140). The cutoff for SBP is 140 and the cutoff for DBP is 90. The sample excludes individuals who at baseline report a previous diabetes diagnosis. p10 and p90 correspond to the 10th and 90th percentiles, respectively. Descriptive statistics including those who at baseline report a previous hypertension diagnosis are reported in Appendix Table B.1.

to 60.8 years old. Around 2.7% of the respondents are aged 80 or older.[7]

Appendix Table B.1 shows corresponding descriptive statistics for the entire sample, which includes both diagnosed individuals, i.e., individuals who at baseline report a previous hypertension diagnosis, and undiagonsed individuals, i.e. individuals who at baseline do not report a previous hypertension diagnosis. Differences between diagnosed and undiagnosed individuals are investigated in Appendix Table B.2. The results of Appendix Tables B.1 and B.2 indicate that many individuals who had been diagnosed with hypertension by a doctor before joining the TILDA study do not have their BP under control. The results of Table B.2 show that around 55.1% of individuals previously diagnosed with hypertension are considered as hypertensive at the time of wave 1 screening according to BP measurement. This compares to 34.4% among undiagnosed individuals. The drop in BP at follow-up is larger among diagnosed individuals as compared to undiagnosed individuals. This suggests that the rate of improvement

[7] Age of the respondents in TILDA is capped at 80. In our econometric specification, we therefore include a dichotomous variable that takes the value 1 if a respondent is aged 80 or older, and 0 otherwise, in addition to controlling for our continuous measure of age.

between baseline and follow-up is higher among diagnosed individuals. The last column of Table B.2 shows the p-values resulting from testing the difference in means between diagnosed and undiagnosed individuals. Means of the variables considered are all statistically different between the two groups, except in the % of females.

3 Econometric specifications

We use a regression discontinuity design (RDD) to estimate effects on outcomes of receiving BP measurements that are outside the normal ranges. Causal identification relies on the assumption that respondents in a narrow range around the cutoff that separate the normal to the abnormal BP ranges are similar on average in both observed and unobserved characteristics such that an outcome would evolve smoothly and continuously through the threshold if no such cutoff were to exist. Any discontinuity in the outcome at the cutoff can then be attributed to the causal effect of crossing the normal BP range cutoffs.

We observe respondents ($i = 1, 2, .., n$) whose BP is measured two times ($t = 1, 2$) at baseline. For each respondent, we have two measurements each of SBP (s_{ti}) and DBP (d_{ti}), from which we compute the mean $\overline{s_i}$ and $\overline{d_i}$. Normal ranges for SBP and DBP are below 140/90 mmHg. The Health Centre Assessment feedback form filled in by the nurse reports the respondent's mean SBP $\overline{s_i}$ and DBP $\overline{d_i}$, as well as the normal range. If the respondent's BP is outside the normal ranges, this would be pointed out to the respondent by the nurse.

3.1 Unidimensional RDD

Most previous RDD evaluations of hypertension screening estimate treatment effects either at only one threshold or separately at the systolic and diastolic thresholds using unidimensional RDD (Chen *et al.*, 2019; Ciancio *et al.*, 2021; Dai *et al.*, 2022; Kämpfen *et al.*, 2023; Rodriguez-Lesmes, 2021; Sudharsanan *et al.*, 2020; Zhao *et al.*, 2013). This is also one of the strategies we adopt. This strategy estimates frontier-specific treatment effect —systolic or diastolic—. To ensure that treatment status (but nothing else) differs on each side of the respective cutoff (140 mmHg for systolic and 90 mmHg for diastolic), respondents who cross the other threshold must be excluded from the sample used for unidimensional RDD. The scope of exclusion encompasses respondents who surpass both cutoffs, as failing to do so would render the crucial continuity assumption required for identification implausible.

The effect of crossing the 140 mmHg systolic cutoff, τ_s, is estimated along the frontier

defined by that threshold and below the DBP threshold, $F_s = (\overline{s_i} = 140, \overline{d_i} < 90)$. The corresponding effect of crossing the DBP cutoff, τ_d, is estimated along the respective diastolic frontier, $F_d = (\overline{d_i} = 90, \overline{s_i} < 140)$. These effects are defined as follows:

$$\begin{aligned}\tau_x &= lim_{\overline{x_i} \downarrow c_x} \mathbb{E}[Y_i(1) \mid \overline{x_i}] - lim_{\overline{x_i} \uparrow c_x} \mathbb{E}[Y_i(0) \mid \overline{x_i}] \\ &= \mathbb{E}[Y_{1i} - Y_{0i} \mid \overline{x_i} = c_x] \end{aligned} \tag{1}$$

where Y_{1i} and Y_{0i} are potential outcomes for respondents right above and right below the cutoff, respectively, and $c_x \in \{c_s, c_d\} = \{140, 90\}$ is the relevant cutoff.

We employ non-parametric estimation techniques to derive these effects. We use local linear regression along with triangular weights generated by kernel functions centered at the threshold. This weighting method assigns greater weights to observations close to the cutoff. To determine the bandwidths of observations on either side of the cutoff, we use the Mean Square Error (MSE) optimal bandwidth selector to set the bandwidths that can differ on each side of the threshold (Calonico *et al.*, 2014a,b, 2015). To calculate standard errors, we employ the heteroskedasticity-robust plug-in residuals variance estimator (Calonico *et al.*, 2017; Kolesár and Rothe, 2018).

The unidimensional RDD approach has significant drawbacks, primarily involving a substantial reduction in both information and statistical power due to the exclusion of a substantial number of observations in each unidimensional RDD. Additionally, the effects identified using this method are frontier-specific and do not reflect the overall average effect on individuals categorized based on their SBP or DBP. To address these limitations, we adopt an alternative strategy that leverages the changes in treatment status at both thresholds simultaneously. This approach allows us to utilize observations from all four quadrants of Figure 1, mitigating the drawbacks associated with the unidimensional approach.

3.2 Binding-score RDD

Binding-score RDD (Reardon and Robinson, 2012) is a centering approach (Wong *et al.*, 2013) that creates a single running variable from the two assignment variables, $\overline{s_i}$ and $\overline{d_i}$, by reducing the dimensions over which treatment is determined from two to one. This technique has already been used to evaluate hypertension screening in South Africa and Germany (Kämpfen *et al.*, 2023; Pedron *et al.*, 2022). This approach is particularly appealing in the case of BP screening because the two assignment variables $\overline{s_i}$ and $\overline{d_i}$ are in the same measurement units (mmHg),

which simplifies the interpretation of both the significance and scale of the estimated effects.

In order to create a single running variable from the two assignment variables, we first center $\overline{s_i}$ and $\overline{d_i}$ relative to their respective thresholds $\overline{x_i}_{,c} = \overline{x_i} - c_x$ with $x = \{s, d\}$. To ensure similar scale in the two variables, we standardize each centered variable on its standard deviation $\overline{x_i}_{,c}^{std} = \overline{x_i}_{,c} \big/ sd_x$.

We can then calculate the maximum distance of these two standardized and centered assignment variables away from their respective cutoff (0), $r_i = max(\overline{s_i}_{,c}^{std}, \overline{d_i}_{,c}^{std})$. r_i corresponds to the new running variable and is the basis of our unidimensional RDD to estimate the effect of the BP screening on BP characteristics at follow-up. Any individuals with $r_i \geqslant 0$ has BP characteristics, either SBP or DBP, outside the normal range. The discontinuity at the cutoff 0 is estimated in the same fashion as the unidimensional RDD (Eq. 1), that is:

$$\begin{aligned} \tau_r &= lim_{r_i \downarrow 0} \mathbb{E}[Y_{1i} \mid r_i] - lim_{r_i \uparrow 0} \mathbb{E}[Y_{0i} \mid r_i] \\ &= \mathbb{E}[Y_{1i} - Y_{0i} \mid r_i = 0] \end{aligned} \tag{2}$$

Although still a local average effect, τ_r is not as local as τ_x for $x = \{s, d\}$. τ_r is an overall average treatment effect at the frontier running along the two thresholds. By incorporating data from all four quadrants as delineated by these thresholds, including individuals above both the SBP and DBP cutoffs (red dots in Figure 1), there is a gain in power, as well as external validity, compared with the unidimensional approach. In implementing the binding-score approach, we select the same estimator (local linear regression), kernel function, optimal bandwidths, and standard error estimator as for unidimensional RDD.

3.3 Identification assumptions

The two empirical strategies above rely on the assumption of imprecise control over the assignment variables. In other words, they rely on the assumption that there is no sorting around the two thresholds. We test the validity of this assumption by examining histograms of the SBP and DBP assignment variables and conducting density tests (McCrary, 2008). Figure C.1 in the Appendix show that there appears to be no discontinuity in the densities of the running variable when considering r_i, $\overline{s_i}$, and $\overline{d_i}$ as running variables.[8] The heat plot of the joint density of SBP and DBP also gives no evidence that suggests any manipulation of recorded BP along

[8] This holds true as well in the various subsamples of main interest we consider in our analysis (undiagnosed males, undiagnosed middle-aged respondents, and undiagnosed individuals without any public health insurance).

these two dimensions (Appendix Figure C.2).[9] Finally, unidimensional RDD and binding-score RDD estimates do not show any discontinuity in the predetermined variables we consider in our analysis at the thresholds (Appendix Table B.3).[10]

4 Results

Table 2 shows estimates of the discontinuities in the outcome variables —change in SBP, DBP, MAP, and the probability of being hypertensive at follow-up— at the BP cutoffs used to determine BP values outside the normal range at baseline.[11] Column 1 presents estimates derived from the binding-score RDD strategy, while Columns 3 and 5 show estimates of the unidimensional RDD using the systolic and diastolic frontier, respectively.

The results of the binding-score approach indicate that undiagnosed individuals at the cutoff experience a large drop in SBP of 5.3 mmHg (p-value=0.027) relative to undiagnosed individuals right below the cutoff. A similar effect is estimated from the discontinuity at the systolic frontier (-5.5 mmHg, p-value=0.062) and at the diastolic frontier (-6.1 mmHg, p-value=0.113). Similar patterns emerge for changes in DBP and MAP, where large and precisely estimated effects are observed. Individuals at the cutoffs experience a drop in MAP at follow-up ranging between about 4.1 mmHg (binding-score, p-value=0.021) and 4.9 mmHg (systolic frontier, p-value=0.019). It is worth noting that these effects are surprisingly consistent across the three different estimation strategies, although they are less precise when considering the diastolic frontier only, probably because of the lower number of treated individuals (green dots in Figure 1). However, these effects do not translate into a statistically significant drop in the probability of being hypertensive at follow-up (last row of Table 2).[12] Corresponding discontinuity plots of these effects are presented in Appendix Figure C.6.

Appendix Table B.5 shows estimates of the discontinuities in the outcome variables for the entire TILDA sample, which also includes individuals who at baseline report a previous diagnosis of hypertension. The results of Table B.5 show that the decrease in BP experienced by diagnosed and undiaogonsed individuals at the cutoff is smaller than the decrease in BP

[9] Corresponding heatplots for undiagnosed males,undiagnosed middle-aged respondents, and undiagnosed inviduals witouth public health insurance can be found in Appendix Figures C.3, C.4, and C.5, respectively.

[10] Again, as shown in Appendix Table B.3, this holds in the various subsamples we consider in our analysis.

[11] Note that these results are derived using a sample that do not include individuals who at baseline report a previous diabetes diagnosis. Appendix Table B.4 show that the results presented in this section are very robust to not imposing this restriction.

[12] Note that in order to assess whether changes in BP translate into changes in the probability of being hypertensive, we derive treatment effects on hypertension using the optimal sample from the MAP analysis.

experienced by undiagnosed individuals only at the cutoff. To illustrate, the results of the binding-score approach show that for the entire sample, SBP decreases by about -1.5 mmHg (p-value=0.404), as compared to -5.3 mmHg (p-value=0.027) for undiagnosed individuals. Drops in DBP and MAP are of similar magnitude to drops in SBP. Moreover, none of the effects of the binding-score approach are statistically significant at conventional levels. The results of unidimensional RDD at the systolic frontier show that individuals at the cutoff consistently experience a larger drop in BP characteristics relative to those just below the cutoff, although once again none of these effects is precisely estimated. Estimates from the diastolic frontier are positive and far from being remotely statistically significant.[13]

Taken together, the results of Table 2 and Table B.5 seem to suggest that screening is effective at lowering BP only among individuals who are unaware of their high BP at the time of screening. One can argue that the feedback provided by the nurse to unaware individuals carries information that is new to the individual and in turn stimulates a change in behaviour and an improvement in BP. As similar effects are not found when diagnosed individuals are included in the sample, which suggests that awareness of hypertension status dilutes somehow the overall effectiveness of the BP screening.

4.1 Heterogeneous effects of BP screening

Results in the previous section show that BP screening is effective at lowering BP at follow-up only among respondents who at baseline do not report a previous hypertension diagnosis. In this section, we document important heterogeneity in these effects across key demographic characteristics, more specifically sex, age, educational attainment, and public health insurance coverage. Figure 2 shows the estimated results for these subgroups by considering a specification that includes linear local polynomials and the set of predetermined control variables. In Figure 2, results derived from the binding-score RDD strategy are displayed in blue. Results derived from the systolic frontier and diastolic frontier are presented in green and red, respectively. Appendix Tables B.8–B.15 show the corresponding estimates.

Our analysis shows that when considering the change in SBP, DBP, and MAP, BP screening appears to be effective for males but not for females. For instance, when considering the SBP frontier only (in green), undiagnosed males experience a drop in SBP and DBP of about

[13] Results presented in Table 2 are derived from a specification that employs local linear regressions and controls for sex and age. Appendix Table B.6 show that these results are robust to local linear regression specifications that do not include any controls and to specifications that use local quadratic regressions instead of linear ones. Appendix Table B.7 shows that the null findings when including individuals who at baseline report a previous hypertension diagnosis are also robust to various econometric specifications.

Table 2: Effects of BP screening among undiagnosed individuals

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
Change in SBP	-5.299**	1067	-5.523*	761	-6.105	470
	(0.027)		(0.062)		(0.113)	
Change in DBP	-3.245**	994	-4.291**	711	-3.061	736
	(0.044)		(0.022)		(0.263)	
Change in MAP	-4.111**	990	-4.890**	724	-4.173	596
	(0.021)		(0.019)		(0.162)	
Hypertension[a]	-0.045	990	-0.097	724	-0.041	596
	(0.671)		(0.426)		(0.773)	

Notes: [a]: Hypertension is a dichotomous variable that = $\mathbb{1}$(Mean DBP $\geqslant$ 90 $\vee$ Mean SBP $\geqslant$ 140) at follow-up. Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local linear regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. All estimates are from specifications that control for age (including a dichotomous variable for age 80 and above) and sex. Corresponding results from specifications without controls, and/or using local quadratic regression are presented in Appendix Table B.6.

8.3 mmHg (p-value=0.043) and 6.7 mmHg (p-value=0.009), respectively. The corresponding effects for females are much smaller (-2.2 mmHg and -0.8 mmHg, respectively) and not precisely estimated (p-value=0.630 and p-value=0.774, respectively). This patterns holds when considering MAP and the probability of hypertension, and is robust to using the binding-score RDD (in blue) and to considering treatment when crossing the diastolic frontier only (in red).

Even larger differences in the effects of the screening emerge when distinguishing between middle-aged and older adults. The cutoff between the two groups is defined by the median age in the sample. Along the SBP frontier (in green), middle-aged individuals just above the cutoff have lower SBP (-12.9 mmHg, p-value=0.002) and DBP (-10.1 mmHg, p-value<0.001) at follow-up relative to those just below it. Older adults just above the cutoff do not experience any changes in their BP characteristics. Differences between the two groups are again very similar when considering changes in MAP instead of SBP and DBP and robust to using the binding-score RDD or the diastolic frontier only strategies. Interestingly, our analysis does not reveal any heterogeneity by educational attainment. We define an individual as highly educated if the highest level of education attained is a leaving certificate or higher[14] (58% of the sample), and lowly educated otherwise (42% of the sample). Moreover, the effects of the BP screening appear large and statistically significant when considering individuals without public

[14]"Higher" includes diploma/certificate, primary degree, or postgraduate/higher degree.

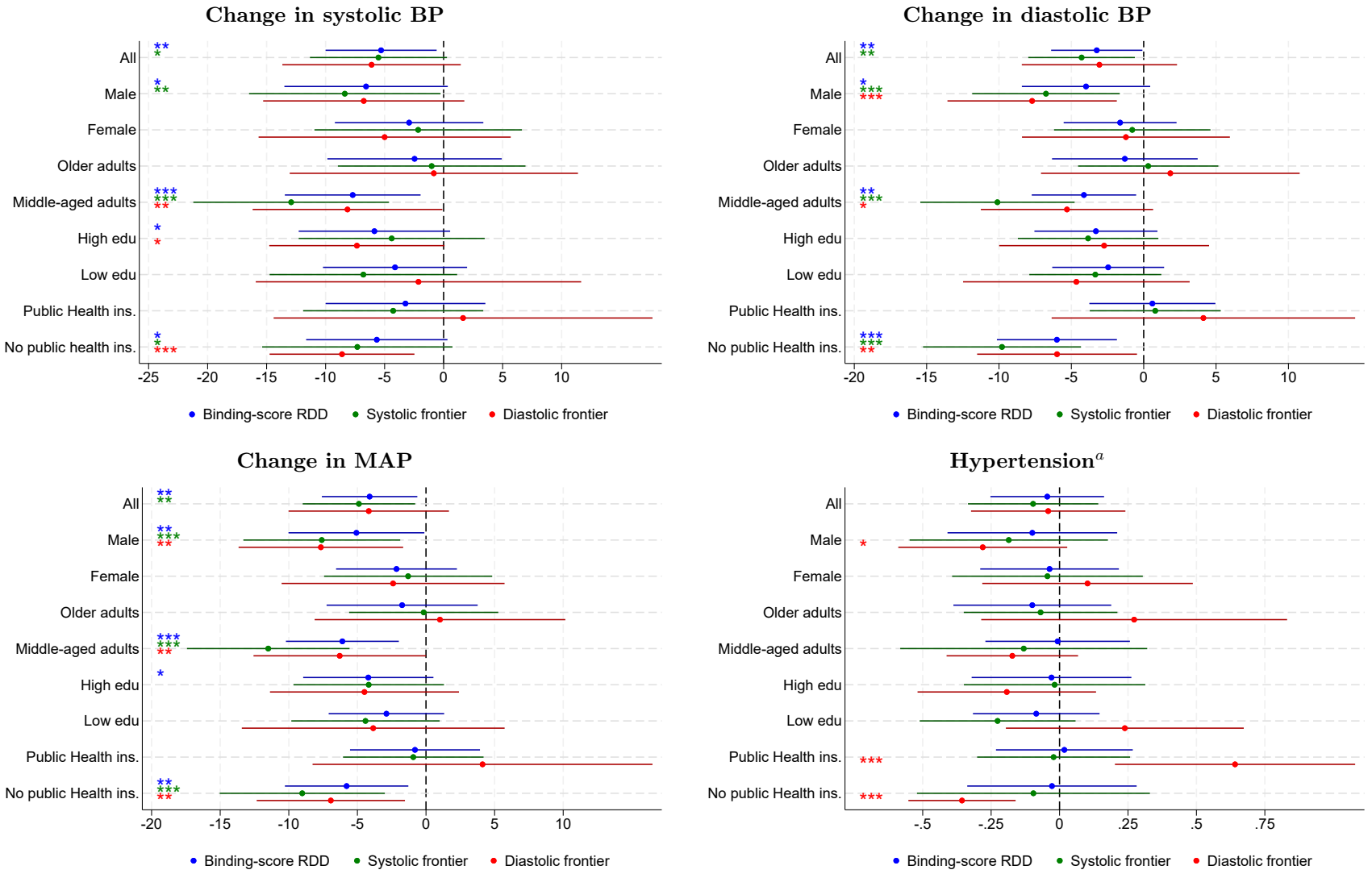
health insurance coverage (65% of the sample).[15] In contrast, such effects are not detected when considering individuals with such health insurance (34% of the sample).[16]

Appendix Tables B.8 for males, B.9 for females, B.10 for middle-aged respondents, B.11 for older respondents, B.12 for respondents with lower educational attainment, B.13 for respondents with higher educational attainment, B.14 for individuals with public health insurance coverage, and B.15 for individuals without public health insurance coverage show that our results are robust to local linear regression specifications that do not include any controls, or to specifications that use local quadratic regressions instead of linear ones.

[15] We consider someone as having a public health insurance coverage if that person has a Full Medical Card or a GP Visit Card.

[16] We obtain non-credible estimates for the effects of BP screening on the probability of having hypertension when considering the DBP frontier and individuals with public health insurance coverage. This is due to the small sample size and the small variation in the outcome close to the frontier.

Figure 2: Heterogeneous effects of BP screening among undiagnosed individuals



Notes: [a]: Hypertension is a dichotomous variable that = $\mathbb{1}$(Mean DBP $\geqslant$ 90 $\vee$ Mean SBP $\geqslant$ 140) at follow-up. Centering (blue), systolic-frontier (green), and diastolic-frontier (blue) RDD estimates obtained from local linear regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. Standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Estimates are derived using undiagnosed individuals at baseline. Details of these results, along with their corresponding estimates from local quadratic regressions are presented in the Appendix. Results for males, females, middle-aged individuals, older adults, individuals with low education, individuals with high education, individuals with public health insurance coverage, and individuals without public health insurance coverage are presented in Appendix Tables B.8, B.9, B.10, B.11, B.12, B.13, B.14, and B.15, respectively.

5 Discussion and conclusion

To the best of our knowledge, this is the first study that investigates the heterogeneous effects of BP screening in a HIC. Using a large and nationally representative sample of older adults living in Ireland, we show that BP screening does not improve the BP characteristics of screened individuals four years after the screening on average. However, we find precise and consistent effects among individuals who at baseline do not report a previous hypertension diagnosis. More specifically, we find improvements in systolic and diastolic BP at follow-up among undiagnosed individuals who at baseline have BP outside the normal range. The results of the binding-score RDD approach indicate that improvements in SBP and DBP are about 5.3 mmHg and 3.2 mmHg, respectively. The binding-score RDD approach determines treatment based on both crossing the systolic and diastolic BP frontiers that define the normal/abnormal range. Results are similar in magnitude when considering both frontiers separately, although they are less precise when the analysis is restricted to the diastolic frontier only. We then show that there exists important heterogeneity in these effects, with larger and more precisely estimated effects for undiagnosed males (ΔSBP = −6.6 mmHg, ΔDBP = −4.0 mmHg), middle-age individuals (ΔSBP = −7.7 mmHg, ΔDBP = −4.1 mmHg), and individuals without public health insurance coverage (ΔSBP = −5.6 mmHg, ΔDBP = −6.0 mmHg). These effects are similar in magnitude, although somewhat lower, to those estimated in LMICs (Chen *et al.*, 2019; Ciancio *et al.*, 2021; Sudharsanan *et al.*, 2020).

Overall, our results show that BP screening improves BP characteristics only among individuals who at baseline do not report a previous diagnosis of hypertension and thus are likely unaware of their condition. This suggests that the health information provided to individuals through the screening might trigger a health response only if that information is new to the respondent. Our study also illustrates the importance of the quality of the health information provided to respondents, as well as the importance of the way the information is conveyed (MacKian, 2003; Zhang, 2014). Our study uses data from TILDA, which has four clear advantages over other large-scale surveys employed in previous studies that looked at the effects of hypertension screening. The first advantage is that BP is measured by trained and qualified nurses as part of a very comprehensive health assessment. In many previous studies, BP is measured by field workers (Ciancio *et al.*, 2021; Sudharsanan *et al.*, 2020). Measurements taken by nurses as opposed to field workers might be less prone to errors, which in turn might reduce the probability of false positive and false negative discovery. The second advantage is

that in TILDA the health assessment feedback is provided to the respondent by the nurse who undertakes the assessment. The feedback and recommendations provided by a nurse might be more credible, trustworthy and persuasive than feedback and recommendations provided by a field worker (Binder *et al.*, 2020; Hsu, 2023; Woods *et al.*, 2017). Respondents who are unaware of their hypertension status and who are notified by a professional healthcare worker that their BP is high might take this warning more seriously and in turn might be more inclined to change health-related behaviour.

The third advantage is that in TILDA the feedback is given to respondents directly after the assessment. This is in contrast to some previous studies such as Pedron *et al.* (2022) where the feedback is given through a letter that is sent to respondents about two weeks after the BP measurements are taken. Immediate feedback might result in better outcomes and corrective behaviours as compared to delayed feedback (Kulik and Kulik, 1988; Metcalfe *et al.*, 2009). The fourth advantage is that in TILDA respondents are clearly informed that they "may be at higher risk of some diseases" if their BP measurements are outside the normal range. This is in contrast to some previous studies which provide less assertive feedback to respondents with abnormal BP measurements (Rodriguez-Lesmes, 2021).[17] Evidence shows that the content of the information provided and its framing matter to a great extent (Gonzalez *et al.*, 2005; Wankar *et al.*, 2015; Wu *et al.*, 2012). The clear and unambiguous feedback given to TILDA respondents is likely to have lower cognitive load of information processing, which might facilitate changes in behaviours by lowering the cognitive effort of making "a good decision" (Gonzalez *et al.*, 2005).

In a nutshell, in contrast to most previous studies on BP screening, in TILDA BP screening is performed by *trained and qualified nurses*, who provide *credible* and *assertive warnings* to respondents whose BP is outside the normal range *directly after the health assessment*. All combined, these factors might explain why our study is the first to show that BP screening is effective in improving the BP characteristics of undiagnosed respondents living in a HIC. We also argue that our results are policy relevant as the screening provided in TILDA is closer to how it would be provided in an actual screening programme, both in terms of measurements (performed by health care professionals) and feedback (provided again by health care professionals at the time of the screening).

[17] For example, the statement given to respondents in the English Longitudinal Study on Ageing (ELSA) with BP measurements outside the normal range reads as follows: *"Your blood pressure is a bit high today. Blood pressure can vary from day to day and throughout the day so that one high reading does not necessarily mean that you suffer from high blood pressure. You are advised to visit your GP within 3 months to have a further blood pressure reading to see whether this is a once-off finding or not"* (Rodriguez-Lesmes, 2021).

Our result that the screening lowers BP among undiagnosed individuals without public health insurance coverage, but not among undiagonsed individuals with public health insurance coverage, deserves further attention. This result is perhaps surprising because individuals without public health insurance coverage face a higher price of medical care and therefore might have less opportunity to respond to the information provided to them at the time of screening. One possible explanation for our finding is that those without public health insurance cover and with BP above the normal range are less likely to believe that they are a "type I error" than those with cover. Those with cover likely have had more access to primary health care and their BP measured before baseline. More frequent interactions with health care providers should increase the likelihood of someone knowing their BP levels. Receiving a warning in TILDA knowing that previous BP measurements were in the normal range might make respondents more likely to believe that the TILDA measurements are a one time off BP measurements and that there is no reason for concern. One can argue that those without cover have less basis for such judgement and are therefore more likely to take the TILDA BP measurement seriously.

Several limitations should be acknowledged. First, while we do find an improvement in BP characteristics for some subgroups of the population, we cannot draw clear conclusions on the mechanisms leading to improvements in BP four years after the screening. In the follow-up survey of TILDA (wave 3), respondents are asked whether in the last two to four years they have been diagnosed with hypertension by a doctor. If their answer is affirmative, then they are also asked whether they are currently taking medication for hypertension[18] and whether they have put in place lifestyle changes (e.g., diet, exercise, etc.) to control their BP.[19] We show in Appendix Table B.17 that BP screening does not have any positive effect on these outcomes (i.e., doctor diagnosis, self-reported medication, and lifestyle changes) for undiagnosed individuals. The screening also does not have any positive effect among undiagnosed males, undiagnosed middle-aged adults, and undiagnosed individuals without public health insurance coverage. One major limitation of this analysis is that the two questions on self-reported medication and lifestyle changes are asked only to respondents who report a diagnosis of hypertension in the last two to four years. It is possible that individuals changed their lifestyle after the TILDA screening without having been diagnosed with hypertension by a

[18] Note that at the end of the interview, interviewers also ask respondents to show them the medications they are currently on. Interviewers ask to see medication packages to transcribe the correct medication names. Up to 20 medications are recorded per participant. We also investigate the effects of the screening on the probability of being currently on hypertensive medication based on this alternative measure of medication. More details are presented in Appendix Tables B.16 and B.17.

[19] Descriptive statistics of these variables are presented in Table B.16.

doctor. Unfortunately, behavioral changes adopted by respondents who have not received a recent diagnosis of hypertension are not captured in our analysis. Therefore, while our results are robust to various sample selection and econometric specifications, we cannot draw clear conclusions on how exactly individuals achieve improvements in their BP characteristics four years after the screening.

Second, by design, the method used in our study uncovers treatment effects that are very local. Effects correspond to changes in BP characteristics among individuals who are at the treatment threshold and not elsewhere on the BP characteristics distribution. Third, there is evidence of possible selective attrition in our analysis. Surprisingly, we find that individuals right above the BP cutoffs are more likely to participate in the follow-up survey than those right below it. However, we discuss and show in Appendix D that even under extreme assumptions about the BP characteristics of those not participating at follow-up, we still obtain effects that are consistent with the effects reported in our main analysis. We are therefore confident that our main conclusions are not driven by selective attrition.

Overall, our study shows that population screening does appear to be effective among those who prior to the screening are unaware of their hypertension status but ineffective when those who are aware of their hypertension status are also screened. The null effect of the screening program on average does not necessarily mean that it is not cost-effective: if the health benefits of improving BP characteristics of males, middle-aged adults, and individuals without public health insurance coverage outweigh the cost of such screening program, then it might still make financial sense to implement it.

Acknowledgments: Researchers interested in using TILDA data may access the data for free from the following sites: Irish Social Science Data Archive (ISSDA) at University College Dublin http://www.ucd.ie/issda/data/tilda/; Interuniversity Consortium for Political and Social Research (ICPSR) at the University of Michigan http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/34315.

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Online Appendix

A Additional materials

Figure A.1: Feedback form received at health assessment center

Participant Name:	
Date of Assessment:	

TEST	FINDING	REFERENCE RANGE	INTERPRETATION
BLOOD PRESSURE	MMHG	LESS THAN 140/90 MMHG LESS THAN 135/85 IN PEOPLE WITH DIABETES	
WEIGHT	kg (st lbs)		
HEIGHT	cm (ft ")		
HEEL BONE ULTRASOUND	T Score	+2 to -1 = NORMAL -1 to -2.5 = REDUCED -2.5 and below = MAY INDICATE OSTEOPOROSIS BUT NEEDS FURTHER ASSESSMENT	
VISION LOGMAR	Right Eye: Left Eye:	0.2 to -0.3 = NORMAL 1.0 to 0.2 = REDUCED	Right Eye: Left Eye

NOTES

The interpretation of findings is based on information from previous studies linking these factors with health risk. Participants with undesirable findings may be at higher risk of some diseases, and may wish to consider appropriate lifestyle changes (e.g. stopping smoking; reducing dietary intake of salt, meat and other sources of animal and other "saturated" fats; increasing physical activity). Some advice leaflets are available from reception. Participants with high blood pressure levels may also wish to have their blood pressure checked again by their own doctor. Please note that local GPs are not part of the TILDA study therefore the normal charge for a consultation with your doctor will apply.

Figure A.2: Feedback form received at home

Participant Name:	
Date of Assessment:	

TEST	FINDING	REFERENCE RANGE	INTERPRETATION
BLOOD PRESSURE	_____ MMHG	LESS THAN 140/90 MMHG LESS THAN 135/85 IN PEOPLE WITH DIABETES	
WEIGHT	_____kg		
HEIGHT	_____ cm		
BLOOD RESULTS WILL FOLLOW BY POST			

NOTES

Participants with high blood pressure may be at a higher risk for heart disease and may wish to consider appropriate lifestyle changes (e.g. stopping smoking; reducing dietary intake of salt, meat and other sources of animal and other "saturated" fats; increasing physical activity). Participants with high blood pressure levels may also wish to have their blood pressure checked again by their own doctor. Please note that local GPs are not part of the TILDA study therefore the normal charge for a consultation with your doctor will apply.

B Additional Tables

Table B.1: Descriptive statistics, including those who at baseline report a previous hypertension diagnosis

	Mean	Std. dev.	p10	p90	Obs
		Baseline characteristics			
SBP	134.676	19.593	111	160.5	4093
DBP	82.431	11.180	68.5	96.5	4093
MAP	99.846	13.089	83.667	116.667	4093
Hypertension[a]	0.412	0.492	0	1	4093
Above SBP cutoff	0.368	0.482	0	1	4093
Above DBP cutoff	0.241	0.428	0	1	4093
		Outcomes			
Change in SBP	-0.547	18.016	-22.5	21	4093
Change in DBP	-1.567	10.799	-15	11	4093
Change in MAP	-1.227	12.457	-16.5	13.333	4093
Hypertension[a]	0.384	0.486	0	1	4093
		Controls (at baseline)			
Female	0.550	0.498	0	1	4093
Age	61.945	8.317	52	74	4087
Age above 80	0.034	0.181	0	0	4087

Notes: SBP, DBP, and MAP stand for systolic blood pressure, diastolic blood pressure, and mean arterial pressure, respectively. [a]: Hypertension is a dichotomous variable that = $\mathbb{1}$(Mean DBP $\geqslant$ 90 $\vee$ Mean SBP $\geqslant$ 140). The cutoff for SBP is 140; the cutoff for DBP is 90. Descriptive statistics excluding those who at baseline report a previous hypertension diagnosis are reported in Table 1 in the paper. The sample excludes individuals who at baseline report a previous diabetes diagnosis.

Table B.2: Differences between diagnosed and undiagnosed individuals

	Diagnosed individuals at baseline			***Undiagnosed individuals at baseline***			***Difference*** Diag. vs Undiag.
	Mean	Std. dev.	Obs	Mean	Std. dev.	Obs	
				Baseline characteristics			
SBP	141.541	19.466	1341	131.331	18.769	2752	0.000
DBP	85.002	11.379	1341	81.178	10.865	2752	0.000
MAP	103.849	13.014	1341	97.895	12.677	2752	0.000
Hypertension[a]	0.551	0.498	1341	0.344	0.475	2752	0.000
Above SBP cutoff	0.506	0.500	1341	0.302	0.459	2752	0.000
Above DBP cutoff	0.322	0.467	1341	0.202	0.402	2752	0.000
				Outcomes			
Change in SBP	-1.957	20.544	1341	0.140	16.607	2752	0.001
Change in DBP	-2.557	11.960	1341	-1.084	10.153	2752	0.000
Change in MAP	-2.357	14.023	1341	-0.676	11.581	2752	0.000
Hypertension[a]	0.503	0.500	1341	0.326	0.469	2752	0.000
				Controls (at baseline)			
Female	0.550	0.498	1341	0.550	0.498	2752	0.991
Age	64.397	8.415	1338	60.751	8.003	2749	0.000
Age above 80	0.049	0.215	1338	0.027	0.161	2749	0.000

Notes: SBP, DBP, and MAP stand for systolic BP, diastolic BP, and mean arterial pressure, respectively. [a]: Hypertension is a dichotomous variable that = $\mathbb{1}$(Mean DBP $\geqslant$ 90 $\vee$ Mean SBP $\geqslant$ 140) at follow-up. The cutoff for SBP is 140; the cutoff for DBP is 90. High BP/hypertension diagnosis is based on the question: "Has a doctor ever told you that you have high BP or hypertension?". Out of the 4,093 respondents for whom we have valid BP measurements in wave 1 and wave 3, 1,341 (32.76%) report at baseline a previous hypertension diagnosis. The last column shows the results (p-values) of tests for the difference (means) in respondent's characteristics between diagnosed and undiagnosed individuals.

Table B.3: Tests for threshold discontinuities in predetermined variables

	Female	N	Age	N	$\mathbb{1}(\text{Age} \geqslant 80)$	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Undiagnosed individuals at baseline			
Unidimensional RDD - Systolic frontier	-0.013	1343	-1.781	809	0.033	1215
	(0.851)		(0.211)		(0.373)	
Unidimensional RDD - Diastolic frontier	-0.114	708	-0.184	741	-0.000	384
	(0.315)		(0.908)		(0.987)	
Binding-score RDD	-0.059	1942	-1.812*	1614	0.016	1602
	(0.306)		(0.082)		(0.563)	
			Undiagnosed males at baseline			
Unidimensional RDD - Systolic frontier			-2.850	466	-0.089	451
			(0.125)		(0.149)	
Unidimensional RDD - Diastolic frontier			0.169	408	-0.012	276
			(0.942)		(0.463)	
Binding-score RDD			-1.983	803	-0.078	676
			(0.173)		(0.130)	
			Undiagnosed middle-aged individuals at baseline			
Unidimensional RDD - Systolic frontier	-0.126	733	0.035	752		
	(0.235)		(0.967)			
Unidimensional RDD - Diastolic frontier	-0.083	648	0.509	557		
	(0.530)		(0.576)			
Binding-score RDD	-0.142*	1056	-0.137	1106		
	(0.078)		(0.818)			
			Undiagnosed individuals without public health insurance			
Unidimensional RDD - Systolic frontier	-0.134	712	-0.654	548	0.025	274
	(0.174)		(0.630)		(0.192)	
Unidimensional RDD - Diastolic frontier	-0.250*	510	-1.836	401	[a]	
	(0.096)		(0.209)			
Binding-score RDD	-0.185**	1024	-0.990	1005	0.004	610
	(0.023)		(0.319)		(0.736)	

Note: RDD estimates using predetermined variables –sex and age– as outcome variables. $\mathbb{1}(\text{Age} \geqslant 80)$ is a dichotomous variable that takes the value 1 if age is equal or greater than 80. Estimates obtained from local linear regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. [a]: not enough variability in the sample to estimate the effects.

Table B.4: Effects of BP screening including individuals with a prior diagnosis of diabetes

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-4.718**	1169	-5.094*	824	-5.710	483
	(0.039)		(0.075)		(0.130)	
Linear with controls	-4.615**	1157	-4.529	861	-5.486	522
	(0.041)		(0.103)		(0.144)	
Quadratic	-5.690**	1659	-5.751*	1391	-6.190	869
	(0.035)		(0.066)		(0.139)	
Quadratic with controls	-5.561**	1674	-5.330*	1453	-5.702	917
	(0.037)		(0.079)		(0.169)	
			Change in diastolic BP			
Linear	-3.064**	1076	-3.681**	781	-3.444	947
	(0.047)		(0.037)		(0.162)	
Linear with controls	-3.099**	1075	-4.008**	758	-2.982	1012
	(0.046)		(0.026)		(0.223)	
Quadratic	-3.705**	1604	-4.628**	1128	-3.451	1229
	(0.043)		(0.032)		(0.214)	
Quadratic with controls	-3.727**	1599	-4.846**	1096	-3.172	1262
	(0.043)		(0.026)		(0.253)	
			Change in MAP			
Linear	-3.746**	1080	-4.302**	774	-4.189	698
	(0.027)		(0.031)		(0.127)	
Linear with controls	-3.745**	1087	-4.258**	781	-3.953	742
	(0.026)		(0.031)		(0.151)	
Quadratic	-4.698**	1573	-4.905**	1204	-4.141	1028
	(0.020)		(0.033)		(0.179)	
Quadratic with controls	-4.719**	1559	-4.811**	1204	-3.933	1108
	(0.019)		(0.036)		(0.204)	
			Hypertension			
Linear	-0.028	1080	-0.076	774	-0.002	698
	(0.782)		(0.520)		(0.987)	
Linear with controls	-0.020	1087	-0.063	781	-0.008	742
	(0.847)		(0.589)		(0.956)	
Quadratic	-0.032	1573	-0.093	1204	0.002	1028
	(0.772)		(0.462)		(0.991)	
Quadratic with controls	-0.022	1559	-0.078	1204	0.003	1108
	(0.844)		(0.529)		(0.986)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. Control variables include age (including a dichotomous variable for age 80 and above) and sex. These estimates are based on a sample that includes individuals who at baseline report a previous diabetes diagnosis but excludes individuals who at baseline report a previous hypertension diagnosis.

Table B.5: Effects of BP screening on outcomes, including individuals who at baseline report a previous hypertension diagnosis

	Binding-score RDD		***Unidimensional RDD***			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
Change in SBP	-1.478	2161	-1.722	1332	1.314	804
	(0.404)		(0.466)		(0.696)	
Change in DBP	-1.654	2115	-2.197	1292	1.642	931
	(0.130)		(0.124)		(0.448)	
Change in MAP	-1.566	2147	-2.086	1271	1.540	864
	(0.199)		(0.200)		(0.530)	
Hypertension[a]	-0.026	2147	-0.050	1271	0.134	864
	(0.710)		(0.576)		(0.290)	

Notes: [a]: Hypertension is a dichotomous variable that $= \mathbb{1}(\text{Mean DBP} \geqslant 90 \vee \text{Mean SBP} \geqslant 140)$ at follow-up. Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local linear regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. All estimates are from specifications that control for age (including a dichotomous variable for age 80 and above) and sex.

Table B.6: Effects of BP screening — robustness checks

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-5.343**	1059	-6.138**	733	-6.277	432
	(0.028)		(0.045)		(0.108)	
Linear with controls	-5.299**	1067	-5.523*	761	-6.105	470
	(0.027)		(0.062)		(0.113)	
Quadratic	-6.497**	1566	-6.615*	1192	-7.032	797
	(0.023)		(0.052)		(0.101)	
Quadratic with controls	-6.499**	1538	-6.141*	1226	-6.661	846
	(0.022)		(0.064)		(0.119)	
			Change in diastolic BP			
Linear	-3.174**	1045	-3.945**	739	-3.567	737
	(0.047)		(0.032)		(0.191)	
Linear with controls	-3.245**	994	-4.291**	711	-3.061	736
	(0.044)		(0.022)		(0.263)	
Quadratic	-4.273**	1484	-5.099**	1081	-3.725	1084
	(0.028)		(0.025)		(0.225)	
Quadratic with controls	-4.473**	1446	-5.320**	1048	-3.333	1122
	(0.022)		(0.020)		(0.282)	
			Change in MAP			
Linear	-4.062**	991	-4.927**	717	-4.401	596
	(0.023)		(0.019)		(0.139)	
Linear with controls	-4.111**	990	-4.890**	724	-4.173	596
	(0.021)		(0.019)		(0.162)	
Quadratic	-5.241**	1480	-5.642**	1113	-4.558	897
	(0.013)		(0.022)		(0.170)	
Quadratic with controls	-5.315**	1447	-5.577**	1113	-4.242	948
	(0.012)		(0.023)		(0.207)	
			Hypertension			
Linear	-0.050	991	-0.111	717	-0.029	596
	(0.639)		(0.368)		(0.851)	
Linear with controls	-0.045	990	-0.097	724	-0.041	596
	(0.671)		(0.426)		(0.773)	
Quadratic	-0.050	1480	-0.145	1113	-0.032	897
	(0.667)		(0.276)		(0.845)	
Quadratic with controls	-0.044	1447	-0.130	1113	-0.039	948
	(0.703)		(0.326)		(0.802)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. Control variables include age (including a dichotomous variable for age 80 and above) and sex. These estimates exclude individuals who at baseline report a previous hypertension diagnosis.

Table B.7: Effects of BP screening including individuals who at baseline report a previous hypertension diagnosis — robustness checks

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-1.561	2136	-1.954	1293	1.437	753
	(0.384)		(0.417)		(0.679)	
Linear with controls	-1.478	2161	-1.722	1332	1.314	804
	(0.404)		(0.466)		(0.696)	
Quadratic	-1.441	2775	-2.182	2075	1.071	1246
	(0.503)		(0.417)		(0.780)	
Quadratic with controls	-1.383	2726	-1.968	2072	1.251	1305
	(0.521)		(0.461)		(0.738)	
			Change in diastolic BP			
Linear	-1.707	2118	-2.143	1293	1.704	933
	(0.120)		(0.132)		(0.429)	
Linear with controls	-1.654	2115	-2.197	1292	1.642	931
	(0.130)		(0.124)		(0.448)	
Quadratic	-1.820	2427	-2.444	1800	1.678	1701
	(0.214)		(0.155)		(0.470)	
Quadratic with controls	-1.819	2430	-2.477	1768	1.483	1645
	(0.214)		(0.151)		(0.535)	
			Change in MAP			
Linear	-1.597	2123	-2.126	1272	1.584	866
	(0.195)		(0.193)		(0.524)	
Linear with controls	-1.566	2147	-2.086	1271	1.540	864
	(0.199)		(0.200)		(0.530)	
Quadratic	-1.580	2538	-2.273	1871	1.711	1500
	(0.318)		(0.231)		(0.523)	
Quadratic with controls	-1.584	2495	-2.232	1868	1.609	1599
	(0.316)		(0.240)		(0.544)	
			Hypertension			
Linear	-0.027	2123	-0.045	1272	0.147	866
	(0.713)		(0.617)		(0.260)	
Linear with controls	-0.026	2147	-0.050	1271	0.134	864
	(0.710)		(0.576)		(0.290)	
Quadratic	-0.006	2538	-0.043	1871	0.169	1500
	(0.947)		(0.657)		(0.206)	
Quadratic with controls	-0.006	2495	-0.045	1868	0.161	1599
	(0.945)		(0.643)		(0.212)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. Control variables include age (including a dichotomous variable for age 80 and above) and sex.

Table B.8: Effects of BP screening on undiagnosed males

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-6.971*	522	-9.402**	332	-7.460*	265
	(0.054)		(0.028)		(0.074)	
Linear with controls	-6.571*	533	-8.374**	347	-6.768	265
	(0.063)		(0.043)		(0.120)	
Quadratic	-8.629**	736	-11.572**	498	-9.336**	400
	(0.039)		(0.021)		(0.038)	
Quadratic with controls	-7.916*	763	-10.325**	509	-9.187**	416
	(0.050)		(0.035)		(0.039)	
			Change in diastolic BP			
Linear	-4.026*	566	-6.600**	315	-7.689***	332
	(0.075)		(0.011)		(0.010)	
Linear with controls	-3.986*	567	-6.752***	305	-7.711***	332
	(0.078)		(0.009)		(0.010)	
Quadratic	-6.272**	703	-8.005***	449	-9.543***	494
	(0.018)		(0.008)		(0.002)	
Quadratic with controls	-6.319**	692	-8.268***	449	-9.236***	494
	(0.018)		(0.006)		(0.002)	
			Change in MAP			
Linear	-5.341**	532	-7.848***	305	-7.763**	289
	(0.037)		(0.008)		(0.010)	
Linear with controls	-5.071**	539	-7.596***	309	-7.661**	296
	(0.045)		(0.009)		(0.012)	
Quadratic	-7.213**	707	-9.254***	447	-9.608***	472
	(0.015)		(0.007)		(0.002)	
Quadratic with controls	-6.931**	709	-9.045***	463	-9.340***	472
	(0.017)		(0.008)		(0.002)	
			Hypertension			
Linear	-0.120	532	-0.214	305	-0.303**	289
	(0.469)		(0.261)		(0.039)	
Linear with controls	-0.099	539	-0.186	309	-0.281*	296
	(0.529)		(0.316)		(0.075)	
Quadratic	-0.124	707	-0.214	447	-0.278*	472
	(0.471)		(0.306)		(0.089)	
Quadratic with controls	-0.103	709	-0.193	463	-0.296*	472
	(0.530)		(0.340)		(0.076)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for age (including a dichotomous variable for age 80 and above).

Table B.9: Effects of BP screening on undiagnosed females

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-3.085	616	-2.520	399	-4.793	273
	(0.340)		(0.581)		(0.382)	
Linear with controls	-2.925	615	-2.158	399	-4.997	274
	(0.362)		(0.630)		(0.359)	
Quadratic	-4.010	874	-4.823	743	-3.921	534
	(0.295)		(0.325)		(0.518)	
Quadratic with controls	-4.036	871	-4.459	745	-3.975	532
	(0.292)		(0.356)		(0.513)	
			Change in diastolic BP			
Linear	-1.577	640	-0.925	393	-1.301	330
	(0.427)		(0.737)		(0.718)	
Linear with controls	-1.630	638	-0.790	393	-1.228	300
	(0.413)		(0.774)		(0.738)	
Quadratic	-2.813	808	-1.902	635	0.238	690
	(0.296)		(0.581)		(0.957)	
Quadratic with controls	-2.935	781	-1.852	616	0.628	635
	(0.280)		(0.598)		(0.890)	
			Change in MAP			
Linear	-2.186	616	-1.539	399	-2.453	297
	(0.331)		(0.623)		(0.560)	
Linear with controls	-2.150	615	-1.303	399	-2.399	274
	(0.339)		(0.677)		(0.563)	
Quadratic	-3.248	810	-2.062	703	-1.519	612
	(0.258)		(0.567)		(0.748)	
Quadratic with controls	-3.372	801	-1.773	683	-1.232	585
	(0.243)		(0.624)		(0.799)	
			Hypertension			
Linear	-0.032	616	-0.051	399	0.122	297
	(0.802)		(0.775)		(0.565)	
Linear with controls	-0.037	615	-0.044	399	0.102	274
	(0.777)		(0.803)		(0.602)	
Quadratic	-0.021	810	-0.007	703	0.148	612
	(0.892)		(0.971)		(0.503)	
Quadratic with controls	-0.027	801	-0.003	683	0.145	585
	(0.862)		(0.985)		(0.488)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for age (including a dichotomous variable for age 80 and above).

Table B.10: Effects of BP screening on middle-aged undiagnosed individuals

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-7.300**	618	-13.064***	317	-8.540**	332
	(0.013)		(0.002)		(0.046)	
Linear with controls	-7.704***	612	-12.918***	332	-8.147**	332
	(0.009)		(0.002)		(0.047)	
Quadratic	-10.214***	845	-14.863***	563	-10.461**	596
	(0.004)		(0.002)		(0.020)	
Quadratic with controls	-10.416***	841	-14.213***	588	-10.127**	596
	(0.003)		(0.003)		(0.021)	
			Change in diastolic BP			
Linear	-3.950**	697	-10.074***	277	-5.471*	386
	(0.032)		(<0.001)		(0.073)	
Linear with controls	-4.130**	686	-10.108***	277	-5.302*	386
	(0.025)		(<0.001)		(0.081)	
Quadratic	-6.842***	816	-10.793***	491	-6.172*	640
	(0.005)		(<0.001)		(0.056)	
Quadratic with controls	-6.960***	827	-11.025***	486	-5.963*	676
	(0.004)		(<0.001)		(0.064)	
			Change in MAP			
Linear	-5.745***	594	-11.605***	263	-6.536**	332
	(0.006)		(<0.001)		(0.045)	
Linear with controls	-6.094***	594	-11.497***	271	-6.289**	332
	(0.004)		(<0.001)		(0.050)	
Quadratic	-8.133***	807	-12.663***	499	-7.561**	596
	(0.002)		(<0.001)		(0.027)	
Quadratic with controls	-8.274***	807	-12.634***	497	-7.328**	632
	(0.001)		(<0.001)		(0.030)	
			Hypertension			
Linear	-0.001	594	-0.119	263	-0.166	332
	(0.992)		(0.610)		(0.168)	
Linear with controls	-0.007	594	-0.131	271	-0.173	332
	(0.959)		(0.570)		(0.159)	
Quadratic	0.003	807	-0.134	499	-0.179	596
	(0.987)		(0.543)		(0.150)	
Quadratic with controls	-0.009	807	-0.136	497	-0.183	632
	(0.954)		(0.535)		(0.140)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age.

Table B.11: Effects of BP screening on older undiagnosed individuals

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-2.424	538	-1.511	430	-1.190	251
	(0.516)		(0.711)		(0.846)	
Linear with controls	-2.462	517	-1.015	420	-0.830	253
	(0.514)		(0.802)		(0.894)	
Quadratic	-2.496	702	-1.730	585	-1.046	374
	(0.567)		(0.716)		(0.886)	
Quadratic with controls	-2.290	702	-1.249	585	-0.958	363
	(0.596)		(0.788)		(0.897)	
			Change in diastolic BP			
Linear	-1.338	458	0.264	423	2.680	263
	(0.602)		(0.915)		(0.551)	
Linear with controls	-1.303	458	0.312	419	1.841	239
	(0.612)		(0.900)		(0.686)	
Quadratic	-2.095	591	-1.983	465	2.592	350
	(0.510)		(0.572)		(0.653)	
Quadratic with controls	-1.972	595	-1.840	464	2.494	326
	(0.533)		(0.598)		(0.672)	
			Change in MAP			
Linear	-1.800	482	-0.365	440	1.855	314
	(0.521)		(0.895)		(0.685)	
Linear with controls	-1.740	474	-0.167	433	1.019	281
	(0.536)		(0.952)		(0.827)	
Quadratic	-2.360	618	-1.787	503	1.321	374
	(0.493)		(0.630)		(0.820)	
Quadratic with controls	-2.200	618	-1.517	503	0.947	349
	(0.519)		(0.678)		(0.875)	
			Hypertension			
Linear	-0.117	482	-0.091	440	0.278	314
	(0.434)		(0.540)		(0.334)	
Linear with controls	-0.100	474	-0.069	433	0.273	281
	(0.498)		(0.628)		(0.339)	
Quadratic	-0.117	618	-0.104	503	0.326	374
	(0.496)		(0.570)		(0.308)	
Quadratic with controls	-0.096	618	-0.077	503	0.338	349
	(0.566)		(0.660)		(0.304)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age (including a dichotomous variable for age 80 and above) and sex.

Table B.12: Effects of BP screening on undiagnosed individuals with low level of education

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-4.152	593	-6.887*	382	-1.030	156
	(0.191)		(0.097)		(0.884)	
Linear with controls	-4.118	598	-6.801*	393	-2.133	153
	(0.186)		(0.093)		(0.762)	
Quadratic	-5.291	803	-8.563*	559	-2.743	292
	(0.178)		(0.076)		(0.718)	
Quadratic with controls	-5.500	790	-8.308*	568	-3.163	309
	(0.158)		(0.076)		(0.679)	
			Change in diastolic BP			
Linear	-2.434	624	-3.047	464	-4.432	255
	(0.217)		(0.179)		(0.266)	
Linear with controls	-2.455	624	-3.343	451	-4.653	255
	(0.213)		(0.151)		(0.244)	
Quadratic	-3.354	782	-5.105	497	-4.431	467
	(0.203)		(0.131)		(0.310)	
Quadratic with controls	-3.430	759	-5.096	480	-4.367	478
	(0.194)		(0.135)		(0.324)	
			Change in MAP			
Linear	-2.859	641	-4.309	414	-3.418	185
	(0.186)		(0.120)		(0.485)	
Linear with controls	-2.885	630	-4.412	414	-3.847	197
	(0.179)		(0.110)		(0.431)	
Quadratic	-4.092	781	-6.302*	518	-3.710	360
	(0.154)		(0.082)		(0.487)	
Quadratic with controls	-4.194	771	-6.148*	514	-3.567	381
	(0.142)		(0.085)		(0.507)	
			Hypertension			
Linear	-0.092	641	-0.238	414	0.306	185
	(0.450)		(0.108)		(0.167)	
Linear with controls	-0.085	630	-0.226	414	0.238	197
	(0.470)		(0.119)		(0.282)	
Quadratic	-0.098	781	-0.294*	518	0.315	360
	(0.507)		(0.093)		(0.167)	
Quadratic with controls	-0.090	771	-0.277	514	0.250	381
	(0.533)		(0.107)		(0.272)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age (including a dichotomous variable for age 80 and above) and sex.

Table B.13: Effects of BP screening on undiagnosed individuals with high level of education

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-5.709*	584	-4.985	388	-8.199**	430
	(0.090)		(0.236)		(0.028)	
Linear with controls	-5.866*	583	-4.401	397	-7.349*	430
	(0.073)		(0.274)		(0.052)	
Quadratic	-6.159*	891	-5.854	708	-9.301**	718
	(0.098)		(0.197)		(0.020)	
Quadratic with controls	-6.445*	874	-5.617	742	-9.119**	735
	(0.080)		(0.192)		(0.021)	
			Change in diastolic BP			
Linear	-3.392	510	-3.848	405	-2.521	468
	(0.127)		(0.122)		(0.490)	
Linear with controls	-3.302	549	-3.841	402	-2.735	467
	(0.128)		(0.121)		(0.460)	
Quadratic	-4.225*	818	-4.877	601	-3.988	690
	(0.099)		(0.101)		(0.322)	
Quadratic with controls	-4.311*	820	-4.580	629	-3.915	689
	(0.088)		(0.117)		(0.339)	
			Change in MAP			
Linear	-4.157*	514	-4.290	388	-4.669	430
	(0.092)		(0.131)		(0.183)	
Linear with controls	-4.206*	542	-4.176	402	-4.485	459
	(0.082)		(0.136)		(0.202)	
Quadratic	-5.061*	831	-5.207	626	-5.997	718
	(0.069)		(0.105)		(0.114)	
Quadratic with controls	-5.131*	826	-4.917	660	-5.872	717
	(0.063)		(0.116)		(0.124)	
			Hypertension			
Linear	-0.027	514	-0.005	388	-0.170	430
	(0.860)		(0.977)		(0.362)	
Linear with controls	-0.029	542	-0.018	402	-0.193	459
	(0.843)		(0.915)		(0.247)	
Quadratic	-0.054	831	0.065	626	-0.183	718
	(0.741)		(0.733)		(0.357)	
Quadratic with controls	-0.059	826	0.036	660	-0.206	717
	(0.713)		(0.843)		(0.256)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age (including a dichotomous variable for age 80 and above) and sex.

Table B.14: Effects of BP screening on undiagnosed individuals with public health insurance coverage

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-3.628	516	-5.019	447	1.981	121
	(0.302)		(0.200)		(0.811)	
Linear with controls	-3.233	521	-4.276	442	1.647	121
	(0.349)		(0.272)		(0.841)	
Quadratic	-4.434	632	-4.770	532	4.415	221
	(0.319)		(0.330)		(0.661)	
Quadratic with controls	-3.839	636	-4.077	538	4.319	237
	(0.382)		(0.394)		(0.661)	
			Change in diastolic BP			
Linear	0.365	518	0.664	448	4.306	160
	(0.870)		(0.774)		(0.440)	
Linear with controls	0.600	506	0.799	443	4.125	147
	(0.787)		(0.729)		(0.441)	
Quadratic	-0.642	611	0.625	539	5.437	334
	(0.825)		(0.834)		(0.363)	
Quadratic with controls	-0.365	614	0.807	538	4.841	333
	(0.898)		(0.785)		(0.433)	
			Change in MAP			
Linear	-0.938	525	-1.290	451	3.097	129
	(0.702)		(0.618)		(0.620)	
Linear with controls	-0.803	527	-0.926	448	4.120	129
	(0.740)		(0.723)		(0.515)	
Quadratic	-1.951	621	-1.507	554	4.832	288
	(0.538)		(0.641)		(0.490)	
Quadratic with controls	-1.509	625	-1.150	555	5.773	297
	(0.627)		(0.721)		(0.415)	
			Hypertension			
Linear	-0.020	525	-0.045	451	0.665**	129
	(0.879)		(0.752)		(0.013)	
Linear with controls	0.018	527	-0.022	448	0.641***	129
	(0.890)		(0.879)		(0.004)	
Quadratic	-0.088	621	-0.089	554	0.720***	288
	(0.580)		(0.586)		(0.009)	
Quadratic with controls	-0.039	625	-0.057	555	0.685***	297
	(0.801)		(0.724)		(0.004)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age (including a dichotomous variable for age 80 and above) and sex.

Table B.15: Effects of BP screening on undiagnosed individuals without public health insurance coverage

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Change in systolic BP			
Linear	-5.590*	632	-7.759*	360	-8.516***	648
	(0.068)		(0.064)		(0.006)	
Linear with controls	-5.662*	624	-7.313*	375	-8.609***	624
	(0.064)		(0.076)		(0.006)	
Quadratic	-6.652*	966	-8.770*	663	-9.651**	709
	(0.054)		(0.057)		(0.011)	
Quadratic with controls	-6.777**	959	-8.323*	660	-9.694**	708
	(0.049)		(0.066)		(0.011)	
			Change in diastolic BP			
Linear	-5.884***	545	-9.655***	299	-6.042**	656
	(0.005)		(<0.001)		(0.031)	
Linear with controls	-5.997***	539	-9.791***	299	-5.988**	656
	(0.005)		(<0.001)		(0.034)	
Quadratic	-7.310***	845	-10.096***	562	-7.231**	773
	(0.003)		(0.001)		(0.019)	
Quadratic with controls	-7.466***	819	-10.265***	542	-7.112**	772
	(0.002)		(0.001)		(0.022)	
			Change in MAP			
Linear	-5.703**	545	-9.161***	308	-6.934**	656
	(0.013)		(0.003)		(0.011)	
Linear with controls	-5.785**	544	-9.019***	306	-6.937**	656
	(0.012)		(0.003)		(0.012)	
Quadratic	-7.055***	875	-9.493***	583	-8.067***	709
	(0.007)		(0.005)		(0.009)	
Quadratic with controls	-7.175***	874	-9.372***	583	-7.992**	737
	(0.006)		(0.005)		(0.010)	
			Hypertension			
Linear	-0.026	545	-0.122	308	-0.358***	656
	(0.867)		(0.573)		(<0.001)	
Linear with controls	-0.028	544	-0.096	306	-0.356***	656
	(0.860)		(0.660)		(<0.001)	
Quadratic	-0.047	875	-0.157	583	-0.359***	709
	(0.761)		(0.440)		(0.008)	
Quadratic with controls	-0.045	874	-0.137	583	-0.365***	737
	(0.770)		(0.499)		(0.007)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age (including a dichotomous variable for age 80 and above) and sex.

Table B.16: Descriptive statistics of mechanisms measured at wave 3 among individuals who at baseline do not report a previous hypertension diagnosis

	Undiagnosed			***Undiagnosed males***			***Undiagnosed middle-aged adults***			***Undiagnosed without public health ins.***		
	Mean	Sd	N	Mean	Sd	N	Mean	Sd	N	Mean	Sd	N
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Diagnosed	0.149	0.356	3746	0.172	0.377	1677	0.131	0.338	2304	0.121	0.327	2307
Medication	0.112	0.316	3746	0.131	0.337	1677	0.086	0.280	2304	0.085	0.280	2307
Antihypertensive	0.088	0.283	3746	0.123	0.329	1677	0.046	0.210	2304	0.059	0.236	2307
Antihypertensive (broader def.)	0.211	0.408	3746	0.265	0.442	1677	0.126	0.332	2304	0.141	0.348	2307
Lifestyle changes	0.047	0.212	3746	0.050	0.218	1677	0.049	0.215	2304	0.048	0.213	2307

Notes: Sample descriptive statistics of the variables we use to explore potential mechanisms measured at wave 3. "Sd" stands for standard deviation and N corresponds to the number of observations. Columns (1)-(3) are based on the entire sample of undiagnosed respondents, and columns (4)-(6) are based on undiagnosed males. Columns (7)-(9) and (10)-(12) are based on undiagnosed middle-aged individuals and undiagnosed individuals without public health insurance, respectively. "Medication" corresponds to a question in which *diagnosed* respondents (at wave 3) are asked whether they are currently taking any medication for hypertension. Moreover, at the end of the interview, interviewers ask respondents to show them the medications they are currently on. "Antihypertensive" is a variable that takes the value one if a respondent shows the interviewer a medication that is specifically designed for hypertension. "Antihypertensive (broader def.)" is a variable that takes the value one if a respondent shows the interviewer a medication that is specifically designed for hypertension, as well as medications that have been shown to improve BP characteristics but that were not designed exclusively to treat hypertension.

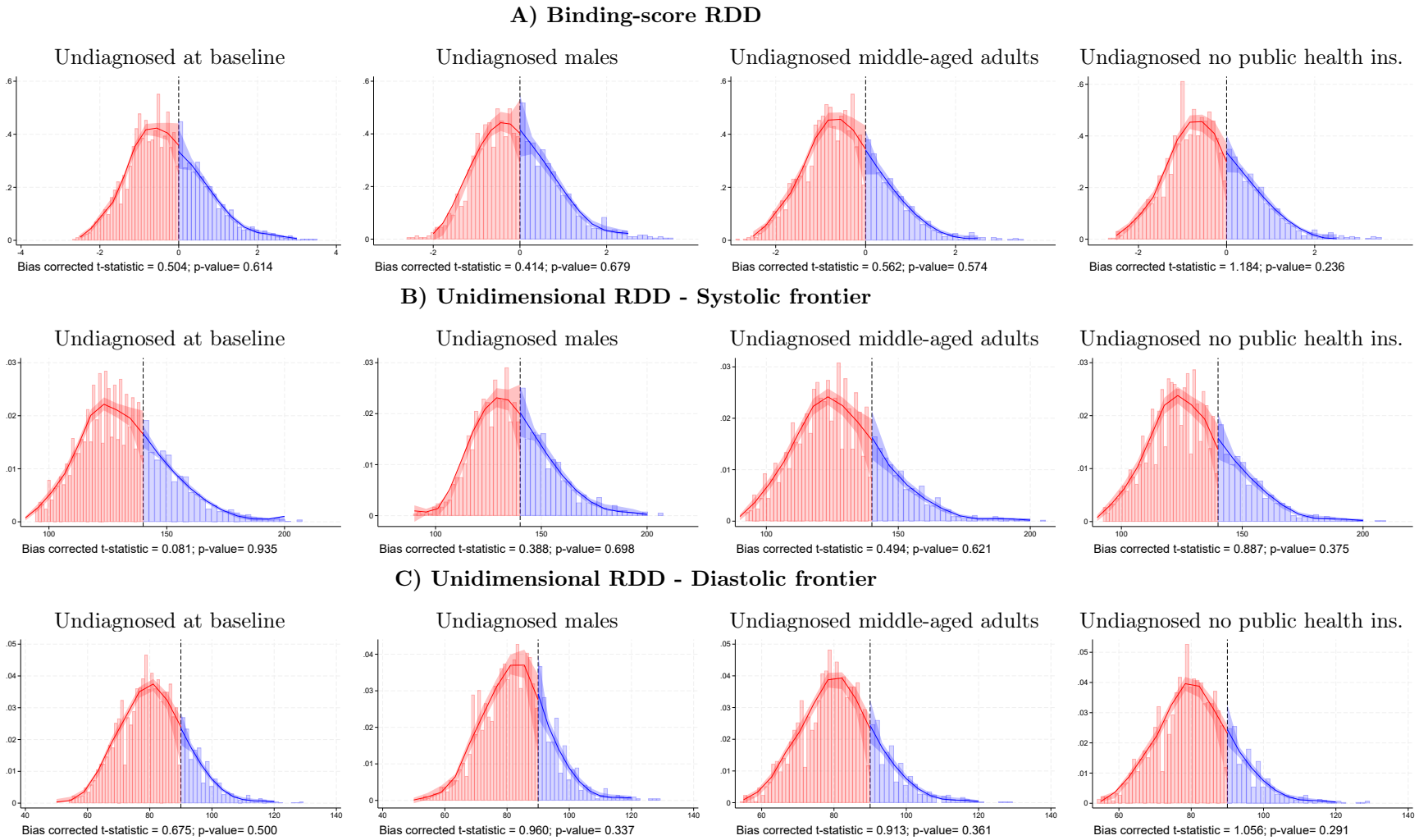
Table B.17: Effects of BP screening on mechanisms measured at wave 3

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
			Undiagnosed individuals at baseline			
Diagnosed	-0.144**	1105	-0.127	814	-0.187**	667
	(0.041)		(0.119)		(0.016)	
Medication	-0.130**	1105	-0.131*	814	-0.148**	667
	(0.042)		(0.080)		(0.035)	
Antihypertensive	-0.011	1105	-0.012	814	-0.040	667
	(0.843)		(0.865)		(0.269)	
Antihypertensive (broader def.)	-0.001	1105	0.025	814	-0.130*	667
	(0.986)		(0.785)		(0.061)	
Lifestyle changes	-0.012	1105	0.015	814	-0.062	667
	(0.742)		(0.702)		(0.143)	
			Undiagnosed males at baseline			
Diagnosed	-0.246**	597	-0.221	344	-0.350***	329
	(0.046)		(0.113)		(0.005)	
Medication	-0.256**	597	-0.248**	344	-0.307**	329
	(0.025)		(0.046)		(0.011)	
Antihypertensive	-0.043	597	-0.053	344	-0.065	329
	(0.692)		(0.673)		(0.384)	
Antihypertensive (broader def.)	0.059	597	0.094	344	-0.153	329
	(0.623)		(0.500)		(0.194)	
Lifestyle changes	-0.024	597	-0.039	344	-0.071	329
	(0.610)		(0.507)		(0.191)	
			Undiagnosed middle-aged individuals at baseline			
Diagnosed	-0.083	667	0.015	311	-0.173*	371
	(0.299)		(0.877)		(0.070)	
Medication	-0.046	667	-0.006	311	-0.113	371
	(0.422)		(0.913)		(0.128)	
Antihypertensive	0.005	667	0.005	311	-0.066	371
	(0.886)		(0.918)		(0.122)	
Antihypertensive (broader def.)	0.034	667	0.087	311	-0.164**	371
	(0.620)		(0.265)		(0.035)	
Lifestyle changes	-0.050	667	0.024	311	-0.094	371
	(0.278)		(0.577)		(0.155)	
			Undiagnosed without public health insurance at baseline			
Diagnosed	-0.111	601	-0.049	343	-0.133*	716
	(0.236)		(0.675)		(0.045)	
Medication	-0.084	601	-0.063	343	-0.074	716
	(0.275)		(0.537)		(0.185)	
Antihypertensive	0.051	601	0.019	343	-0.037	716
	(0.481)		(0.857)		(0.221)	
Antihypertensive (broader def.)	-0.023	601	0.021	343	-0.112	716
	(0.826)		(0.882)		(0.069)	
Lifestyle changes	0.000	601	0.065	343	-0.035	716
	(0.999)		(0.140)		(0.350)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age (including a dichotomous variable for age 80 and above) and sex. These estimates include only undiagnosed. "Medication" corresponds to a question in which *diagnosed* respondents (at wave 3) are asked whether they are currently taking any medication for hypertension. Moreover, at the end of the interview, interviewers ask respondents to show them the medications they are currently on. "Antihypertensive" is a variable that takes the value one if a respondent shows the interviewer a medication that is specifically designed for hypertension. "Antihypertensive (broader def.)" is a variable that takes the value one if a respondent shows the interviewer a medication that is specifically designed for hypertension, as well as medications that have been shown to improve BP characteristics but that were not designed exclusively to treat hypertension.

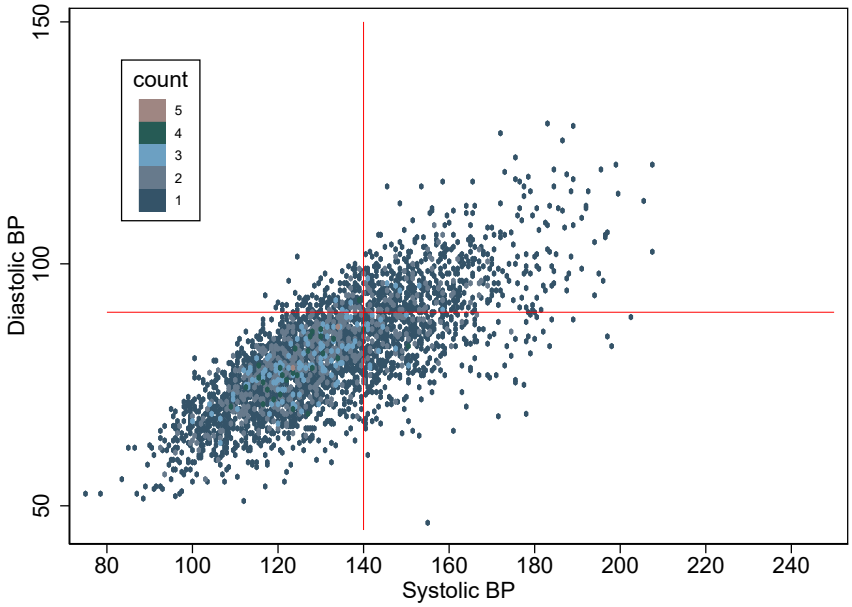
C Additional Figures

Figure C.1: Histograms and tests of threshold discontinuities in running variables



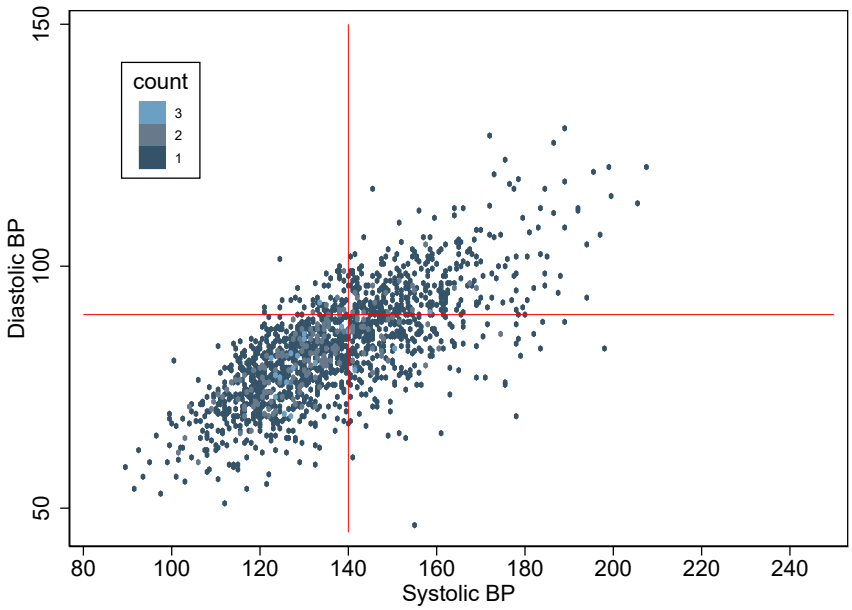
Notes: Plots exclude respondents who at baseline report a previous diagnosis of hypertension. Plots in column 2 are derived using males who were not diagnosed at baseline. Plots in column 3 are derived using middle-aged individuals who were not diagnosed at baseline. All plots show there is no statistically significant discontinuity in either running variables at the respective threshold (0 for centering (Panel A), 140 mmHg for systolic BP (Panel B) and 90 mmHg for diastolic BP (Panel C)). These RDD plots are generated using third order polynomial, triangular weights, and a different optimal bandwidth on each side of the threshold (based on the MSE of each density estimator separately) (Calonico *et al.*, 2015, 2017, 2018; Cattaneo *et al.*, 2018, 2020). Below each RDD plot is the bias-corrected t-statistic and corresponding p-value for test of no discontinuity at the threshold (McCrary, 2008).

Figure C.2: Joint density of the running variables – heat plot for undiagnosed individuals at baseline



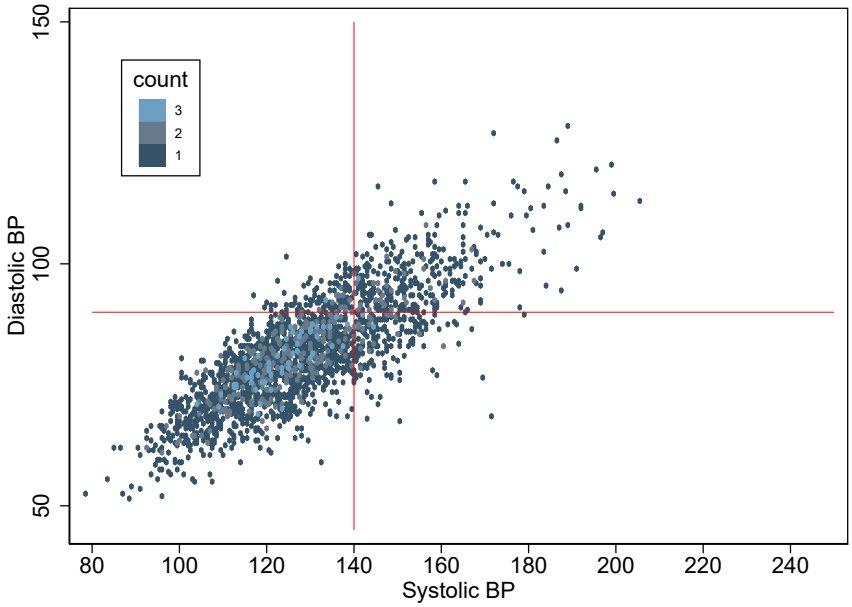
Notes: $N = 2,752$. x-axis (y-axis) shows average systolic (diastolic) BP at baseline. The red lines identify treatment assignment thresholds (140 mmHg for systolic and 90 mmHg for diastolic).

Figure C.3: Joint density of the running variables – heat plot for undiagnosed males at baseline



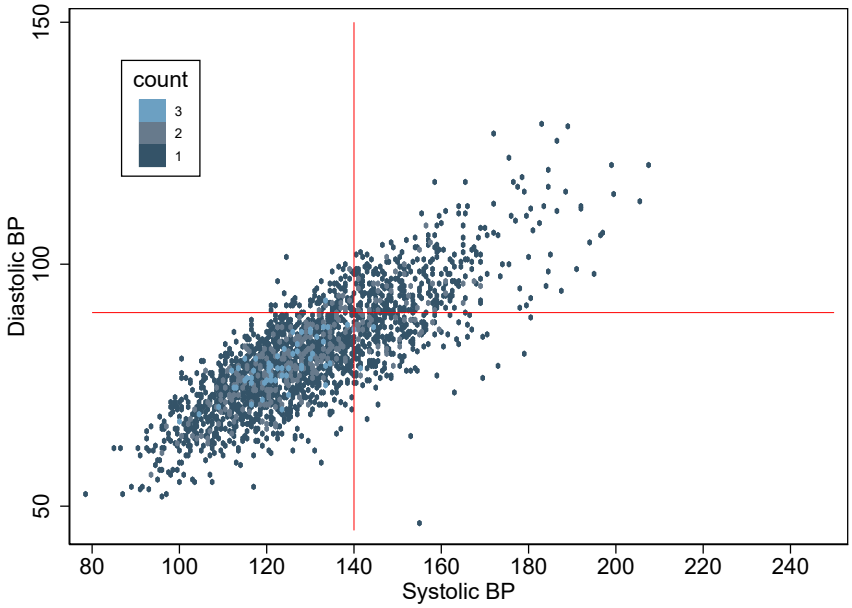
Notes: $N = 1,238$. x-axis (y-axis) shows average systolic (diastolic) BP at baseline. The red lines identify treatment assignment thresholds (140 mmHg for systolic and 90 mmHg for diastolic).

Figure C.4: Joint density of the running variables – heat plot for undiagnosed middle-aged individuals at baseline



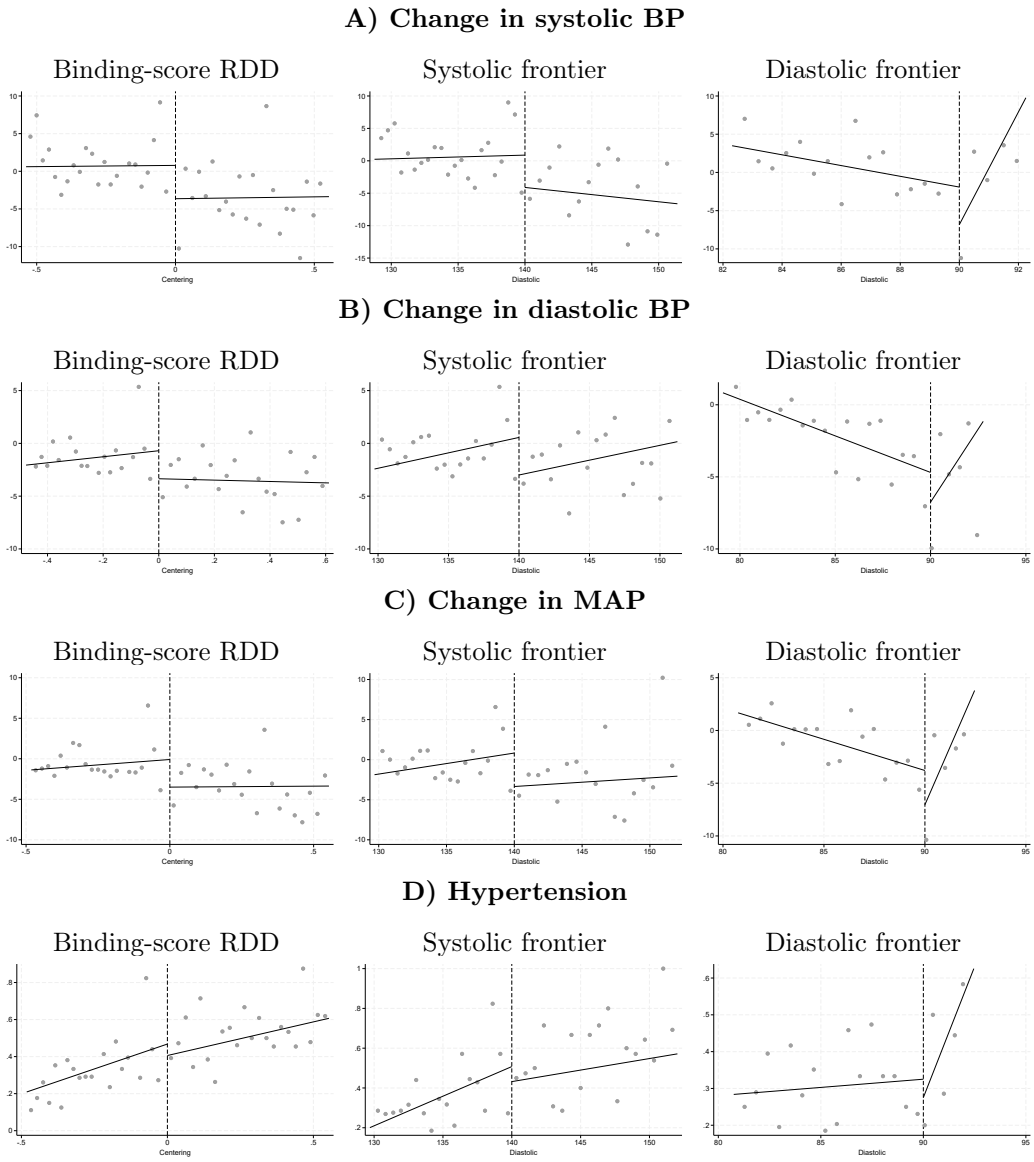
Notes: $N = 1,602$. x-axis (y-axis) shows average systolic (diastolic) BP at baseline. The red lines identify treatment assignment thresholds (140 mmHg for systolic and 90 mmHg for diastolic).

Figure C.5: Joint density of the running variables – heat plot for undiagnosed individuals without public health insurance at baseline



Notes: $N = 2,826$. x-axis (y-axis) shows average systolic (diastolic) BP at baseline. The red lines identify treatment assignment thresholds (140 mmHg for systolic and 90 mmHg for diastolic). This plots include individuals who were not diagnosed with high BP at baseline and who did not have public health insurance.

Figure C.6: Discontinuity plots for undiagnosed individuals at baseline



Notes: Plots of average outcomes conditional on the running variable(s). For these plots, we use local linear regression, triangular kernels, and the MSE optimal bandwidth selector. Each dot is the mean of the respective outcome in a given bin. We use optimal bins obtained with variance evenly-spaced method using spacing estimators (Calonico *et al.*, 2014a,b, 2015, 2017). In all plots, we control for sex and age (including a dichotomous variable for age 80 and above).

D Attrition

There appears to be selective attrition in our sample. Out of the 3,596 undiagnosed individuals with valid BP at baseline, 2,752 have valid BP measurements at follow-up, and 844 have not (23.47%). Surprisingly, Table D.1 shows that having a systolic BP above the normal range increases the probability of being in the sample by about 13-15% point. When combining both SBP and DBP to estimate the effects of having abnormal BP at baseline on the probability of being in the sample at follow-up, we again obtain a positive effect of about 11-12% point, although this effect is statistically significant only at 10% level.

To assess the extent to which this selective attrition can influence our results, we bound our treatment effects by assigning BP characteristics to individuals missing at follow-up. More specifically, akin to Lee (2002) and Horowitz and Manski (1998, 2000), we implement a simulation exercise in which we first predict our outcome variables using the observations available, then impute the values of outcome variables for attrited individuals based on their individual characteristics, allowing these predictions to be different on both sides of the cutoffs. We then add a positive or negative penalty to the predicted outcomes for attrited individuals above the thresholds, with penalties equal to 0.25, 0.5, 1, 2, and 3 standard deviations above or below the values of the predicted outcomes. For instance, when considering the effects at the systolic frontier, and restricting the sample to the one optimally derived in our benchmark analysis, the average predicted change in SBP for the treated individuals is equal to -5.098 mmHg and the standard deviation is equal to 3.139. Imposing a positive penalty of 3 standard deviations implies that attrited individuals who have abnormal SBP at baseline experience on average an increase in SBP of about +4.318 mmHg at follow-up ($+4.318 = -5.098 + 3 \times 3.139$). Relative to the average predicted *drop* of 5.098 mmHg in SBP, assuming an average *increase* in SBP of 4.318 mmHg for attrited individuals is extreme as there is a priori no reason to believe that such large differences in the effects across these two groups exist.[20] We finally estimate our RDD models including in our sample the attrited individuals whose BP characteristics were imputed with positive or negative penalty. Our simulations show that our results are very robust to selective attrition, irrespective of the "direction" of this selection.

Tables D.2, D.3, D.4, and D.5 present the results of these simulations when considering SBP, DBP, MAP and the probability of being hypertensive at follow-up, respectively. Naturally, if attrited individuals whose BP at baseline were above the threshold have better BP characteristics at follow-up —in the sense that the drop is larger for them—, then the overall effects of the screening increases. This can be seen in the first panel of the four tables where we assume that the drop in the outcome variables for each treated attrited individuals is 0.25, 0.5, 1, 2, and 3 standard deviations larger than the average values of treated individuals in observed samples.

Reassuringly, our benchmark results hold when we assume that treated attrited individuals have worse BP characteristics at follow-up as compared to treated individuals for whom we have valid BP measurement at follow-up. Indeed the second panel of Tables D.2, D.3, D.4, and D.5 show that our results are robust even to extreme assumptions about the BP characteristics of the treated attrited individuals. Naturally, the drop in BP characteristics at the threshold decreases as the penalty on the imputed BP characteristics increases, but the overall effects remain rather constant and precisely estimated. For instance, our benchmark analysis shows a drop in SBP of about 5.3 mmHg (p-value=0.027) for undiagnosed individuals at baseline when considering our binding-score approach (see Table 2). When we impose a penalty of +0.25 standard deviation in the

[20] The average predicted change in SBP for untreated individuals is equal to +1.087 mmHg.

Table D.1: Effects of BP screening on the probability of follow-up

	Binding-score RDD		***Unidimensional RDD***			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
Linear	0.105*	1623	0.128**	1155	0.043	517
	(0.067)		(0.048)		(0.731)	
Linear with controls	0.106*	1597	0.141**	1215	0.045	566
	(0.056)		(0.021)		(0.714)	
Quadratic	0.114*	2266	0.137*	2040	0.020	1390
	(0.085)		(0.053)		(0.874)	
Quadratic with controls	0.123*	2285	0.148**	1924	0.023	1387
	(0.053)		(0.032)		(0.855)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age. These estimates include only undiagnosed individuals. The outcome variable is a dichotomous variable that takes the value 1 if a respondent has a valid BP measure at follow-up and 0 otherwise.

SBP characteristics of individuals that were above the threshold at baseline but for whom we do not have BP measurements at follow-up, the effect of the screening remain large and precisely estimated, at -5.03 mmHg (p-value=0.006) (Table D.2). These effects appear large and precisely estimated even in the extreme case where we increase the penalty to up to 3 standard deviations above the SBP average value of the treated group that we observe in our sample ($\beta = -4.19$, p-value=0.023). This results hold true for our four outcome variables and for the three empirical strategy we put in place (binding-score, systolic frontier, and diastolic frontier).

Overall, our simulation exercise shows that selective attrition is unlikely to explain the sizable and precisely estimated effects of the screening. We show that even in the extreme cases where attrited individuals above the cutoff have much worse BP characteristics at follow-up relative to those for whom we have valid BP measurements at follow-up, we still obtain statistically significant large improvement in BP characteristics at follow-up for those who are at the cutoffs that determine normal vs abnormal BP range.

Table D.2: Effects of BP screening on change in SBP, robustness checks to selective attrition

	Binding-score RDD		***Unidimensional RDD***			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
Attrited individuals with better BP characteristics at follow-up						
-0.25 × Std. dev.	-5.188***	1335	-5.645**	961	-4.945*	517
	(0.004)		(0.014)		(0.060)	
-0.5 × Std. dev.	-5.270***	1335	-5.784**	961	-5.242**	517
	(0.004)		(0.012)		(0.045)	
-1 × Std. dev.	-5.440***	1351	-6.066***	942	-5.838**	517
	(0.003)		(0.008)		(0.025)	
-2× Std. dev.	-5.767***	1358	-6.634***	942	-7.034***	517
	(0.001)		(0.004)		(0.007)	
-3× Std. dev.	-6.101***	1358	-7.201***	942	-8.228***	517
	(0.001)		(0.002)		(0.002)	
Attrited individuals with worse BP characteristics at follow-up						
+0.25 × Std. dev.	-5.026***	1311	-5.367**	961	-4.353	517
	(0.006)		(0.019)		(0.104)	
+0.5 × Std. dev.	-4.948***	1311	-5.229**	961	-4.058	517
	(0.006)		(0.022)		(0.133)	
+1 × Std. dev.	-4.794***	1311	-4.954**	961	-3.471	517
	(0.008)		(0.031)		(0.209)	
+2× Std. dev.	-4.494**	1311	-4.412*	961	-2.198	530
	(0.014)		(0.055)		(0.450)	
+3× Std. dev.	-4.187**	1294	-3.874*	961	-0.615	530
	(0.023)		(0.095)		(0.842)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age. These estimates include only undiagnosed individuals. The outcome variable is change in SBP. The specification includes linear trends on both sides of the cutoff and our usual set of control variables.

Table D.3: Effects of BP screening on change in DBP, robustness checks to selective attrition

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
Attrited individuals with better BP characteristics at follow-up						
-0.25 × Std. dev.	-3.431***	1161	-4.397***	841	-2.389	848
	(0.007)		(0.003)		(0.197)	
-0.5 × Std. dev.	-3.464***	1172	-4.467***	841	-2.643	848
	(0.006)		(0.002)		(0.152)	
-1 × Std. dev.	-3.533***	1172	-4.601***	841	-3.159*	848
	(0.005)		(0.002)		(0.087)	
-2× Std. dev.	-3.670***	1197	-4.847***	846	-4.244**	848
	(0.004)		(0.001)		(0.025)	
-3× Std. dev.	-3.816***	1225	-5.109***	859	-5.449***	848
	(0.002)		(0.001)		(0.006)	
Attrited individuals with worse BP characteristics at follow-up						
+0.25 × Std. dev.	-3.361***	1161	-4.258***	822	-1.887	848
	(0.008)		(0.004)		(0.315)	
+0.5 × Std. dev.	-3.325***	1145	-4.190***	822	-1.637	848
	(0.009)		(0.005)		(0.388)	
+1 × Std. dev.	-3.253**	1121	-4.052***	822	-1.145	848
	(0.011)		(0.006)		(0.555)	
+2× Std. dev.	-3.120**	1121	-3.783**	822	-0.190	852
	(0.015)		(0.011)		(0.927)	
+3× Std. dev.	-2.967**	1104	-3.506**	809	0.751	852
	(0.021)		(0.020)		(0.736)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age. These estimates include only undiagnosed individuals. The outcome variable is change in DBP. The specification includes linear trends on both sides of the cutoff and our usual set of control variables.

Table D.4: Effects of BP screening on change in MAP, robustness checks to selective attrition

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
Attrited individuals with better BP characteristics at follow-up						
-0.25 × Std. dev.	-4.340***	1121	-4.882***	841	-3.636*	612
	(0.002)		(0.003)		(0.074)	
-0.5 × Std. dev.	-4.392***	1121	-4.957***	841	-3.854*	612
	(0.002)		(0.002)		(0.057)	
-1 × Std. dev.	-4.482***	1145	-5.111***	846	-4.292**	612
	(0.001)		(0.002)		(0.033)	
-2× Std. dev.	-4.685***	1161	-5.421***	846	-5.170**	612
	(0.001)		(0.001)		(0.011)	
-3× Std. dev.	-4.886***	1172	-5.734***	846	-6.049***	612
	(<0.001)		(0.001)		(0.004)	
Attrited individuals with worse BP characteristics at follow-up						
+0.25 × Std. dev.	-4.236***	1121	-4.733***	841	-3.155	625
	(0.002)		(0.004)		(0.125)	
+0.5 × Std. dev.	-4.184***	1121	-4.660***	841	-2.852	625
	(0.003)		(0.004)		(0.168)	
+1 × Std. dev.	-4.080***	1104	-4.513***	841	-2.303	625
	(0.004)		(0.006)		(0.273)	
+2× Std. dev.	-3.867***	1104	-4.214**	841	-1.316	625
	(0.006)		(0.010)		(0.550)	
+3× Std. dev.	-3.659***	1091	-3.899**	841	-0.389	625
	(0.010)		(0.018)		(0.867)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age. These estimates include only undiagnosed individuals. The outcome variable is change in MAP. The specification includes linear trends on both sides of the cutoff and our usual set of control variables.

Table D.5: Effects of BP screening on the probability of being hypertensive, robustness checks to selective attrition

	Binding-score RDD		*Unidimensional RDD*			
		N	Sys front.	N	Dia front.	N
	(1)	(2)	(3)	(4)	(5)	(6)
Attrited individuals with better BP characteristics at follow-up						
-0.25 × Std. dev.	-0.039	1789	-0.020	1409	-0.005	553
	(0.446)		(0.767)		(0.954)	
-0.5 × Std. dev.	-0.044	1789	-0.024	1409	-0.011	553
	(0.383)		(0.723)		(0.903)	
-1 × Std. dev.	-0.055	1817	-0.031	1409	-0.024	553
	(0.274)		(0.637)		(0.786)	
-2× Std. dev.	-0.078	1844	-0.047	1401	-0.051	553
	(0.121)		(0.481)		(0.572)	
-3× Std. dev.	-0.099**	1882	-0.064	1401	-0.078	543
	(0.046)		(0.351)		(0.392)	
Attrited individuals with worse BP characteristics at follow-up						
+0.25 × Std. dev.	-0.028	1766	-0.012	1409	0.004	553
	(0.590)		(0.859)		(0.963)	
+0.5 × Std. dev.	-0.022	1766	-0.008	1409	0.009	553
	(0.667)		(0.905)		(0.922)	
+1 × Std. dev.	-0.011	1749	-0.000	1409	0.018	553
	(0.825)		(0.998)		(0.841)	
+2× Std. dev.	0.010	1724	0.015	1422	0.037	553
	(0.851)		(0.817)		(0.689)	
+3× Std. dev.	0.032	1709	0.031	1422	0.055	553
	(0.552)		(0.645)		(0.558)	

Notes: Centering (column 1), and frontier-specific RDD estimates (systolic frontier in column 3 and diastolic frontier in column 5) obtained from local regression, with triangular kernels and optimal bandwidths on each side of the threshold using the MSE optimal bandwidth selector. p-values in parentheses derived from standard errors that are heteroscedasticity-robust with * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. N is the effective number of observations used in estimation. We control for sex and age. These estimates include only undiagnosed individuals. The outcome variable is the probability of being hypertensive. The specification includes linear trends on both sides of the cutoff and our usual set of control variables.