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Regulate me! Self-control dissatisfaction in meat reduction success relates to stronger support for behavior-regulating policy

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ABSTRACT

Recent work suggests that most individuals support policies targeting the immediate economic and physical food environment to change behavior. The present set of studies builds upon this preliminary evidence by testing the idea that people who are dissatisfied with their self-regulation success in implementing a low-meat diet are more supportive of policy interventions aiming to reduce meat consumption. Multiple regression models from exploratory Study 1 ($N = 220$) and pre-registered Study 2 ($N = 180$) provide evidence that those reporting more dissatisfaction with their success in reducing meat consumption were more supportive of both government (Study 1) and institutional policy (Study 2) increasing meat prices to reduce its consumption. Exploratory analyses also revealed an interaction with meat intake, such that individuals who regularly eat meat indicated greater policy support if they were also more dissatisfied with their meat reduction success. Together, our results suggest that individuals may indeed outsource self-control to institutional or governmental regulators when they are dissatisfied with their own self-regulatory success. Follow-up work should establish the boundary conditions of these findings across behavioral domains and probe their robustness using longitudinal data.

1. Introduction

Current levels of meat consumption in high-income countries are incompatible with a climate that supports safe living conditions (Gerber et al., 2013; IPCC, 2019; Pimentel & Pimentel, 2003). Animal agriculture is a principal source of greenhouse gas (GHG) emissions (Gerber et al., 2013; Goodland, 2013; Pimentel & Pimentel, 2003; Tilman & Clark, 2014), biodiversity loss, and deforestation (Díaz et al., 2019; Machovina, Feeley, & Ripple, 2015). Shifting to predominantly plant-based (e.g., vegan, vegetarian, or flexitarian) diets is consequently a key priority for climate change mitigation and biodiversity conservation (Barnsley et al., 2021; Ivanova et al., 2020; The Eat-Lancet Commission, 2019; Wynes, Nicholas, Zhao, & Donner, 2018). For example, one study found that moving from current global diets to a diet that excludes animal products could reduce food-related GHG emissions by 49% (Poore & Nemecek, 2018). Lower levels of meat consumption would also greatly benefit biodiversity conservation (Machovina et al., 2015), global food security (Stokstad, 2010), and public health (Tilman & Clark, 2014). Despite recent modest decreases in meat consumption in some high-income countries, much greater reductions are needed (Stewart, Piernas, Cook, & Jebb, 2021).

Individual behavior is at the heart of adopting more plant-based diets. To successfully change their diet, people must be sufficiently motivated and possess the knowledge and ability to prepare alternative meals. However, a decontextualized focus on individual factors may be too narrow, as even for people who are motivated and able, reducing meat consumption is challenged by a range of psychological, economic, political, cultural, and social factors (Bianchi, Garnett, Dorsel, Aveyard, & Jebb, 2018; Bonnet, Bouamra-Mechemache, Réquillart, & Treich, 2020; Gossard & York, 2003; Loewenstein, 2018; Rees et al., 2018). This means that people often fail to implement and maintain vegetarian or reduced-meat diets despite being motivated to do so; a phenomenon referred to as the intention-behavior gap (Bianchi, Dorsel, Garnett, Aveyard, & Jebb, 2018; Sheeran & Webb, 2016). Here, we focus on the

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interplay among motivational (i.e., personal self-control) factors and support for regulatory policies aimed at encouraging behavior change around meat consumption.

Overcoming the intention-behavior gap can be facilitated by self-control (Nielsen, 2017; Wyss, Knoch, & Berger, 2022), which refers to the process of aligning behavior with long-term goals, such as climate protection (Kotabe & Hofmann, 2015). For instance, people who want to reduce their meat consumption must exert self-control whenever confronted by tempting desires (e.g., to eat a steak) to stay on track. However, in-the-moment resistance of desires is often unsuccessful (Hofmann, Baumeister, Förster, & Vohs, 2012). Therefore, changing diets requires complementary self-control strategies (Bürgler, Hoyle, & Hennecke, 2021; Hennecke & Bürgler, 2020) or the implementation of interventions that seek to counteract the appeal of meat products by making changes to the immediate context in which dietary choice unfolds – i.e., the economic and physical environment (as conceptualized in the TIPPME framework, Hollands et al., 2017).

Highlighting the role of economic environments in shaping dietary choice, U.K. consumers report pricing and promotions as the principal influences on food purchases, alongside characteristics of the physical food environment, such as the availability of healthy options (Department for Environment, Food, & Affairs, 2014). Given that governments and organizations are key actors shaping economic and physical environments (Garnett & Balmford, 2022), policy interventions can facilitate environmentally relevant behavior change by targeting specific aspects of these environments that currently act as barriers to reduced-meat diets. Indeed, interventions targeting the economic and physical environments have successfully reduced meat consumption. For instance, changing the relative prices of vegetarian and meat meals in cafeterias can increase vegetarian meal purchases (Garnett, Balmford, Marteau, Pilling, & Sandbrook, 2021). A recent Cochrane review also suggests that food option availability and order of presentation can influence dietary choice (Hollands et al., 2019).

From a behavior-change perspective, behavior-regulating policy can be a highly effective route for promoting self-control: Introducing constraints such as increased meat prices on societally and individually undesired behavior should minimize the necessity or difficulty of exercising self-control to avoid eating meat. Indeed, such policy interventions can alter the subjective value of meat vs. vegetarian options (see value-based choice model, Berkman, 2018) and thereby promote desired behavior by constraining the range or feasibility of undesired behavioral options (see also enactment constraints, Kotabe & Hofmann, 2015).

Recent work has shown that most people support public policies to change their own food choices (Gold et al., 2020) and that support for interventions regulating dietary choice increases after Thanksgiving, a holiday often characterized by overeating (Schroeder et al., 2017). Individuals may therefore support policies that facilitate desired but difficult behavior change. Extant work on dietary behaviours and food policy support has produced mixed results. For instance, overweight and obese participants have been found to support policies that regulate junk food advertising and eliminate fast food concessions in schools (Oliver & Lee, 2005). Conversely, Hagmann, Siegrist, and Hartmann (2018) found that those at increased risk of obesity were more likely to oppose obesity prevention policies. Notably, policy support was more pronounced among dieters than among non-dieters, underscoring the relevance of considering individuals' *dissatisfaction* with their behavior rather than focusing on the outcome (e.g., BMI). Other recent studies have found inconsistent associations between self-control and support for food and climate policy (Kukowski, Bernecker, von der Heyde, Boos, & Brandstätter, 2022; van Gestel, Adriaanse, & de Ridder, 2021). However, these studies assessed trait self-control (general self-control ability) instead of satisfaction with behavior change in a specific domain, introducing considerable noise. It therefore remains unclear whether individuals may be motivated to "delegate" self-control to external regulators when unsatisfied with their self-control success.

2. The present studies

In two cross-sectional studies, we investigated whether people who are dissatisfied with their success in reducing meat consumption are more supportive of policies that increase the price of meat relative to plant-based products. To maximize policy relevance, we investigated this question in two settings where these policies were actively discussed at the time of data collection. Study 1 focused on a federal policy in Germany and Study 2 on an institutional policy at a Swiss university. Based on the results of Study 1 and the theoretical considerations outlined above, we pre-registered the following hypotheses for Study 2: The likelihood of voting for the proposed policy will be higher among people who (1) are more dissatisfied with their self-control success in reducing meat consumption, (2) report higher goal importance of climate change mitigation, (3) consume less meat, and (4) experience fewer desires to eat meat. We additionally control for political orientation, gender, and age. The methods and results of these two studies are jointly presented below.

3. Method

3.1. Samples

N = 308 adults residing in Germany (50% university students) completed Study 1, and N = 198 University of Zurich affiliates (89% university students) participated in Study 2 and were entered into a draw for vouchers to an excursion provider. Participants who failed either an attention check[1] (n_{S1} = 80, n_{S2} = 15) or data quality check[2] (n_{S1} = 8, n_{S2} = 3) were excluded from all analyses. The final samples (N_{S1} = 220, N_{S2} = 180) were mostly female (S1 = 60%; S2 = 76%) with mean ages of M_{S1} = 35.74 years (SD_{S1} = 15.29 years) and M_{S2} = 24.71 (SD_{S2} = 8.14 years). The sample size for Study 1 was set as the maximum permitted by our budget. For Study 2, we conducted an a-priori power analysis via G*Power using the effect sizes from Study 1. We aimed for sufficient power to replicate the results of Study 1 while balancing budgetary constraints. According to sensitivity analyses, the smallest effect this allows us to detect with 80% at $\alpha = 0.05$ is $f^2 = 0.06$ in Study 1 and $f^2 = 0.07$ in Study 2, respectively. Both of these are considered small effect sizes (Cohen, 2013).

3.2. Measures and procedure

Before data collection, we obtained approval from the University of Zurich ethics board. Participants in both studies completed online questionnaires on the survey platform SoSci-Survey. The studies were part of another larger study that included an experimental manipulation related to a different research question. We control for this manipulation and the order of variable presentation in all analyses. The surveys also included other measures not included in the present analyses. All items were administered in German and were translated for the purpose of communication in the manuscript. The data, syntax, codebook (including the original items), and pre-registration are accessible via the OSF (https://tinyurl.com/yckjezmp).

3.3. Dependent measures

In both studies, participants read a short text explaining how meat consumption contributes to GHG emissions and associated climate change. We then described a realistic policy (see below) to regulate meat consumption, an environmentally impactful individual behavior. We

[1] accurate recall of information relating to meat consumption trends presented earlier.

[2] self-reported conscientious and honest completion of survey, without repercussions for compensation.

subsequently (correctly) informed participants that the [country blinded] federal government (Study 1) or the university (Study 2) is considering adopting this policy. Participants were asked to imagine they were casting a direct-democratic vote on these policies (e.g., as implemented in Switzerland and some U.S. states) and to indicate their level of support for the policy.

3.3.1. Support for a national meat reduction policy

Participants expressed their level of support for the following policy (1 = *completely oppose* - 11 = *completely* support): "Increase VAT on meat products from 7% to 19% and waive VAT on non-animal products. This would increase the price of meat products and decrease the price of non-animal products."

3.3.2. Support for an institutional meat reduction policy

Participants reported their support for the following policy (1 = *completely oppose* to 11 = *completely* support): "Increase the prices of the meat menu in all university cafeterias, making it 10% more expensive, and reduce the prices of the vegetarian menu, making it 10% cheaper. For students, the meat menu would cost CHF 5.94 (1 CHF = approx. 1 USD) and the vegetarian menu CHF 4.86. For employees, the meat menu would cost CHF 7.70 and the vegetarian menu CHF 6.30."

3.4. Main predictors

3.4.1. Self-control dissatisfaction

Participants indicated the extent to which they were dissatisfied with their self-control success in reducing their meat consumption on a five-point Likert scale (1 = completely disagree to 5 = completely agree, −1 = I do not eat meat) in response to the following item: "I wish I would succeed in reducing my meat consumption (German: Ich wünschte, ich würde es schaffen, meinen Fleischkonsum zu reduzieren)." Please note that the German conditional tense implies a current inability to reduce meat consumption despite wishing to do otherwise.

3.4.2. Desire to consume meat

After reading a brief definition of desire, participants indicated the intensity (1 = not at all intense to 5 = very intense) and frequency (1 = (almost) never to 5 = several times daily) with which they desire meat in their everyday lives (adapted from Hofmann et al., 2012). As pre-registered, we combined these two items to form a mean-summed indicator of desire strength.

3.4.3. Personal goal importance

We asked participants to consider "the goal of doing something against climate change in your everyday life" and to indicate their agreement with five items (e.g., "I am committed to this goal" (1 [*do not agree at all*] to 5 [*completely agree*]); Kukowski et al., 2022).

3.4.4. Meat intake

Participants indicated the average proportion of their meals that contain meat (1 = *[almost] none* to 5 = [*almost] all*). Study 2 asked explicitly about meat intake at home and work, and we included both variables in the analyses.

3.5. Sociodemographic variables

After reading a short description of the terms "left" and "right," participants localized their political views on a scale ranging from 1 (*left*) to 11 (*right*) (Breyer, 2015). Participants also chose the gender they identified with (1 = *female*, 2 = *male*, 3 = *non-binary*) and reported their age in years.

3.6. Analytical strategy

Following Wagenmakers, Wetzels, Borsboom, van der Maas, and Kievit (2012), we separate our analyses into exploration (Study 1 and additional analyses) and pre-registered confirmation (Study 2). Because policy votes were extremely unequally distributed in Study 2 (*yes* = 154, *no* = 26), we deviated from our pre-registration by focusing our analyses on predicting policy support (a continuous measure) to capture more between-person variability. For transparency, we provide the results of the logistic regression models predicting policy votes on the OSF.

4. Results

Descriptive statistics, internal consistencies, and zero-order correlations for the main study variables are presented in Table 1.

Table 2 summarizes the results from the multiple regression models for both studies, which all support our pre-registered hypotheses. As expected, self-control dissatisfaction predicted policy support, such that participants who reported being more dissatisfied with their success in reducing their meat intake were more supportive of a national (Study 1) and an institutional policy (Study 2) aimed at reducing meat consumption. Desire to eat meat and meat intake were negatively associated with policy support. This means that participants who reported more frequent and intense desires to consume meat were less supportive of the policies, whereas participants for whom climate change mitigation was an important personal goal were more supportive of the policies. Models from both studies were robust to the inclusion of all data points (e.g., failed attention checks), except for the desire coefficient in Study 1, which was no longer significant (see Supplemental Materials), and the exclusion of the covariates. Collinearity checks using the *performance* package in R (Lüdecke et al., 2021) return maximum Variance Inflation Factors of 2.09 – well under the standard cutoff of 5 (Sheather, 2009) – suggesting that multicollinearity was not a problem.

To unpack the results reported above, we conducted exploratory analyses to test whether the relationship between self-control dissatisfaction and policy support was moderated by how much meat participants consume (see Fig. 1). Indeed, self-control dissatisfaction interacted with meat intake, such that the association between meat intake and policy support was less negative among individuals reporting higher self-control dissatisfaction, $\beta_{S1} = 0.28$, $t(199) = 5.27$, 95% CI [0.18, 0.39], $p < .001$. In Study 2, the effect is only significant for meat intake in participants' personal life, $\beta_{S2a} = 0.23$, $t(151) = 3.68$, 95% CI [0.11, 0.35], $p < .001$, but not at work, $\beta_{S2b} = 0.03$, $t(151) = 0.55$, 95% CI [-0.09, 0.16], $p = .581$. Given that the association between self-control dissatisfaction and policy support emerges in the regression models, where we control for meat intake, but not in the bivariate correlations, meat intake-dependent boundary conditions should be examined more closely in follow-up work. The present studies were insufficiently powered to detect interaction effects reliably. Therefore, these results should be considered exploratory and warrant further investigation in future studies with greater statistical power.

Based on their previously documented relationships with policy support, we additionally conducted exploratory analyses controlling for environmental concern (measured in Study 2 only), the perceived cost of meat compared to vegetarian options, and general support for behavior-regulating climate policy (Kukowski et al., 2022). In Study 1, participants who considered meat less expensive and those who were generally more supportive of behavior-regulating climate policy were more in favor of the national meat reduction policy, $\beta_{cost} = -0.13$, $t(198) = -2.32$, 95% CI [-0.25, −0.02], $p = .021$, $\beta support = .27$, $t(198) = 3.78$, 95% CI [0.13, 0.40], $p < .001$. All primary main effects remained significant. In Study 2, participants who were more concerned about the environment and those generally more in favor of behavior-regulating climate policy were more supportive of the institutional meat reduction policy, $\beta_{concern} = 0.19$, $t(149) = 2.22$, 95% CI [0.02, 0.36], $p = .028$, $\beta support = .17$, $t(149) = 2.10$, 95% CI [0.01, 0.33], $p = .038$. The originally observed associations with self-control dissatisfaction and desire for meat, but not personal goal importance and meat intake, remained. Half of participants indicated not being able to appraise meat

Table 1
Summary of Intercorrelations, means, standard Deviations, and internal consistencies for main study 1 and 2 variables.

	Variable	1	2	3	4	5	6	7	8	9	10	M_{S2}	SD_{S2}	α_{S2}	Theoretical range
1	Policy vote		**.38**	**−.17**	**.30**	.04	.09	**−.17**	**−.35**	.02	.04				no; yes
2	Policy support	**.85**		**−.35**	**.54**	.12	−.05	**−.39**	**−.49**	−.09	−.08	8.92	2.92	- [b]	1–11
3	Desire for meat	**−.33**	**−.38**		**−.23**	**.45**	**.33**	**.62**	**.23**	.11	**.25**	2.1	0.94	0.81	1–5
4	Goal importance	**.37**	**.46**	**−.15**		−.02	.05	**−.31**	**−.51**	.03	−.04	3.77	0.88	0.93	1–5
5	SC_a dissatisfaction	.08	.10	**.33**	**.15**		**.16**	**.37**	−.02	−.04	−.01	3.68	2.97	- [b]	1–9
6	Meat intake (work)	–	–	-	–	–		**.32**	.15	.09	**.22**	1.28	1.71	- [b]	1–5
7	Meat intake (private)	**−.43**	**−.45**	**.65**	**−.23**	**.29**	–		**.28**	.06	**.21**	2.11	1.25	- [b]	1–5
8	Political orientation	−.11	−.12	.12	−.12	.02	–	0.11		−.01	.06	4.12	2.11	- [b]	1–11
9	Age	**−.20**	**−.26**	**.17**	−.05	.01	–	**0.23**	0.05		**.28**	24.7	8.14	- [b]	–
10	Gender	−.09	**−0.14**	**0.3**	−0.03	0.05	–	**0.3**	**0.23**	0.07				- [b]	male; female
	M_{S1}	–	6.73	2.35	3.59	4.07	–	2.41	4.72	35.7					
	SD_{S1}	–	3.87	0.91	0.95	2.68	–	1.03	2.48	15.3					
	α_{S1}	- [b]	- [b]	.79	- [b]	.94	- [b]	- [b]	- [b]	- [b]					

Note. Study 1 correlations are displayed below the diagonal, Study 2 correlations above. [a]SC = self-control. [b]one-item measure.

Table 2
Linear regression models predicting policy support.

Variable	Policy Support											
	Study 1						Study 2					
	β	95% CI		*t*	*p*	ΔR^2	β	95% CI		*t*	*p*	ΔR^2
Intercept	−.04	−0.44	0.36	−0.18	.854	-	.02	−0.11	0.14	0.22	.824	-
Desire	**−.19**	**−0.34**	**−0.05**	**−2.63**	**.009**	**.02**	**−.24**	**−0.40**	**−0.09**	**−3.17**	**.002**	**.03**
Goal importance	**.33**	**0.21**	**0.45**	**5.57**	**.000**	**.09**	**.35**	**0.21**	**0.48**	**4.96**	**.000**	**.08**
SC dissatisfaction	**.20**	**0.08**	**0.32**	**3.23**	**.001**	**.03**	**.29**	**0.15**	**0.42**	**4.22**	**.000**	**.06**
Meat intake (work)	-	-	-	-	–	–	.08	−0.05	0.21	1.29	.199	.01
Meat intake (home)	**−.27**	**−0.42**	**−0.13**	**−3.63**	**.000**	**.04**	**−.22**	**−0.38**	**−0.06**	**−2.68**	**.008**	**.02**
Political orientation	−.04	−0.15	0.07	−0.69	.488	.00	**−.22**	**−0.35**	**−0.09**	**−3.29**	**.001**	**.04**
Age	**−.14**	**−0.25**	**−0.03**	**−2.55**	**.012**	**.02**	−.02	−0.15	0.10	−0.39	.698	.00
Gender	.05	−0.19	0.29	0.40	.687	.00	.06	−0.23	0.34	0.38	.703	.00
Total adjusted R^2	.37						.48					

Note. βs indicate standardized betas. CI = confidence interval.

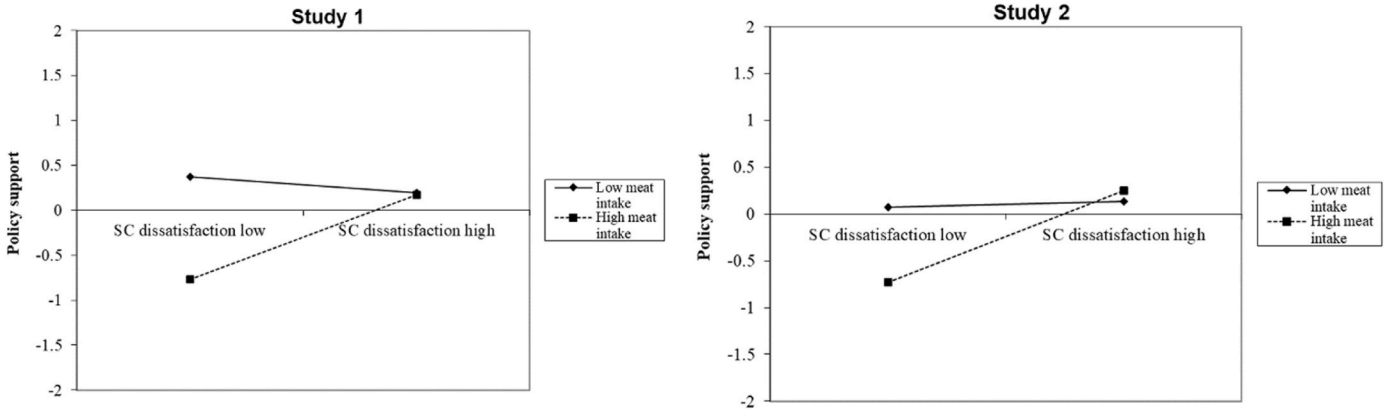

Fig. 1. Self-control dissatisfaction interacts with meat intake to predict policy support.

pricing at the cafeteria, so we did not test this effect. The full models and corresponding measures are presented in the Supplementary Materials.

5. Discussion

Recent work has suggested that individuals support policies targeting the immediate economic and physical food environment to change behavior (Gold et al., 2020; Schroeder et al., 2017). This set of studies builds upon this preliminary evidence by testing the idea that those dissatisfied with their self-regulated success in implementing a low-meat diet are more supportive of policy interventions to reduce meat consumption. Multiple regression models from exploratory Study 1 and pre-registered Study 2 provide evidence for this hypothesis. This evidence also supports the idea that individuals who struggle to change their behavior may wish to "delegate" self-control to an external regulator to make meat consumption more expensive and presumably less attractive. While self-control studies have focused on deliberative individual behavior change, research on choice architecture suggests that interventions targeting situational characteristics are typically more effective in realizing population-level behavior change (Hollands, Marteau, & Fletcher, 2016; Marteau, Fletcher, Hollands, & Munafò, 2020). Notably, our results suggest that individuals may also recognize the advantage of external regulation in helping them realize difficult but desired behavioral changes.

As expected, immediate self-interest – higher desire for and actual consumption of meat – was negatively associated with policy support.

However, under some circumstances, expected benefits to other people or non-human species may motivate self-transcendence. Indeed, as hypothesized, participants who reported higher personal goal importance of climate change mitigation were more likely to support the proposed policies to reduce meat consumption. Exploratory analyses also revealed an attenuating effect of self-control dissatisfaction, such that policy support remained stable among frequent meat eaters if they were dissatisfied with their success in reducing meat consumption. These findings emerged beyond sociodemographic variables and were consistent across studies.

The present results have two principal implications for environmental psychological research. First, research reveals that, in many cases, citizens support more ambitious climate policies than currently implemented by their governments (e.g., in the U.S.; Tyson and Kennedy, 2020). The present work extends these findings by showing that individuals may consider policy a helpful tool to realize desired behavioral changes. Second, our work suggests one – of many imaginable – interfaces between consumer and citizen action, where top-down regulation can complement individual behavior-change efforts. This supports recent arguments that individual-level and system change are not mutually exclusive but urgently needed complementary strategies (e.g., Nielsen, Nicholas, Creutzig, Dietz, & Stern, 2021).

The present research has three main limitations. First, self-control processes unfold within short periods; thus, cross-sectional survey research cannot pinpoint functional associations between predictor and outcome variables or identify the mechanism linking self-control dissatisfaction to policy support. Second, our data cannot speak to the motivations underlying the "delegation" of self-control. That is, we did not assess reasons for wanting to reduce meat consumption (e.g., perceived climate, animal welfare, or health benefits). The magnitude of the observed association might vary across types or numbers of personal goals (see goal systems theory, Kruglanski et al., 2018). We also did not assess household income, and it is plausible that wealthier individuals are less affected by price increases. Third, the studies include single-item measures, potentially raising concerns over content validity and reliability. While not unfounded, bivariate correlations in both studies largely align with previous findings and conceptual expectations, and we found comparable results across one exploratory and one pre-registered, confirmatory study, increasing our confidence in the results.

6. Conclusion

Across two studies, we show that participants dissatisfied with their success in implementing a low-meat diet are more supportive of government (Study 1) and institutional (Study 2) policies that change food pricing to reduce meat consumption. The studies point to a previously underexplored self-control phenomenon, suggesting that individuals who struggle to implement desired behavioral changes may "delegate" behavioral regulation to an external agent under some circumstances.

Author statement

CAK: Conceptualization; Data curation; Formal analysis; Methodology; Writing – original draftKB: Conceptualization; Methodology; Writing – review & editing; Supervision KSN: Conceptualization; Methodology; Writing – review & editing WH: Conceptualization; Methodology; Writing – review & editing VB: Conceptualization; Methodology; Resources; Writing – review & editing; Supervision.

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