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Expectations About Others' Values and Actions Drive Green Pension Preferences By Shaping Efficacy Beliefs

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Abstract: Pension funds are among the world's largest investors, and how they invest carries significant environmental consequences. In many jurisdictions funds may weigh beneficiaries' preferences in setting sustainable investment policy, yet such preferences may not be a simple readout of how much people value the environment. The current paper investigates what underlies green pension preferences in a preregistered study of a sample of Dutch adults ($N = 531$), in which participants allocated hypothetical pension contributions between a sustainable and a conventional fund under an explicit return–emissions trade-off. As expected, participants who valued the environment more allocated more to green funds. But allocation was equally predicted by personal outcome expectancy—the belief that green investing can help reduce climate change—which was in turn shaped by perceptions of what others value. These perceptions had no direct effect on allocation, so others' values mattered not as social influence but as information about what could be achieved. Exploratory analyses revealed a different process when participants allocated on another's behalf, where perceived group values predicted allocation directly. Green pension preferences thus reflect not only environmental values but beliefs about efficacy and about other people.

1. Introduction

Pension funds are among the largest institutional investors in the world, managing the retirement savings of hundreds of millions of people. Given the scale of capital involved, how they invest carries significant environmental consequences ¹: their portfolios can drive substantial emissions, but that same capital can also help finance a sustainable transition.

Funds increasingly face the question of how far to pursue environmentally sustainable investing ², with practice still varying widely across funds ³. In many jurisdictions, occupational funds are governed by the prudent person rule, which requires investing in beneficiaries' interest and permits sustainability considerations if beneficiaries prefer them and if doing so does not harm their other interests ⁴. Because the prudent person rule is an open norm, it allows for a wide range of allocations rather than a single "correct" portfolio. Many funds already aim to reflect beneficiary broader preferences, including those related to sustainability, with some surveying members to gauge them ². This is likely to become more central in the years ahead: a November 2025 proposal to revise the European Union's occupational-pension rules suggests integrating members' sustainability preferences where these can be gauged ⁵. Understanding what beneficiaries actually prefer with respect to sustainable investing is therefore increasingly important. That is the question we take up: What underlies green pension preferences, and what has to be in place for them to translate into support for sustainable pension investing?

One natural answer is that green preferences simply express personal values, which reflect the general and desirable goals people strive for in life ⁶. This fits a large body of research showing that personal values underlie many of people's actions and decisions ⁶, including sustainable ones, and that biospheric values—the importance a person places on protecting nature—are a highly consistent predictor of environmentally-friendly choices ^{7–10}. Extending this to the pension context, we expect that people who value the environment more strongly are also more likely to allocate part of their pension to green funds, since doing so expresses and serves what they care about. Initial supporting evidence for this claim comes from research which has shown that Dutch pension fund participants who prioritize postmaterialist aims (a value orientation that also encompasses environmental concern) are more willing to pay for sustainable investments ¹¹.

At the same time, we argue that a sole focus on personal values is incomplete. Whether people prefer a green pension also depends on whether they believe it can accomplish anything. Even a deeply held environmental value may not translate into action if people doubt it will have any effect ^{12,13}. This belief that a given action contributes to a desired outcome is also called personal outcome expectancy ^{14–}

¹⁶; in our context, it is the belief that investing one's own pension in green funds can help reduce climate change. We argue that this belief, too, shapes support for sustainable pension investing.

Judging whether an action is effective, however, is difficult—even for experts. Lay decision-makers rarely have the necessary information to estimate the impact of different climate actions accurately ^{17,18}, and so lean on cues ¹⁷. One cue is what they personally value: because effectiveness is hard to gauge, what people consider important can color what they judge to be effective ¹⁹. Caring about an outcome can also make people more optimistic about bringing it about, so that those who value the environment more may see their own green investment as more likely to make a difference. Personal values may thus work indirectly as well, raising the expectation that investing one's own pension in green funds can help reduce climate change.

For a collective endeavor like pension investing (and mitigating climate change), though, effectiveness depends on more than oneself: it depends on others' preferences too. Beneficiaries do not invest their pensions themselves. Instead, contributions are pooled and invested on their behalf, in their interest.¹ A fund is more likely to move toward a sustainability policy the more beneficiaries consider this in their interest. In this respect sustainable pension investing mirrors climate change policy, where beliefs about others' policy preference have been shown to be significantly associated with policy support ²⁰. People can hardly observe what others would choose for their pension (and are unlikely to talk about it either), but they form expectations about it ²¹; and just as one's own values guide one's behavior, others' values are informative about what they are likely to prefer ²². As such, we propose that beneficiaries gauge how many others will choose green funds from what they perceive others value: believing that others value the environment implies they will also prefer green pensions, a belief known as collective efficacy ^{15,23}. Because one's own preference for green pensions matters only when enough others join in, collective efficacy beliefs (believing that many others would choose green pensions) in turn raise outcome expectancy beliefs (believing that one's own green pension can help reduce climate change) which is what makes a green preference worth acting on.

Notably, our account differs from most work on how perceptions of others shape climate action. That work locates the effect in social influence: people align their attitudes and behavior with those around them ^{21,24–27}. But social influence depends on a present and personally relevant group to align with,

¹ This is most pronounced in countries such as the Netherlands, Denmark, and Sweden, where pension contributions are pooled, invested and managed by pension funds. But the collective character extends beyond such systems: even where individuals invest their own pension savings—say, in a sustainable ETF—the impact of doing so still depends on enough others making similar choices.

and pension decisions are solitary and private, made largely unobserved by others, in large collectives of people unknown to each other. The efficacy route we propose needs no such group: others' values matter not because one acts for them or like them, but because what they are likely to do bears directly on whether one's own action will be impactful.

Taken together, we propose that two efficacy beliefs—personal outcome expectancy and collective efficacy—form a chain through which values translate into green pension preferences (see Figure 1). Perceptions that others value the environment raise the sense that enough others prefer green funds (i.e. collective efficacy), which raises the sense that one's own preference is worthwhile (i.e. personal outcome expectancy), which in turn drives the allocation of one's pension to green funds.² Personal environmental values enter twice: directly, in that valuing the environment predicts green allocation on its own, and indirectly, by shaping personal outcome expectancy—which is also shaped by perceived group values^{29,30}. This mediating structure is consistent with evidence that collective efficacy's direct effect on pro-environmental behavior is weak, yet it correlates strongly and reliably with personal outcome expectancy^{15,31,32}, suggesting its influence may operate through outcome expectancy rather than directly. Our preregistered hypotheses are:³

H1. Personal outcome expectancy (i.e. the belief that one's own pension investment can meaningfully reduce climate change) mediates the effect of personal values on green-fund allocation.

H2. Personal outcome expectancy is jointly shaped by (a) the participant's own personal values and (b) their collective efficacy beliefs.

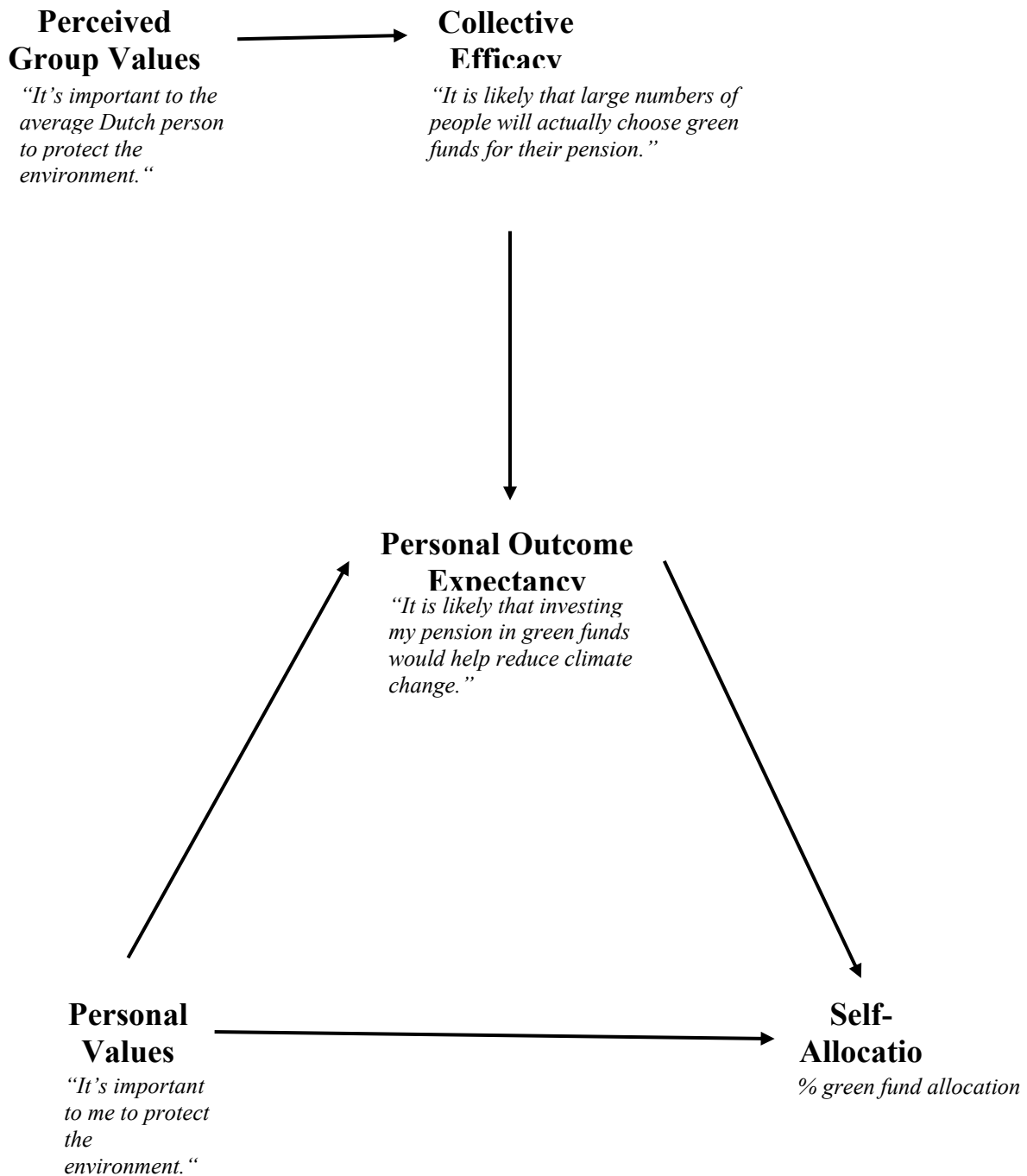
H3. Collective efficacy beliefs are shaped by the participant's perception of others' values (perceived group values), forming a serial chain: perceived group values → collective efficacy → personal outcome expectancy → allocation.

Figure 1

Serial Mediation via Personal Outcome Expectancy

² Efficacy beliefs are defined in various, sometimes inconsistent ways in the literature²⁸. Following the European Social Survey Round 8, we define collective efficacy as the belief that enough other people will take a required action (here, choosing green funds) and personal outcome expectancy as the belief that a given action (here, choosing investing one's pension in green funds) contributes to a particular outcome or goal (here, reducing climate change).

³ We split our preregistered hypothesis into three components for readability



Note. The figure illustrating our preregistered hypothesis additionally included a moderation path (personal outcome expectancy moderating the personal values → allocation relationship). This moderation was not part of our stated hypothesis; we treat it as exploratory. Because the interaction is statistically symmetric, we report it below in the equivalent form of personal values moderating the outcome expectancy → allocation relationship.

We collected survey data in the Netherlands as it offers an instructive case. Dutch pension funds managed roughly €1.93 trillion in assets in 2024³³, the prudent person rule is codified in the Dutch Pension Act³⁴, contributing to a pension plan is mandatory and funds must report annually on how they incorporate environmental, social, and governance (ESG) criteria. Dutch pension funds have explicitly committed to involving participants in sustainable investing through the Pension Funds Code³⁵ and the sector-signed International Socially Responsible Investment Covenant³⁶. In our online study, participants allocated hypothetical pension contributions between a sustainable "green" fund and a conventional "brown" fund under an explicit return–emissions trade-off. They completed this allocation four times, each for a different beneficiary—all Dutch pensioners collectively, themselves, another Dutch person, and their future self—and rated their own and other beneficiaries' values along with their collective efficacy and personal outcome expectancy beliefs.

2. Results

Analyses were conducted in R (version 4.6.0., R Core Team, 2026) and JASP (version 0.18.3.0; JASP Team, 2026). Means and standard deviations for the green fund allocation outcomes, personal outcome expectancy, collective efficacy, and biospheric value scores (personal and perceived values of others) are reported in Table 1 as well as all zero-order correlations among all model variables. Notably, personal outcome expectancy correlated more strongly with green allocation than personal biospheric values did (see Table 1), a pattern we examine directly with a mediation analysis below. Many participants rated their own biospheric values higher than those they perceived in the average Dutch person (see Fig. 2).

Table 1

Descriptive Statistics and Zero-Order Correlations Among Study Variables

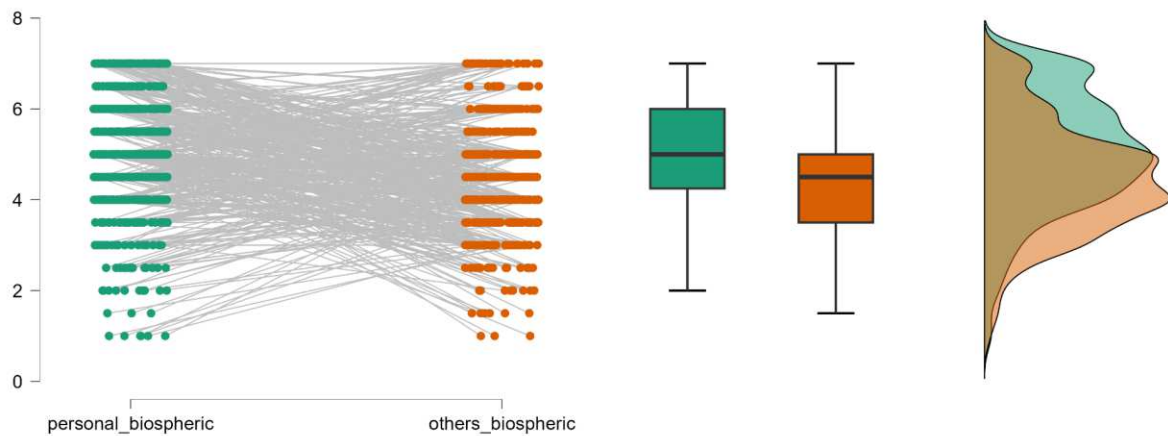
Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Personal biospheric values	5.11	1.27							
2. Others biospheric values	4.42	1.23	0.44						
3. Collective efficacy	3.54	1.42	0.24	0.38					
4. Personal outcome expectancy	3.98	1.57	0.37	0.32	0.49				
5. Green allocation for collective	50.92	27.75	0.37	0.24	0.29	0.46			
6. Green allocation for self	49.12	30.78	0.40	0.23	0.30	0.55	0.85		

7. Green allocation for future self	51.04	29.73	0.37	0.24	0.30	0.53	0.82	0.87	
8. Green allocation for others	42.59	23.78	0.15	0.37	0.39	0.32	0.44	0.45	0.51

Note. $N = 531$. Green allocation was measured on a scale from 0 to 100. It reflects the percentage of pension money a participant assigned to the green (sustainable) rather than the brown (conventional) fund, with 50 representing an equal split. Higher values thus indicate a stronger preference for sustainable investing. All other variables were measured on a scale from 1 to 7, with higher values indicating stronger agreement.

Figure 2

Personal Versus Perceived Biospheric Values



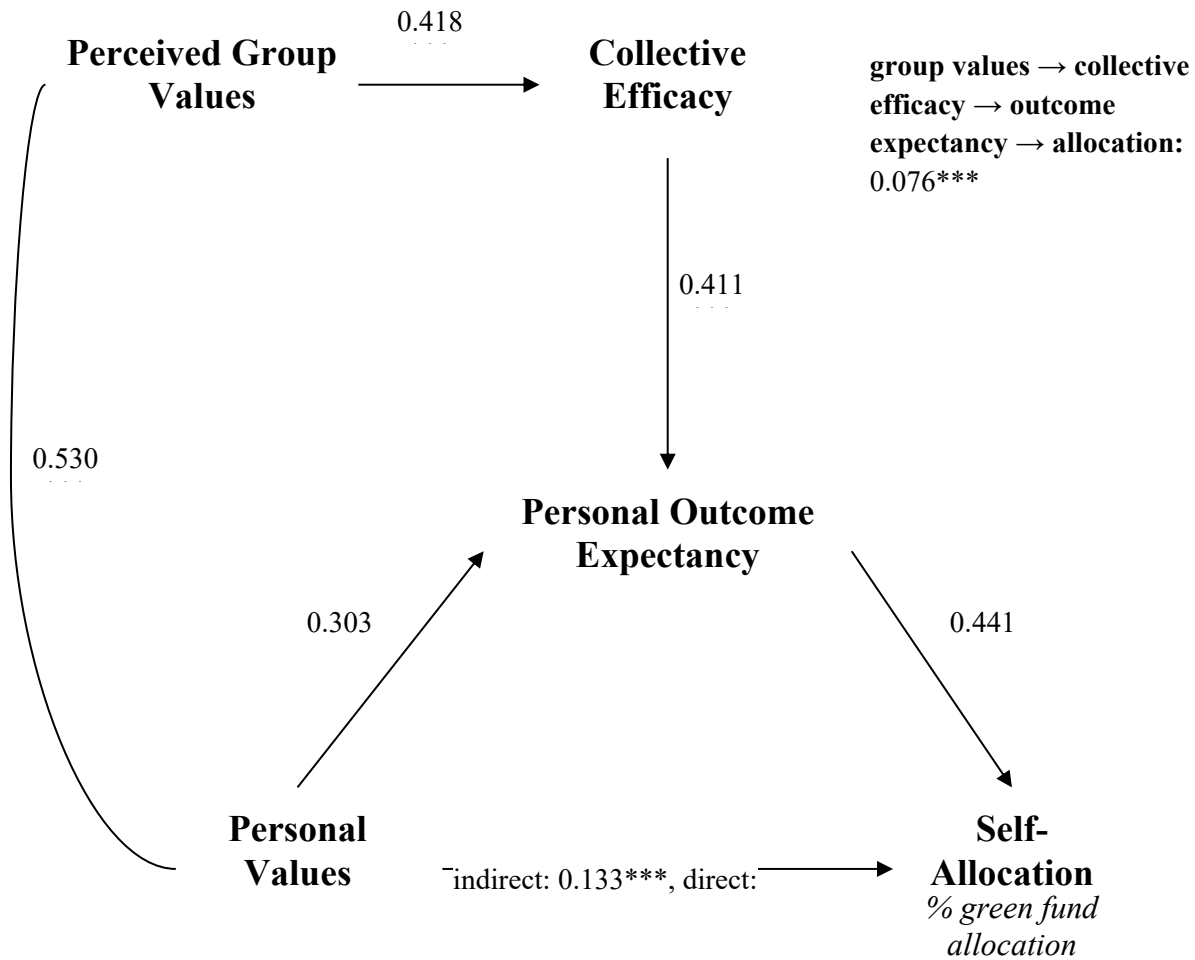
Note. Personal biospheric values are shown in green and perceived biospheric values of others in orange ($N = 531$). The left panel shows individual paired observations, with grey lines connecting each participant's two ratings; the centre panel shows box plots (median, interquartile range, and whiskers); and the right panel shows the distribution of each variable as a density curve.

2.1 Deciding for Oneself: Efficacy Carries the Effect of Values

Following our preregistered analysis plan, we used structural equation modeling with the lavaan package in R (version 0.6-21; Rosseel, 2012) to test the model depicted in Figure 1. We find support for our hypotheses: personal outcome expectancy mediated the association between personal values and green-fund allocation, and this expectancy was in turn shaped both by participants' own values and by collective efficacy, which itself reflected perceptions of others' values (see Fig. 3).

Figure 3

Mediation Analysis Results for Self-Allocation



Note. Standardized estimates for all direct, indirect, and total effects. * $p < .05$; ** $p < .01$; *** $p < .001$.

The model fit the data well, $\chi^2(11) = 32.70$, $p < .01$; CFI = .984. TLI = .970, SRMR = .027, RMSEA = .061, explaining about 35% of the variance in self-allocation, 32% in personal outcome expectancy, and 17.5% in collective efficacy. Personal values had a significant total effect on self-allocation ($\beta = .39$, $p < .001$), comprising a direct effect ($\beta = .26$) and an indirect effect through personal outcome expectancy ($\beta = .13$, both $p < .001$). Each link in the hypothesized serial chain held: personal values predicted outcome expectancy ($\beta = .30$), which predicted allocation ($\beta = .44$); perceived group values predicted collective efficacy ($\beta = .42$), which predicted outcome expectancy ($\beta = .41$); and the full serial indirect effect was also significant ($\beta = .08$, all $p < .001$). Because allocation was regressed simultaneously on personal values and outcome expectancy, these estimates show that values operate partly through outcome expectancy and partly independently of it, while outcome expectancy predicts allocation over and above personal values. Constraining the two paths to equality did not worsen fit

($\Delta\chi^2(1) = 1.37, p = .242$), so although personal outcome expectancy showed the larger standardized estimate, the paths were not statistically distinguishable, meaning we cannot conclude that outcome expectancy predicts self-allocation more strongly than personal values do, only that each contributes independently of the other.

We also explored whether the effect of outcome expectancy was amplified by personal values. Specifically, we tested whether outcome expectancy translates into allocation more strongly among people who hold stronger biospheric values. To do so, we added an interaction between outcome expectancy and personal values to the self-allocation path. The interaction was non-significant, $\beta = -.03$, 95% CI $[-.10, .04]$, $p = .409$. Because this interaction is symmetric, the same result indicates that the association between personal values and allocation did not depend on outcome expectancy.

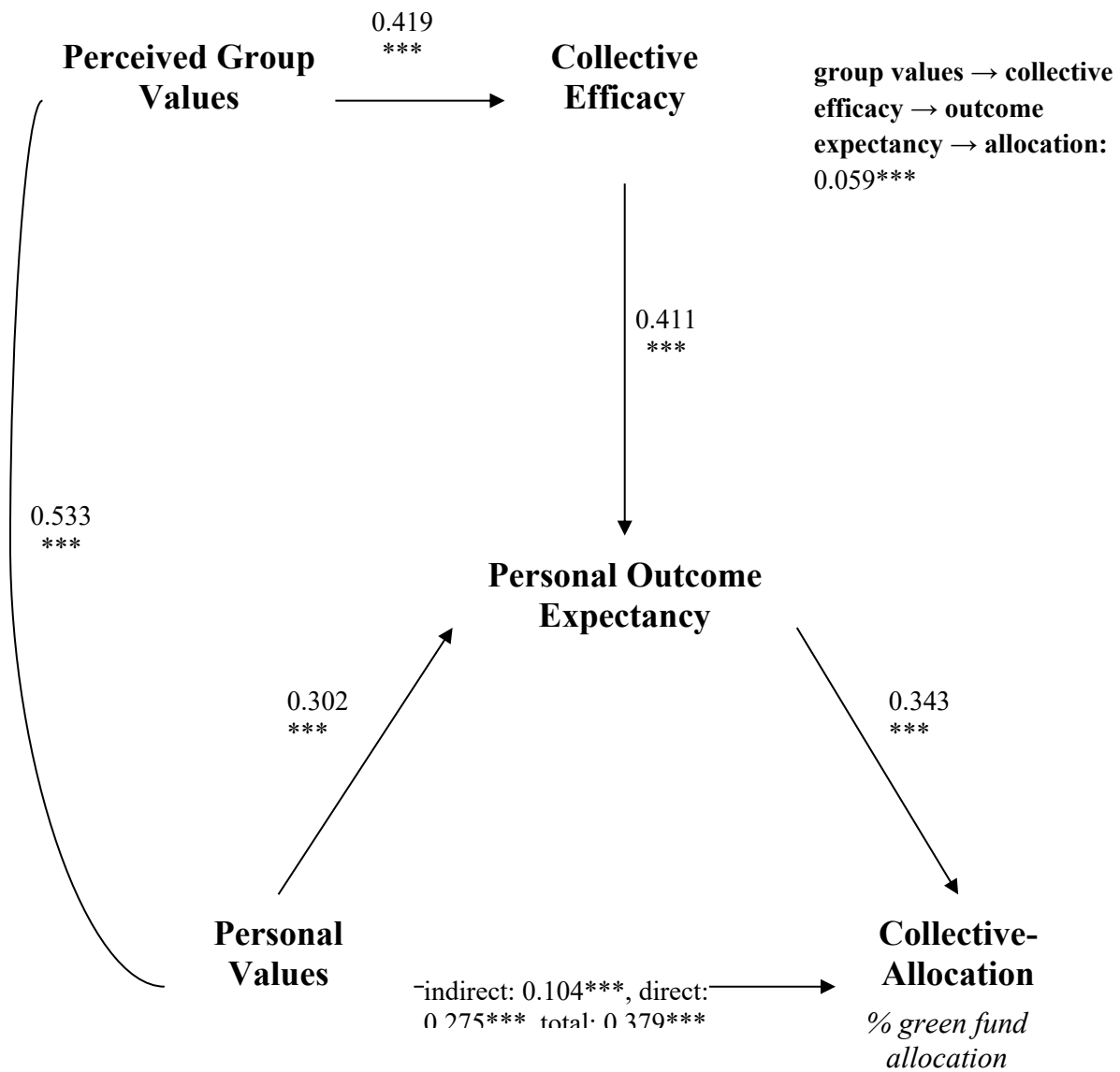
To explore whether perceived group values reach allocation through social influence or through efficacy beliefs, we added a direct path from perceived group values to allocation. This did not improve fit, $\Delta\chi^2(1) = 0.66, p = .418$, and the path was non-significant, $\beta = -.04$, 95% CI $[-.15, .07]$. Perceived group values thus appear to reach allocation through efficacy beliefs.

In two further exploratory analyses, we refit the preregistered model with allocation for the participant's future self, and for Dutch society as a whole (including the participant), as outcomes. Both models fit well—Dutch collective: $\chi^2(11) = 32.51, p < .001$, CFI = .984, TLI = .969, SRMR = .028, RMSEA = .061; future self: $\chi^2(11) = 28.73, p < .001$, CFI = .987, TLI = .975, SRMR = .025, RMSEA = .055. Both also showed the same results pattern as self-allocation, with personal outcome expectancy carrying the effect and perceived group values acting only through efficacy (see Figures 4a and 4b). As before, adding a direct path from perceived group values to allocation improved fit in neither case ($\Delta\chi^2(1) = 0.09, p = .767$, and $\Delta\chi^2(1) = 0.01, p = .922$) and was non-significant in both ($\beta = .02$, 95% CI $[-.10, .13]$, and $\beta = -.01$, 95% CI $[-.12, .11]$).

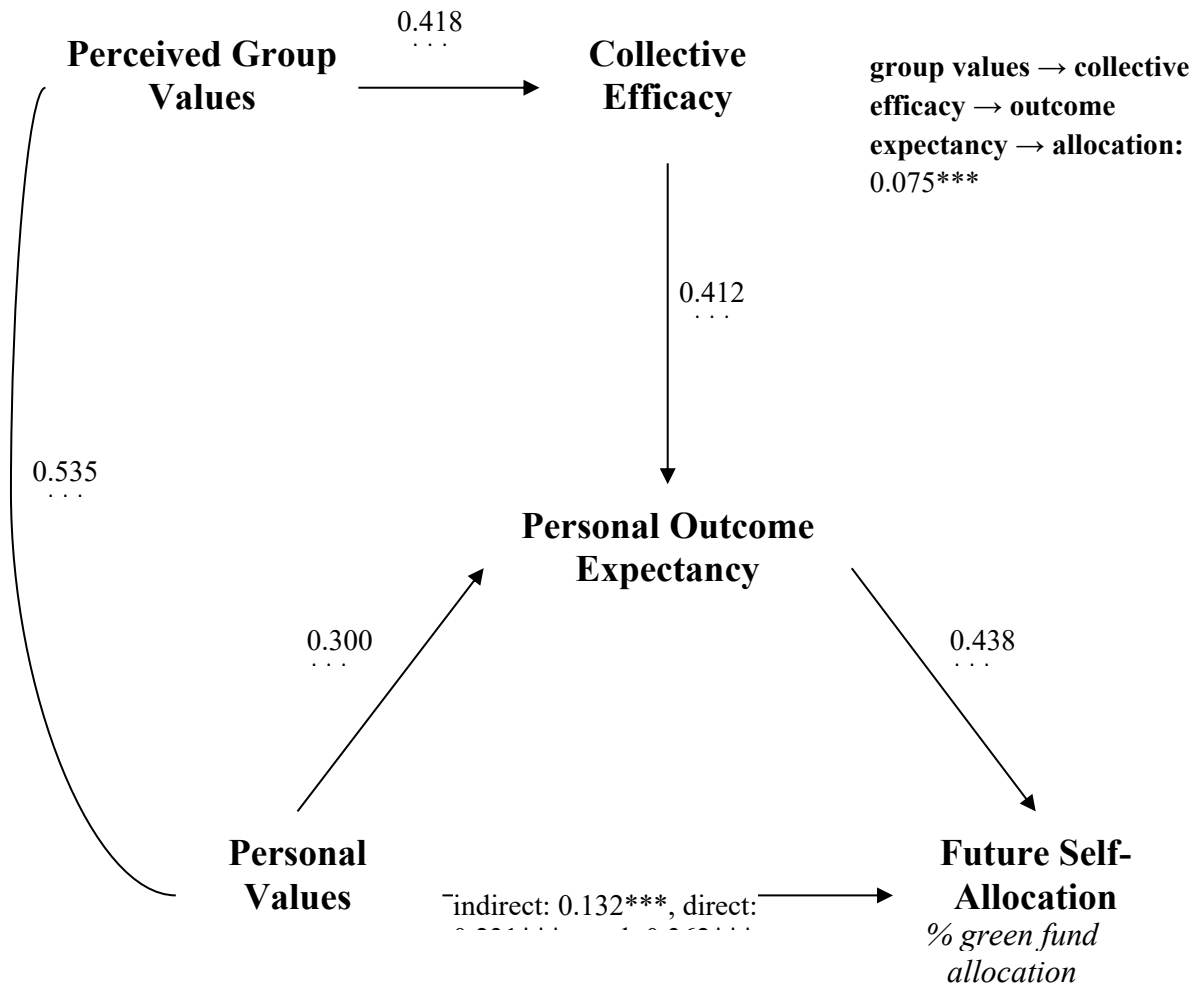
Figure 4

Mediation Analysis Results for (a) Collective and (b) Future-Self Allocation

(a)



(b)



Note. Standardized estimates for all direct, indirect, and total effects. * $p < .05$; ** $p < .01$; *** $p < .001$.

2.2 Deciding for Another Person: Values Predict Allocation Directly

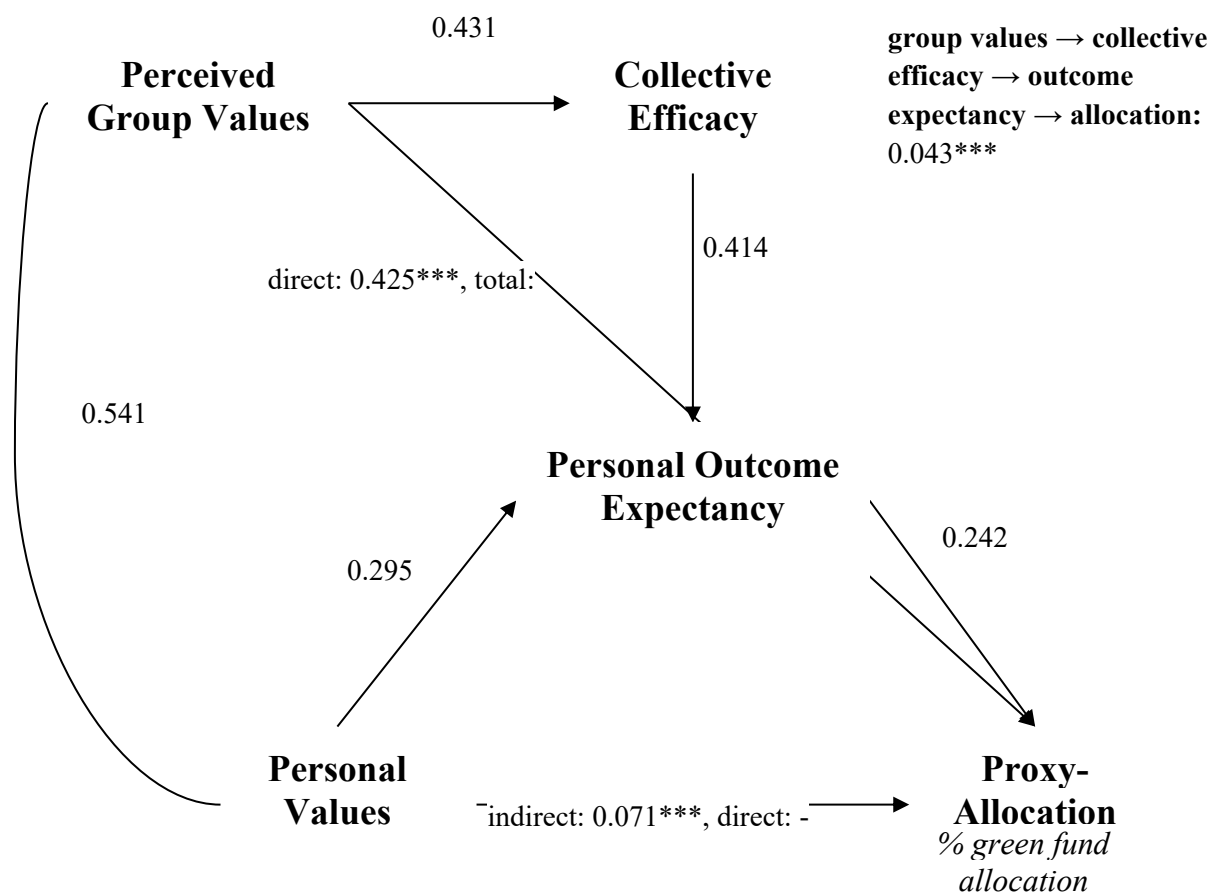
The serial mediation model did not fit the data for allocation made on behalf of another Dutch person, $\chi^2(11) = 97.127, p < .001$; CFI = .933, TLI = .872, SRMR = 0.077, RMSEA = .121. We therefore ran the model we tested on the other dependent variables as well with the added, direct path from perceived group values to allocation. Adding this path improved fit significantly, $\Delta\chi^2(1) = 58.47, p < .001$, and produced acceptable fit, $\chi^2(10) = 38.657, p < .001$; CFI = .978, TLI = .953, SRMR = 0.03, RMSEA = .073 (see Fig. 5).

The pattern of effects in this modified model diverged from the other three targets. Personal values still predicted personal outcome expectancy ($\beta = .30, p < .001$), which predicted allocation for

another person ($\beta = .24, p < .001$), yielding a positive indirect effect ($\beta = .07, p < .001$). However, the direct effect of personal values on allocation for another person was negative ($\beta = -.17, p = .004$), leaving a total effect that was non-significant ($\beta = -.10, p = .088, 95\% \text{ CI } [-.21, .01]$). The serial pathway from perceived group values to allocation remained intact, positive, and significant (perceived group values $\rightarrow$ collective efficacy: $\beta = .43$; collective efficacy $\rightarrow$ personal outcome expectancy: $\beta = .41$; serial indirect effect: $\beta = .04$; all $p < .001$). The added direct path from perceived group values to allocation was itself positive and substantial ($\beta = .43, p < .001$), giving a total effect of perceived group values of $\beta = .47, p < .001$.

Figure 5

Mediation Analysis Results for the Allocation for Another Dutch Person with a Direct Path from Perceived Group Values to Allocation



Note. Standardized estimates for all direct, indirect, and total effects. * $p < .05$; ** $p < .01$; *** $p < .001$.

3. Discussion

This study set out to understand what underlies green pension preferences, and what has to be in place for them to translate into support for sustainable pension investing. Our results show that people prefer green pensions partly because it aligns with their values, but that allocation is not merely a matter of personal values: at least just as important is whether people believe green investing can help reduce climate change, a belief shaped by what they think others value and thus whether enough people will choose green funds for their pension.

When participants were allocating pension money for themselves—whether for themselves, their future self, or Dutch society as a whole—green allocation was predicted by personal outcome expectancy, the belief that green investing can help limit climate change, as strongly as by their own values. This belief was in turn shaped substantially by beliefs about what others value, and therefore what they are likely to do. As we anticipated, rather than influencing allocation directly, perceptions of others' values exerted their influence through efficacy beliefs, shaping green preferences not by social influence but by what they imply could be achieved.

The dynamics shift however when people decide on others' behalf, as pension managers do. When participants allocated for another person, efficacy considerations mattered far less. Allocation was instead explained by a direct path from perceived group values. In other words, when deciding for others, people relied on the simple assumption that what the recipient wants follows straightforwardly from what they value—an inference that does not apply to their own decisions.

Interestingly, although participants' perceptions of others' values were colored by their own (as evidenced by the positive correlation between personal and perceived group values), those who valued the environment more allocated less green on other's behalf. They did not treat their own preferences as a warrant to act for someone else. Instead they attended to what they believed others preferred. Since many perceived others as caring less about the environment than themselves, they correspondingly allocated less of others' pension money to green funds.

Returning to where we began: because the prudent person rule leaves a range of permissible portfolios, beneficiaries' preferences can shape how funds invest, making what beneficiaries prefer an empirical question with large-scale consequences. To understand beneficiaries' preferences, funds increasingly survey beneficiaries directly: for example, in recent years, several Dutch pension funds

surveyed beneficiaries on their support for integrating sustainability into their investment policies ² and one fund granted beneficiaries a binding vote on greater sustainability ⁴⁰—something other funds may come to imitate.⁴ Such surveys typically ask what the fund should invest in, potentially on the implicit assumption that participants' survey answers express what they value. Our results show that investment preferences only somewhat reflect that people care about a topic, and depend just as much on whether they see it as effective. Someone who personally cares about the environment may still decline to support green investment if they doubt enough others will follow, or believe that it will not change anything. Funds that read survey responses as a direct readout of values thus risk misjudging both the level and the stability of beneficiary support for a sustainable investment policy.

What also follows from our results is that the binding constraint for more green pension policies may not be a shortage of beneficiaries who hold personal biospheric values (and our data shows that strong biospheric values are common): higher biospheric values raised green investment only modestly, and the effect of outcome expectancy held regardless of how much participants cared about the environment. What may more often be missing is the sense that green investing will achieve something, which makes convincing people that their choices matter especially important. Our results point to beliefs about others as one route to supplying that belief.

These beliefs are a promising target because they are systematically biased. Our data show a degree of pluralistic ignorance (see Fig. 2): participants underestimated how much others value the environment, echoing prior work which has shown that people underestimate others' biospheric values ²⁵ or others' willingness to act on climate, such as contributing 1% of their income to fight global warming ²⁴. If people underestimate others, then correcting that misperception should raise the sense that enough others will act—and with it, support for green investing.

The results we observed when people decide for others carries its own practical implications. Because allocation for another person tracked perceived values rather than efficacy, and because people perceived others as caring less than themselves, pension fund managers might, to the extent they share these tendencies, conclude that beneficiaries do not favor sustainable investing. This may be compounded by a fear of being accused of imposing their own values on many people's pension portfolios ⁴¹. Correcting managers' beliefs about beneficiaries' preferences may therefore matter as much as correcting

⁴ Notably, this vote was embedded in an elaborate process built around a mini-public, in which participants learned about green investing and about how others viewed it. Support rose substantially after the mini-public was held, and the binding vote itself signaled to the wider membership that the mini-public had been in favor, effectively conveying information about what others wanted.

beneficiaries' beliefs about each other. Recent research supports this notion, showing that politicians and policymakers systematically underestimate public support for climate policies^{42,43}.

Obviously, to give solid practical advice, more research is needed. Our study's main outcome variable is a hypothetical allocation task carried out online. This has several limitations. One limitation is that participants made a concrete allocation decision rather than reporting a simple preference, and the two may diverge. We regard the concreteness as a strength however: displaying the financial and environmental consequences of each allocation likely elicits something closer to a genuine preference than asking whether a green pension sounds appealing. Still, as hypothetical decisions made in an online survey, they need not match the choices beneficiaries would make with real money at stake. Another limitation concerns the anchoring of the allocation scale. Participants began each task at a 50/50 green–brown split—a simplification, since real portfolios vary in sustainability by degree rather than falling into two discrete categories, and a 50/50 start is likely far more sustainable than the effective status quo of most Dutch portfolios. Our data therefore cannot speak to how much more sustainable investing beneficiaries would want relative to current practice. This greener-than-reality anchor may also have dampened movement toward the green fund, especially because participants expected sustainable investments to yield lower returns. Our estimates are therefore likely conservative: starting from an already-sustainable anchor and expecting green funds to underperform, participants may have allocated less to green than a realistic baseline would produce. Lastly, our participants were neither pension nor financial professionals, meaning that our results might be unable to speak to the allocation decisions of fund managers.

Several directions for future research follow. For example, anchoring the allocation slider at the actual status quo of Dutch pension portfolios would test whether the modest allocations we observed are an artifact of our starting point. Moreover, our results imply that correcting misperceptions of others' values should raise collective efficacy and, through it, green allocation—a causal prediction our correlational design cannot test but that an experimental study could. Another direction for future research concerns the generality of the efficacy pathway. Pension sustainability is a distinctive context because it is doubly collective: both the mechanism (preferences must aggregate to move fund policy) and the goal (climate mitigation requires many actors) depend on large numbers of people moving together. This is precisely the condition under which we argued others' values should matter for their informational bearing on efficacy rather than through social influence. Other applied sustainability contexts lack this strong double structure. For example, measures such as installing solar panels, greening front yards or buying an EV can be undertaken by anyone alone: their collective impact is still greatest when many people act, but each action is individually feasible and does not hinge on others. These behaviors are also

more visible and more socially embedded than a pension allocation. In such settings, direct social influence may dominate, and the efficacy chain we observed may weaken or disappear. Comparing contexts would test whether the pathway we identified is specific to problems like pension sustainability or a general feature of how perceptions of others' values shape sustainable choices.

To conclude, the present paper shows that green pension preferences are not simply an expression of how much people value the environment. Whether people prefer a green pension depends also (and at least just as much) on whether they believe it can accomplish anything, and that belief is built from what they perceive others to value: seeing others as caring about the environment supports the sense that enough people will act for one's own green pension to matter. Understanding what beneficiaries prefer therefore means looking past their values to the efficacy beliefs, and the beliefs about other people, on which their preferences rest.

4. Method

The study design, hypotheses, and analysis plan were preregistered; the preregistration, full questionnaire (English and Dutch), data and analysis scripts are available on OSF at https://osf.io/mgxyh/overview?view_only=233d96d9a14b4bd9b39f0070a715519c. The research was performed in accordance with the Declaration of Helsinki. The study was approved by the internal review board of the Faculty of Behavioural and Social Sciences at the University of Groningen (PSY-2526-S-0301).

The study served several purposes; this paper reports one preregistered hypothesis and the measures needed to test it. The broader design included a between-subjects value-priming manipulation. This manipulation served hypotheses outside the present scope and is described in depth in the preregistration which can be found on the OSF folder associated with this manuscript. Because participants in one of the conditions, the future-self condition, did not rate perceived group values and the variable is central to our hypothesis, that condition is excluded here. The analyses below collapse across the three remaining conditions, which did not differ on any model variable (see Appendix A). All other measures are documented in Appendix B and can be found in the full questionnaire which was uploaded to the manuscript's OSF folder.

4.2 Participants

Participants were recruited from a Dutch online panel (PanelInzicht) with recruitment quota-stratified by gender, age, income, and education to approximate the Dutch adult population. We recruited 998 participants. Following our preregistration, we excluded participants who were under 18, did not live

in the Netherlands, failed the embedded attention and AI-detection checks, self-reported insincere responding, or straightlined within a block of items. We deviated from the preregistration in two ways: First, we also excluded participants who sped through the survey, answering it faster than 50% of the median time (i.e. in under 5.7 minutes). Second, we did not exclude respondents based on the six-finger emoji AI-detection check because too many participants failed the item for it to serve as a viable exclusion criterion. Reanalysis restricted to those who answered it correctly yielded no meaningful difference (reported on OSF).

Applied successively, exclusions were: self-reported insincere responding ($n = 76$), speeding ($n = 166$), straightlining ($n = 17$), answered the reversed-shibboleth item with correct code ($n = 10$)⁵, and low CAPTCHA score ($n = 18$), leaving 711 participants. Further excluding the future-self priming condition yields the analytic sample of $N = 531$. Running a Monte Carlo power analysis⁴⁴, treating the fitted estimates as population values and simulating 200 datasets at $N = 531$, showed the focal serial indirect effect (perceived values $\rightarrow$ collective efficacy $\rightarrow$ personal outcome expectancy $\rightarrow$ allocation) was detected (bootstrap CI excluding zero) in all replications, indicating power $> .99$.

The analytic sample of $N = 531$ was evenly split by gender (48.4% women, 51.0% men, 0.2% non-binary, 0.4% prefer not to say). 23.0% were aged 18–34, 32.6% aged 35–54, and 44.4% aged 55 or older. In education, 40.3% had completed higher education (HBO or WO) and 59.7% lower or intermediate education ($n = 2$ did not report). Household income was reported by 467 participants, of whom 45.8% fell below and 54.2% at or above €40,000 per year. The sample was thus roughly representative of the Dutch adult population on gender, age, education, and income, though the youngest age band and the lower-income group were modestly underrepresented. We describe the sample composition relative to recruitment quotas in Appendix A.

4.3 Procedure

After providing informed consent, participants received basic information about the Dutch pension system, presented as an infographic (see Figure A1 in Appendix A), so that they could complete the allocation task well-informed.

Participants then completed the Portrait Values Questionnaire (PVQ) and the pension allocation task. The order in which the PVQ and the allocation task were presented differed across the value-priming

⁵ A reverse shibboleth question is one that most genuine human respondents cannot answer but an automated system easily can. A correct answer therefore signals a bot rather than a person. We used one such item, asking respondents to write working Fortran code from memory.

conditions which were part of the larger survey design. Specifically, participants either completed the allocation task first, followed by the PVQ, or completed one of two PVQ blocks first, followed by the allocation task and then a second PVQ block. Participants completed the PVQ with reference to themselves and with reference to the average Dutch person. The self-referential PVQ provided a measure of participants' personal values, whereas the PVQ concerning the average Dutch person provided a measure of participants' perceptions of group values. In the pension allocation task, participants allocated pension contributions between a sustainable ("Green") fund and a conventional ("Brown") fund. All participants completed the allocation task four times in the same fixed order, with the intended beneficiary being (1) all Dutch pensioners collectively, including the participant; (2) the participant alone; (3) another Dutch person; and (4) the participant's future self.

Afterward, they were debriefed. Participants then completed a battery of additional measures capturing attitudes, beliefs, and individual differences relevant to pension decision-making. Among these were the efficacy and outcome-expectancy items described below. The remaining measures served additional hypotheses outside the scope of this paper and are documented in full in Appendix B. Finally, participants reported demographic information.

4.4 Measures

The survey was written in English, translated to Dutch by the researchers, and checked by a native Dutch speaker.

4.5.1 Pension Money Allocation

Participants allocated pension contributions between two funds using a bipolar slider ranging from 0 (all to the Brown Fund) to 100 (all to the Green Fund), where the Green Fund was a sustainable, low-carbon-intensity portfolio and the Brown Fund was a conventional, high-carbon-intensity portfolio (see Fig. 6)⁴⁵. The task embedded an explicit return-emissions trade-off. The Brown Fund yielded a 2.72% return and the Green Fund 2.02%. We based the 0.7-percentage-point difference on the average annual expense-ratio gap between SRI and conventional funds reported by Riedl and Smeets (2017). This trade-off was built into the design to prevent participants from choosing the sustainable fund for purely financial reasons, as prior research has shown that investors sometimes expect higher returns from sustainable funds⁴⁷. The two funds also differed in carbon intensity, calibrated to approximate empirically observed fund-level values⁴⁸: the green fund reflected a Weighted Average Carbon Intensity (WACI) of 30 tCO₂e per €M invested, consistent with the carbon footprint of the greenest funds in the Netherlands, whereas the brown fund reflected a WACI of 250 tCO₂e per €M invested, consistent with

the most carbon-intensive pension funds. Both the return and carbon-intensity figures were thus calibrated to observed data but should be treated as approximations given the variability in available estimates.

Figure 6

Pension Money Allocation Task (Self Condition)



Note. The allocation task as presented to participants, shown here for the self condition. Participants used the slider to divide their pension money between a green fund (lower CO₂, lower return) and a brown fund (higher CO₂, higher return), starting at a 50/50 split; the panel below the slider updated to show the resulting estimated monthly pension and total CO₂e over 40 years per person. The instruction reads, "Now imagine you get to decide how you yourself will invest your pension money. Move the slider to decide how your pension money will be split between the Green and Brown Fund."

As participants moved the slider, two consequences updated in real time: (1) the projected pension income at retirement, calculated on the average Dutch gross income, and (2) the associated CO₂-equivalent emissions, additionally expressed as one-way Amsterdam–Bangkok flights to make the impact tangible. A 50/50 split between the funds served as a neutral anchor, yielding exactly 70% of the assumed average Dutch gross income (the targeted outcome of most pension schemes).

Participants completed this task four times, varying only in whom the allocation was for. The self allocation served as the primary dependent variable for testing H1, as it most cleanly captures preferences for one's own pension money. The remaining three were exploratory: the collective allocation because it

reflects the status quo of how Dutch pensions are actually invested, and the other-person and future-self allocations to examine whether deciding for another person, or for one's future self, differs from deciding for one's current self. Participants were debriefed afterward and told that the trade-off presented does not necessarily reflect reality.

4.5.2 Personal and Perceived Values

Values were measured with a shortened version of the 21-item Portrait Values Questionnaire (PVQ) used in the European Social Survey to measure Schwartz's basic human values⁴⁹. The shortened PVQ presents 10 third-person portraits, each describing a person's goals or priorities, which participants rate for similarity to a target on a 7-point scale. The scale contains two items that measure biospheric values. In the broader study, participants completed the PVQ under three framings: how much each portrait resembled themselves (personal values), the average Dutch person (perceived group values), or their future self in 10 years. Because participants in the future-self condition did not provide ratings of perceived group values, this condition is excluded from the present manuscript. Full item wording is provided in Table A1.

4.5.3 Efficacy Beliefs and Outcome Expectancy

Three single items were rated on a 7-point scale from "extremely unlikely" to "extremely likely." Personal outcome expectancy: "How likely do you think it is that investing your pension in green funds instead of conventional ones would help reduce climate change?" Collective outcome expectancy: "Now imagine that large numbers of people moved their pension savings into green funds. How likely do you think it is that this would reduce climate change?" Collective efficacy: "How likely do you think it is that large numbers of people will actually choose green funds over conventional funds for their pension?"

4.5.4 Demographic Data

Participants were asked to report their age, gender, highest level of education, and annual income. All measures can be found in Appendix A.

4.5.5 Data Quality

The survey included various checks to ensure quality data. Specifically, we included an invisible CAPTCHA, an invisible open-ended question item, serving as a honeypot, a reversed shibboleth question, asking participants to write code in Fortran, and a hand emoji showing 6 fingers with the request to report the number of fingers shown⁵⁰. We included these AI bot checks at different places in the survey. At the

end of the survey, we also included a self-report conscientiousness item that asked participants about the quality of their own answers ("Did you fill out this questionnaire conscientiously and pay attention to the questions?").

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Author Contribution Statement

T.H.: Conceptualization, Methodology, Software, Formal analysis, Writing – Original Draft

T.B.: Conceptualization, Methodology, Writing – Review & Editing, Supervision

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Competing interests

All authors declare no financial or non-financial competing interests.

Data and Code Availability Statement

The datasets analysed during the current study and code needed for the analyses are available in the OSF folder associated with this manuscript,

https://osf.io/mgxyh/overview?view_only=233d96d9a14b4bd9b39f0070a715519c.

Appendix A

No Differences Across Value-Priming Conditions

The between-subjects value-priming manipulation served hypotheses outside the scope of this paper. Bayesian one-way ANOVAs conducted with default priors in JASP showed no differences across priming conditions on any variable in the mediation model. The data favored the null model in every case: personal biospheric values, $BF_{01} = 14.47$; perceived group biospheric values, $BF_{01} = 35.55$; collective efficacy, $BF_{01} = 8.03$; personal outcome expectancy, $BF_{01} = 27.29$ (posterior null probabilities .89–.97, all proportional errors < 3%). Descriptive means were correspondingly similar, ranging from $M = 5.03$ to 5.24 for personal values, 4.39 to 4.48 for perceived group values, 3.40 to 3.68 for collective efficacy, and 3.88 to 4.04 for personal outcome expectancy. We therefore collapsed across conditions.

Materials

Information about the Dutch Pension System shown to Participants

Figure A1

Dutch pension system infographic presented to participants at the start of the survey



Note. The graphic explains how the state pension (1st pillar) and the pension funds (2nd pillar) jointly provide retirement income, illustrated with the average Dutch income of €3,800, yielding a pension of €2,600 (70% of income). It also explains that this target is achieved by investing money in sectors such as energy or infrastructure to generate returns.

Portrait Values Questionnaire

In the self-condition, participants rated how much each portrait represented themselves (1 = "not like me at all", 7 = "very much like me"); in the other condition, participants rated how much each portrait described an average Dutch person (1 = "not like that at all", 7 = "very much like that"); in the future-self condition, participants rated how much each portrait described their future self in 10 years (1 = "not like me at all", 7 = "very much like me").

Table A1

Items of the Portrait Values Questionnaire

Condition	Self Condition	Future Self Condition	Others Condition
	It's important to this person...	It's important to this person...	It's important to the average Dutch person...
	... to be rich. This person wants to have a lot of money and expensive things. ... that everyone in the world be treated equally. This person believes everyone should have equal opportunities in life. ... to live in secure surroundings. This person avoids anything that might endanger their safety. ... to do lots of different things in life. This person likes surprises and is always looking for new things to do. ... to have a good time. This person likes to “spoil” themselves. ... to help the people around them. This person wants to care for others’ well-being. ... to have an exciting life. This person looks for adventures and likes to take risks. ... to always behave properly. This person wants to avoid doing anything people would say is wrong. ... to protect the environment. This person strongly believes that people should care for nature. ... to respect nature. This person wants to feel connected with nature.		

Demographic Measures

Age. Participants report their age in seven categories: (1) Under 18, (2) 18 to 24, (3) 25–34, (4) 35–44, (5) 45–54, (6) 55–64, and (7) 65 or older.

Gender. Participants report their gender as male, female, non-binary/ third gender or were able to respond “Prefer not to say.”

Education. Participants report the highest level of education according to seven categories: (1) LO (basisschool, lagere school, LAVO, VGLO), (2) LBO (VMBO basis/kader, LBO, LTS, ITO, LEAO, Huishoudschool, LLO), (3) MAO (VMBO GL/TL, MAVO, IVO, MULO, ULO, 3jr HBS, 3jr VWO, 3jr VHMO), (4) MBO (MTS, UTS, MEAO, ROC), (5) HAO (HAVO, VWO, Atheneum, Gymnasium, NMS,

HBS, Lyceum), (6) HBO (HTS, HEAO, Wetensch. kand., Univers. onderwijs kand., Bachelor), (7) WO (Universitair onderwijs, Doctoraalopleiding, TH, Master). They could also chose “I prefer not to answer.”

Income. Participants report income in interval questions, with the following instructions: “Using this chart, can you tell me which letter corresponds to your household’s total income from all sources, after deducting taxes and social security contributions? If you don’t know the exact amount, please provide an estimate.”

	Per Week	Per Month	Per Year
A	Less than 400€	Less than 1600€	Less than 19000€
B	401€ to 500€	1601€ to 2200€	19001€ to 26000€
C	501€ to 600€	2201€ to 2800€	26001€ to 34000€
D	601€ to 800€	2801€ to 3300€	34001€ to 40000€
E	801€ to 900€	3301€ to 4100€	40001€ to 49000€
F	901€ to 1200€	4101€ to 5200€	49001€ to 62000€
G	1201€ to 1500€	5201€ to 6300€	62001€ to 76000€
H	1501€ to 1800€	6301€ to 7600€	76001€ to 91000€
I	1801€ to 2100€	7601€ to 9300€	91001€ to 112000€
J	2101€ to 2600€	9301€ to 11200€	112001€ to 134000€
K	2600€ or more	11201€ or more	134000€ or more

Sample Composition Relative to Recruitment Quotas

Quota targets were derived from population statistics published by Statistics Netherlands^{51–53} and applied as approximate, independent marginal targets rather than exact interlocking cells. Gender was set at 50%

women and 50% men, reflecting the near-even population split. Age was benchmarked to the CBS single-year population distribution for adults (18+), giving targets of 26% for 18–34, 33% for 35–54, and 41% for 55+. Educational attainment was dichotomized into lower (up to and including senior secondary and vocational education, i.e. through HAVO/VWO and MBO) and higher (HBO and WO), with approximate targets of 60% and 40%. Net annual household income was split at €40,000 into two groups, with approximate targets of 40% below and 60% above, coarsely reflecting the CBS distribution of disposable household income. Table A2 reports, for each quota cell, the target percentage and count, the achieved count, and the percentage of the target filled.

Table A2

Sample Composition Relative to Recruitment Quotas

<i>Quota group</i>	<i>Target %</i>	<i>Target n</i>	<i>Achieved n</i>	<i>% of target</i>	<i>Status</i>
<i>Gender</i>					
Female	50	266	257	96.8	Close
Male	50	266	271	102.0	Met
<i>Age</i>					
18–34	26	138	122	88.4	Under
35–54	33	175	173	98.7	Close
55+	41	218	236	108.0	Met
<i>Education</i>					
Lower	60	319	315	98.9	Close
Higher	40	212	214	100.9	Met
<i>Household income</i>					
Under €40k	50	266	214	80.6	Under
Over €40k	50	266	253	95.3	Close

Note. Counts within a quota do not always sum to 531 because some participants fell outside the quota categories or did not provide the relevant information. All participants were retained in the analyses reported in the main text.

Appendix B

Additional Measures

After completing the dependent variables, all participants completed a battery of additional measures designed to capture attitudes, beliefs, and individual differences relevant to pension decision-

making. These measures shed light on the assumptions and knowledge that may underlie participants' allocation choices, and will be used in exploratory analyses.

Obligation. Participants were asked to answer one open-ended question about their views on pension fund obligations: “Pension funds have a legal obligation to act in the best interests of their beneficiaries. Given this obligation, what goals do you think pension funds should pursue in their investments?”

Knowledge. Participants self-rated their knowledge of three pension-related domains:

1. How much do you know about your own pension (e.g., your payout, your contributions, your employer's contributions)?
2. How much do you know about the financial aspects of pension investments (e.g., returns, risks, market fluctuations)?
3. How much do you know about the societal impacts of pension investments (e.g., effects on people and the environment)?

Each item was rated on a 7-point scale (1 = “I have no knowledge about this at all”, 2 = “I know very little about this”, 3 = “I know little about this”, 4 = “I know a bit about this”, 5 = “I know quite a bit about this”, 6 = “I know much about this”, 7 = “I know very much about this”). We also asked respondents “Before starting this questionnaire, had you ever thought about the societal and sustainability impacts of your pension?” (1 = Never, 2 = A little, 3 = A moderate amount, 4 = A lot, 5 = A great deal).

Perceived Trade-Offs. This block assessed how participants think about the relationships between profitability, stability, and environmental sustainability in pension investing. At the outset of the block, participants were presented with a brief definition for each concept:

“On this and the next few pages, we will ask questions on certain aspects of pension investments. These aspects are:

Investments' profitability, indicating how much financial return an investment generates, typically measured as a percentage gain over time.

Investments' stability, indicating how reliably an investment holds its value over time, with minimal ups and downs or risk of loss.

Investments' environmental sustainability, indicating the extent to which an investment supports activities that protect the environment rather than contributing to pollution or climate change.”

First, participants rated the profitability, stability and environmental sustainability of current investments on a 6-point scale each (1 = “Very unprofitable/instable/environmentally unsustainable”, 6 = “Very profitable/stable/environmentally sustainable”). Next, participants rated how strongly pension funds should prioritize each of three investment attributes, on a scale from 1 (“not at all”) to 7 (“very much”).

Finally, participants rated the perceived environmental impact of three investment categories from -3 (“very negative environmental impact”) to +3 (“very positive environmental impact”):

1. Very financially profitable investments
2. Very stable investments
3. Very environmentally sustainable investments

Using the same three investment categories, participants were asked to rate the typical financial returns from -3 (“very low”) to +3 (“very high”) and typical stability from -3 (“very low”) to +3 (“Very high”).

Priorities. Participants were told that the pension sector can prioritize different themes in their investments and asked to rate to what degree the sector should prioritize seven investment themes on a scale from 1 (“not at all”) to 7 (“completely”):

- | | |
|-------------------------|----------------------------|
| 1. Health and wellbeing | 5. Poverty |
| 2. Economic growth | 6. Biodiversity |
| 3. Equality | 7. Returns to participants |
| 4. Climate Change | |

Desired Engagement. In this block, participants were asked to answer the following question: “How (in)appropriate do you consider it if a pension fund invests in companies that are associated with ...” for eight categories (Deforestation, Mining, Pesticides, Weapon production, Cheap labour, Fur and leather, Fossil fuel (oil, gas, coal), nuclear energy) on a 7-point scale (1 = “Extremely inappropriate”, 2 = “Moderately inappropriate”, 3 = “Slightly inappropriate”, 4 = “Neither appropriate nor inappropriate”, 5 = “Slightly appropriate”, 6 = “Moderately appropriate”, 7 = “Extremely appropriate”)

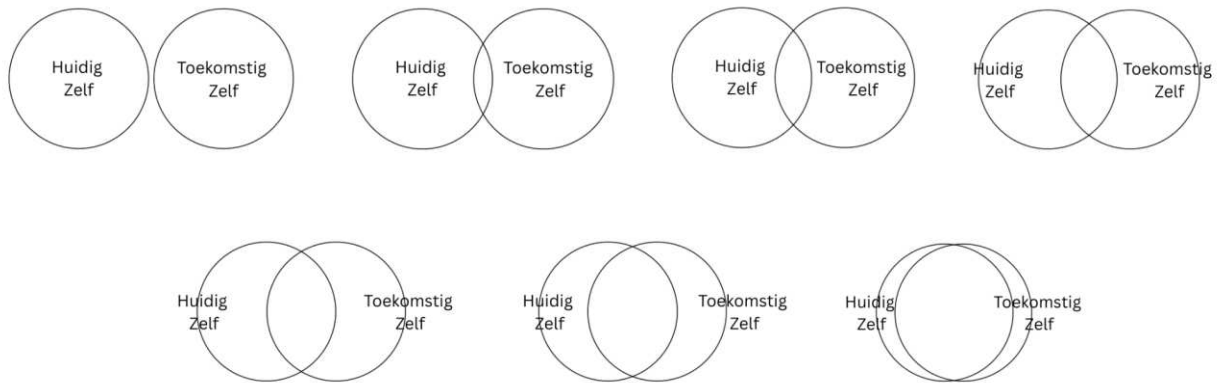
Participation. Participants answered two prompts about their actual and desired influence over pension fund decisions: “How much do you feel you have a say in...” and “How much do you want to have a say in...” Each question is asked in relation to two targets: 1. “which general themes your pension

fund considers when investing?” and 2. “which specific topics and companies your pension fund invests in?” Responses were given on a 7-point scale from 1 = “None at all” to 7 = “Very much”.

Future-Self-Continuity. Participants were asked to fill out the item by Hershfield (2021), asking “Click on the picture below that best describes how similar you feel with your future self (you in 10 years). Current self = you now. Future self = you in 10 years” with the options presented in Figure B1.

Figure B1

Future-Self Continuity Items



Note. Adapted from Hershfield (2011), translated to Dutch.