Forthcoming in *Comprehensive Results in Social Psychology*

Who are the opponents of nudging? Insights from moral foundations theory

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AN conceptualized the research, conducted the analyses, and wrote the paper. AE, DV, and GT provided feedback and suggestions on how to improve the paper. DV and GT designed the non-preregistered study. AE and AN designed the pre-registered study.

To be able to implement nudges in an effective and ethically defensible manner, it is important to understand why some persons find nudges objectionable. Drawing on moral foundations theory, we investigated the moral roots of attitudes to pro-self nudges (which benefit the agent) and pro-social nudges (which benefit society). This registered report is based on a preregistered replication and extension (N = 607) of a first non-preregistered study (N = 629) with diverse samples of Swedish adults. We found that (a) individualizing moral intuitions concerning harm prevention and fairness were associated with the perceived acceptability of the nudges, (b) binding moral intuitions concerning ingroup loyalties, traditions, and sanctity were associated with the perception that nudges infringe on the agent's freedom, and (c) individualist concern with freedom from the government's interference in human lives, and with liberty in general, was associated with the perception that nudges restrict the agent's freedom *and* are not acceptable. Opponents of nudging identified through cluster analysis exhibited high concern with liberty and low concern with individualizing and egalitarian values. These results were similar across studies and nudges, and they were consistent with our hypotheses, although individualist concern with freedom from the government specifically was the most robust *unique* predictor of opposition to nudges. Taken together, our findings suggest that opposition to nudges is rooted in attitudes concerning the conflict between public promotion of social goals, such as well-being, justice, or equality, and respect for the individual's freedom from interference from the government.

Keywords: nudging; pro-social nudge; pro-self nudge; moral foundations; moral intuitions; prosocial behavior

A central dilemma in a liberal democratic society is how to square efforts to improve human decision-making, impelled by our growing knowledge of the deficiencies in human rationality, with a respect for the autonomy and dignity of the individual. In their groundbreaking book, Thaler and Sunstein (2008) proposed that nudging gives us a way out of this dilemma. Nudging restructures the choice architecture so as to make it more likely that the agent chooses the desirable option, for instance by making this the default option or by making it visually salient—one of the paradigmatic examples is that of placing healthy foods up front and unhealthy foods at the back of a cafeteria. Yet nudging is also non-coercive. It does not restrict the range of choices available or compel a particular choice—the agent is free to choose an unhealthy snack if s/he so desires.

Although this notion of nudging has been tremendously influential, it has generated controversy as well. Critics have argued that nudging is a form of subtle behavioral manipulation that encroaches on the individual's autonomy and that the "libertarian paternalism" espoused by Thaler and Sunstein (2008) is incoherent (Hausman & Welch, 2010; Yen, 2012). These considerations have generated a growing literature on to how, and to what extent, nudging can be implemented in an ethically defensible manner (e.g., Bruns et al., 2018; Loewenstein, Bryce, Hagmann, & Rajpal, 2015; Steffel, Williams, & Pogacar, 2016; Yan & Yates, 2019). One of the key issues that recent studies have addressed is how people feel about nudging. This issue has crucial ethical implications, because respect for the individual's autonomy in a liberal democracy entails taking his or her own preferences into consideration. It is easier to justify the use of nudging insofar as the persons who are exposed to it find it to be acceptable. In addition to this, recent research has shown that nudges sometimes backfire, leading people to resist what they perceive as illicit attempts to shape their behavior (Arad & Rubinstein, 2018; Bolton, Dimant, & Schmidt, 2019; Jachimowicz,

Duncan, Weber, & Johnson, 2019). The effectiveness of nudging therefore hinges on our knowledge of how people feel about nudges.

Past research has revealed that people overwhelmingly tend to support nudging, at least as long as they believe that the nudges serve legitimate purposes and fit with the interests and values of most people, throughout a diverse range of countries across the world (Felsen, Castelo, & Reiner, 2013; Hagman, Andersson, Tinghög, & Västfjäll, 2015; Jung & Mellers, 2016; Junghans, Cheung, & de Ridder, 2015; Reisch, Sunstein, & Gwozdz, 2017; Reisch & Sunstein, 2016; Sunstein, Reisch, & Rauber, 2018). Although the support for nudging is somewhat lower in a few countries (Denmark, Hungary, and Japan), most nudges have majority support even in these countries (Reisch & Sunstein, 2016; Reisch et al., 2017, 2018). Nevertheless, this does not necessarily mean that the opinions of minority sub-groups who are vehemently opposed to nudging can be ignored if we want to implement nudging in the most ethically cautious and effective manner. Several researchers have recently proposed that nudges are not a "one-size-fits-all", given that people judge a behavioral intervention differently depending on who they are (Hagman et al., 2015; Jung & Mellers, 2016).

Past studies have found that socio-demographic characteristics have some effects on attitudes to nudges. For the most part (but not without exception), support for nudges tends to be weaker among men than women, among younger than older persons, in high- than low-income households, and in non-metropolitan areas with an industrial heritage than other areas (Branson, Duffy, Perry, & Wellings, 2011; Diepeveen et al., 2013; Loibl, Sunstein, Rauber, & Reisch, 2018; Sunstein et al., 2018). A handful of studies have addressed the effects of personality characteristics on attitudes to nudges as well. Hagman et al. (2015) found that Swedes and Americans with a higher "individualism" (a belief that individuals rather than governments should have the responsibility for solving social problems, see Kahan, 2006)

were less accepting of nudges, while those with stronger preference for analytical thinking were less likely to think that the nudges restricted freedom of choice. Jung and Mellers (2016) also found that American individualists were more likely to oppose nudges by virtue of rejecting the goals of nudges and the messages they send. They found, moreover, that reactant persons and conservatives were more likely to oppose nudges by virtue of viewing them as a threat to personal autonomy, while empathetic persons were more likely to support nudges by virtue of endorsing the goals that they serve. Other studies have found little clear support for a link between political orientation and acceptance of nudging *per se* in a European context (Reisch & Sunstein, 2016). Rather, people appear to exhibit a partisan bias, in the sense that they view nudging as more ethical when illustrated in terms of examples that are consistent with their own political views (Tannenbaum, Fox, & Rogers, 2017).

Although these studies have identified a set of characteristics that shape attitudes to nudging, they do not provide a comprehensive account of why some persons support nudges while others do not. In the current research, we therefore drew on contemporary moral psychology, which provides a more systematic, theory-grounded portrait of individual differences in which activities people feel are morally legitimate and illegitimate (Ellemers, van der Toorn, Paunov, & van Leeuwen, 2019). We propose specifically that moral foundations theory (Graham, Haidt, & Nosek, 2009; Haidt & Graham, 2007; Haidt, 2007) provides a useful framework for understanding attitudes to nudges. This theory synthesizes insights from evolutionary psychology and anthropology, proposing that intuitions about morality rest upon at least two broad categories of evolved psychological foundations. The first category is comprised of the "individualizing" foundations, which involve a concern with caring for others and protecting their rights. The second category is the "binding" foundations, which involve a concern with ingroup loyalty, respect for authority, and purity. Both types of

moral foundation are portrayed as 'moral' by virtue of suppressing selfish desires; but while the individualizing intuitions entail an expansion of the moral circle outward and an impartial concern for the welfare of individuals regardless of their group membership, the binding intuitions pull in the opposite direction toward a circle of moral engagement centered on social collectives, such as family, team, congregation, or nation (Crimston, Bain, Hornsey, & Bastian, 2016; Graham, Waytz, Meindl, Iyer, & Young, 2019; Haidt, 2007).

It is easy to imagine that people would be most inclined to support nudges that are congruent with their moral foundations—past research has suggested that people tend to support charitable causes that are congruent with their moral foundations (Nilsson, Erlandsson, & Västfjäll, 2016) and that arguments and appeals can be more effective when they are framed in terms of the moral foundations of the recipients (Voelkel & Feinberg, 2018; Winterich, Zhang, & Mittal, 2012). But is there reason to think that moral foundations also affect the perceived acceptability of nudging *per se*, irrespective of the content of the nudges? We believe that there is. In fact, the very idea of behavioral interventions and social policy based on nudging appears to be rooted in an individualizing moral focus on improving the welfare (or "health, wealth, and happiness" as the subtitle of Thaler and Sunstein's pioneering book reads) of *all* individuals, regarding of which social groups they belong to. Persons who have strong individualizing moral intuitions should therefore embrace nudging to the extent that they feel that the nudges further these goals. By contrast, persons with strong binding moral intuitions may, given their ingroup-centric view of morality, be more inclined to view nudges as infringements on people's rights to decide for themselves what goals, groups, or causes to support—to them prosociality emerges primarily from cooperation, mutual trust, and respect for traditions and sacred values within a group rather than (or in addition to) behavioral engineering based on universalist moral agendas.

We therefore investigated the associations between people's moral foundations and the extent to which they feel that a series of common nudges are acceptable and restrictive of an individual's freedom of choice. We considered pro-self nudges, which focus on private welfare (e.g., promoting healthy food choices), and pro-social nudges, which focus on social welfare (e.g., lowering energy consumption; Hagman et al., 2015). There are also other prominent conceptualizations of nudges in the literature, including whether they target "System 1" (intuitive) or "System 2" (deliberative) processes (e.g., Felsen et al., 2013; Jung & Mellers, 2016; Sunstein, 2014). But the distinction between pro-self and pro-social nudges is particularly relevant here, because we expected, based on the foregoing theoretical analysis, that persons with strong binding intuitions are opposed primarily to the prosocial nudges. Past research has revealed that binding intuitions predict less donations to charitable causes that are outgroup-focused (e.g., international aid) but *higher* donations to causes that are likely to benefit the self or the ingroup (e.g., health or medical causes; Nilsson et al., 2016). Previous studies have also found that people tend to find pro-self nudges more acceptable than pro-social nudges (Hagman et al., 2015) and System 2 nudges more acceptable than System 1 nudges (Felsen et al., 2013; Jung & Mellers, 2016).

Non preregistered study

Our first study, which was not pre-registered, tested the general hypotheses that individualizing moral intuitions predict higher support for pro-self and pro-social nudges, while binding moral intuitions predict lower support particularly for pro-social nudges, using a diverse sample of Swedish adults (N = 629).

We also investigated the extent to which moral foundations predict these attitudes to nudges over and above the effects of other constructs that have proved to predict support of nudges. Based on the findings from previous studies (Hagman et al., 2015; Jung & Mellers,

2016), we took the individualism and egalitarianism constructs from Kahan's (2006) cultural cognition model, as well as preferences for analytical and intuitive thinking from the Epstein et al. (1996) dual systems framework, into consideration. Past research has revealed associations between individualizing moral foundations and egalitarianism (Federico, Weber, Ergun, & Hunt, 2013; Nilsson & Erlandsson, 2015), as well as intuitive thinking (Yilmaz & Saribay, 2017), and a negative association between binding foundations and analytical thinking (Nilsson, Erlandsson, & Västfjäll, 2019). Furthermore, the moral foundations are strongly associated with left-wing or liberal (individualizing) vs. right-wing or conservative (binding) political orientations (Graham et al., 2009), and Kahan's individualism scale measures a libertarian political orientation. We therefore investigated whether individualizing and binding moral intuitions predict attitudes to nudges over and above effects of individualism, egalitarianism, and preferences for intuitive and rational thinking, as well as sex, age, and income.

Because we were particularly interested in who the opponents of nudging are, we also performed a series of exploratory cluster analyses of the ratings of all nudges. After identifying two distinct groups of persons who found the nudges objectionable, we investigated their levels of binding and individualizing moral intuitions, individualism and egalitarianism, and preference for rational and intuitive processing styles, as well as their socio-demographic characteristics, compared to the whole sample.

Method

Sample

We recruited 629 Swedish adults (50.4% men; 49.4 % women; M_{age} = 46.6, SD = 16.8; Md_{income} = 25000 to 33000 SEK) from a nationwide panel (20000 persons selected to represent the Swedish adult population in terms of socio-demographic characteristics) with

the help of an independent research firm. This firm used quota sampling to make sure that the recruited sample contained approximately the same proportions of persons from different age groups, gender groups, and geographic regions as the total population does. We confirmed the approximate representativeness of the sample by comparing it to official demographic statistics for Swedish adults (gender distribution: 50.0% men; 50.0% women; M_{age} = 50.0; Md_{income} = 30900 SEK; Statistics Sweden, 2018, 2019).

A *post hoc* power analysis conducted in G*power 3.1.9.4 (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that we had 80% power (two-tailed) to detect a correlation of $|\rho|$ = .11 and 95% power to detect a correlation of $|\rho|$ = .14. Gignac and Szodorai (2016) found that 75% of correlations reported in individual differences research are .11 or higher.

Materials

The participants completed the instruments in the following order: demographics, attitudes to nudges, cultural cognition, moral foundations, and processing styles.

Attitudes to nudges. We used an instrument developed by Hagman et al. (2015) to measure attitudes to nudges. All participants were presented with the same eight vignettes in random order (see the supplemental document "Nudge vignettes.pdf", https://osf.io/dwbxf, for a full description of the vignettes). Each vignette presented a common case of nudging (e.g., opt in/opt out or affective images) in a specific policy area. The nudge scenarios were chosen to represent key policy areas and to include the most common type of nudge interventions presented in the literature on nudging (e.g., Marteau et al., 2011; Thaler & Sunstein, 2008). Four of the nudges were classified *a priori* as pro-self nudges and four were classified as pro-social nudges. Two of the pro-social nudges, which consisted in changing the default choice while allowing individuals to opt out (organ donation and a climate compensation fee on air travel respectively), can also be considered System 1-nudges; two of them instead provided

information relevant to the choice (an indication of energy consumption on the bill and a message to encourage payment of taxes respectively), akin to System 2-nudges. Two of the pro-self nudges can be considered System 1-nudges as well (placing healthy food at eye-level in the cafeteria to increase the salience of healthy options and putting deterrent pictures on cigarette packages), while two of them were more akin to System 2-nudges (adding green tags to healthy food and red tags to unhealthy food in order to facilitate healthy choices and offering smokers a voluntary program with financial incentives to stay away from smoking).

The participants were presented a description of each nudge (e.g., "Overconsumption of calorie rich food can lead to deteriorating health. In an attempt to get their employees to eat healthier, a company rearranged its cafeteria. Healthy food was placed at eye-level so that it would be easily available for the visitors of the cafeteria. Unhealthy food, such as candy or snacks, was placed behind the counter to make it less visible and accessible for the visitors in the cafeteria. The idea with this intervention is to encourage the consumption of healthier alternatives to improve the health of the employees."). They were asked to rate the extent to which they thought that the given nudge is acceptable, restricts the individual's freedom of choice, benefits individuals, and benefits society on Likert scales ranging from 1 (*Not at all*) to 4 (*Very much*). We constructed four-item scales for acceptability (pro-self: α = .71, ω_h = .64; pro-social: α = .58, ω_h = .55), restriction of freedom (pro-self: α = .69, ω_h = .66; pro-social: α = .60, ω_h = .55), benefit to individuals (pro-self: α = .75, ω_h = .72; pro-social: α = .58, ω_h = .55), and benefit to society (pro-self: α = .81, ω_h = .76; pro-social: α = .65, ω_h = .60).

The participants did indeed rate the pro-self nudges as more beneficial to individuals (M = 3.15, SD = .76) than the pro-social nudges (M = 2.73, SD = .73), $t(628) = 14.9$, $p < .001$, d = .58[.47, .70] (95% CI), similar to past findings (Hagman et al., 2015). However, they did not

rate the pro-social nudges as more beneficial to society (M = 3.23, SD = .78) than the pro-self nudges (M = 3.22, SD = .69), $t(628) = .58$, $p = .56$, $d = .02$[-.09, .13] (95% CI).

Moral foundations, cultural cognition, processing styles, and demographics. We measured moral intuitions with the Moral Foundations Questionnaire (Graham et al., 2009, 2011), which has previously been translated into Swedish (Nilsson & Erlandsson, 2015). This instrument measures five foundations (harm, fairness, loyalty, authority, and purity) with six items each. For each foundation, three items measure the perceived relevance of moral concerns that rest on this foundation (e.g., "Whether or not someone suffered emotionally") and three measure moral judgments based on this foundation (e.g., "Respect for authority is something all children need to learn"). We used Likert response scales ranging from 0 (*not at all relevant*) to 5 (*extremely relevant*) for the moral relevance items and from 0 (*completely disagree*) to 5 (*completely agree*) for the moral judgment items. We computed individualizing intuitions as the average of intuitions concerning harm and fairness (12 items, α = .84, ω_h = .69) and binding intuitions as the average of intuitions concerning loyalty, authority, and purity (18 items, α = .87, ω_h = .61). We did not analyze results at the level of the specific foundations because our theoretical analyses applied to the distinction between the superordinate factors, and the hierarchical model is well-supported in previous research (Graham et al., 2011; Nilsson & Erlandsson, 2015).

We measured individualism (α = .73, ω_h = .54) with six items (e.g., "The government should stop telling people how to live their lives") and egalitarianism (α = .76, ω_h = .59) with six items (e.g., "Our society would be better off if the distribution of wealth was more equal") based on short-measures of these constructs presented by Kahan (2012). We substituted one egalitarianism item ("Society as a whole has become too soft and feminine") for another item that seemed more appropriate to the Swedish context ("It seems like the criminals and welfare

cheats get all the breaks, while the average citizen picks up the tab") that was also included in the full scale. The participants responded on Likert scales ranging from 1 (*completely disagree*) to 4 (*completely agree*).

We measured preference for intuition (α = .93, ω_h = .76) with 15 items (e.g., "I believe in trusting my hunches") and preference for deliberation (α = .93, ω_h = .71) with 16 items (e.g., "I enjoy intellectual challenges") that were based on an instrument that was developed to integrate several different measures (Pachur & Spaar, 2015). The participants responded on Likert scales ranging from 1 (*completely disagree*) to 5 (*completely agree*).

The participants also reported the gender, age, and monthly pretax income in SEK (1 = *8000 or less*, 2 = *8001 to 17000*, 3 = *17001 to 25000*, 4 = *25001 to 33000*, 5 = *33001 to 41000*, 6 = *41001 to 50000*, 7 = *50001 to 58000*, 8 = *58001 or more*).

Statistical analyses. We estimated reliability coefficients (Cronbach's alpha and McDonald's omega hierarchical coefficients) through the "psych" package in R 3.2 (Revelle, 2018). We performed all other statistical analyses in SPSS 26.0. The data are openly accessible (see "Data non-preregistered study.csv", https://osf.io/k9pba).

Scores on rated acceptability of the nudges were skewed to the left (skewness = -.80 and -.62 for pro-self and pro-social nudges respectively) with most participants clustered at the high end of the scale, while scores on the rated restrictiveness of freedom of choice were skewed to the right (skewness = .54 and .43 for pro-self and pro-social nudges respectively) with most participants at the low end of the scale. We found no indication that these deviations from normality altered the results. Comparable parametric and non-parametric tests yielded very similar results (paired samples t-tests vs. related-samples Wilcoxon signed-rank tests of differences in rated acceptability and restrictiveness of pro-self and pro-social nudges;

Pearson's product moment correlations vs. Spearman's rank-order correlations between all of the variables). We therefore report results of parametric analyses.

We investigated the robustness of the relations between moral foundations and attitudes to nudges (acceptability and restriction on freedom of choice) through regression models. In the first step, we entered only individualizing and binding moral foundations as predictors. In the second step, we added deliberative and intuitive processing styles, and in the third, we added individualism and egalitarianism. In the final fourth step, we added sex, age, and income. We also investigated whether ratings of the extent to which pro-self and pro-social nudges restrict freedom of choice mediated relations between moral foundations and the rated acceptability of the nudges in question. We did this by estimating indirect paths with bias-corrected bootstrap confidence intervals (based on 10000 resamples) through the PROCESS (v. 3.3) macro for SPSS (Hayes, 2017). All reported confidence intervals are based on a 95% confidence level.

We finally ran a series of k-means cluster analyses in order to try to identify one or several groups of persons who disliked the nudges and explore their moral intuitions, cultural cognition, and processing styles. We based the analysis on the rated acceptability and restriction of freedom for all eight nudges (i.e., 16 variables in total). We started with two clusters and then gradually increased the number of clusters until we had identified sizable clusters of persons who disliked the nudges. We then investigated whether the cluster members were significantly above or below the mean of variables measuring moral intuitions, individualism and egalitarianism, intuitive and deliberative processing styles, age, and income, and whether the frequencies of men and women in these clusters varied from the gender distribution in the full sample.

Results

Levels of support for pro-self and pro-social nudges

The degrees to which the participants found the nudges acceptable and restrictive on individual freedom are displayed in Table 1. Around 60-85% of the participants found each of the nudges to be acceptable. Overall, the average acceptability was slightly higher for the pro-self nudges (M = 3.15, SD = .71) than the pro-social nudges (M = 3.02, SD = .70), $t(628)$ = 5.04, $p < .001$, d = .20[.09, .31], similar to the results of Hagman et al. (2015). But there were considerable variations within each category of nudges. As shown in Table 1, the participants found the quit-smoking program (a pro-self nudge) and the nudge promoting lower energy consumption (a pro-social nudge) the least acceptable, and they found the nudge promoting payment of taxes a lot more acceptable than other pro-social nudges.

[Insert Table 1]

There was no difference in the extent to which the participants rated the pro-self nudges (M = 2.03, SD = .76) and the pro-social nudges (M = 2.04, SD = .71) as restrictive of the individual's freedom of choice, $t(628)$ = -.42, p = .67, d = .02[-.09, .13]. As shown in Table 1, there was a lot of variation between the nudges. More than half of the participants considered the quit-smoking program restrictive or very restrictive of freedom of choice, while only around 20% of the participants found labeling of healthy food, deterrent pictures on cigarette packages, and a message promoting tax payment restrictive of freedom of choice, with the rest of the nudges falling in between these extremes.

Associations between personal characteristics and ratings of nudges

As shown in Table 2, which presents correlations between attitudes to nudges and the other scales that were included in the study, there were strong negative correlations between judgments of acceptability and judgments of the extent to which the nudges restrict freedom of choice for both pro-self and pro-social nudges. However, a regression analysis revealed

that acceptability of nudges was still much more strongly determined by whether the nudges were perceived as beneficial to individuals (pro-self nudges: β = .72[.64, .80]; pro-social nudges: β = .42[.36, .47]; $p < .001$) and to society (pro-self nudges: β = .08[.00, .15], p = .052; pro-social nudges: β = .38[.33, .44], $p < .001$)—the defining characteristics of pro-self and pro-social nudges respectively—than by their perceived restrictions of freedom of choice (pro-self nudges: β = -.14[-.18, -.09]; pro-social nudges: β = -.23[-.28, -.18]; $p < .001$; total R^2 = 71.1% for pro-self nudges and total R^2 = 70.3% for pro-social nudges). In other words, people tend to accept nudges more because they perceive them as beneficial than because they do not feel that they restrict freedom of choice.

[Insert Table 2]

Individualizing moral intuitions correlated substantially with the rated acceptability of both pro-self and pro-social nudges (see Table 2). They correlated weakly negatively with ratings of the extent to which both kinds of nudges restrict freedom of choice. Binding intuitions, on the other hand, correlated primarily with ratings of whether the nudges restrict freedom of choice. They correlated negatively with the rated acceptability of pro-social (but not pro-self) nudges as well, consistent with our expectations, but this correlation was weak. The patterns of significant correlations are largely consistent with our hypotheses, but we had not predicted the asymmetries in effect sizes on acceptability and restriction of freedom ratings between individualizing and binding moral intuitions. The correlation analyses also revealed that individualism consistently predicted higher acceptability and lower restriction of freedom ratings, while egalitarianism had effects in the opposite direction, and intuitive thinking consistently predicted higher restriction of freedom ratings as well (see Table 2).

Results of the regression analyses we conducted to investigate the robustness of these relationships are shown in Table 3. The positive association between individualizing moral

intuitions and the rated acceptability of the nudges proved to be highly robust, holding up when we added intuitive and deliberative processing styles (Step 2), individualism and egalitarianism (Step 3), and demographics (Step 4) to the model. The negative association between individualizing moral intuitions and restriction of freedom ratings held up in all four steps of the analysis for the pro-self nudges but only in the first two steps for the pro-social nudges. Conversely, the associations between binding moral intuitions and restriction of freedom ratings were highly robust, holding up across all steps of the analysis for both pro-self and pro-social nudges. Binding moral intuitions had a negative association with the rated acceptability of the pro-social nudges when only moral intuitions and processing styles were included in the model (Step 1 and 2), but this association was not significant when egalitarianism and individualism were added as well (in Step 3).

[Insert Table 3]

The associations between individualism and ratings of both pro-self and pro-social nudges proved to be very robust, while egalitarianism was robustly associated with ratings of the pro-social nudges but not the pro-self nudges. Intuitive and deliberative processing styles showed weak associations with restriction of freedom ratings but not acceptability ratings when moral foundations were included in the model, and age and income also had weak independent associations with ratings of the nudges (see Table 3).

Individualizing moral intuitions had a weak but significant indirect effect on the rated acceptability of pro-social nudges through ratings of the extent to which these nudges restrict freedom (indirect effect = .046[.003, .095], direct effect = .21[.15, .28]). The corresponding indirect effect of individualizing intuitions on the rated acceptability of pro-self nudges was not significant (indirect effect = .031[-.008, .073], direct effect = .26[.20, .33]). There were much clearer indirect effects of binding moral intuitions on the rated acceptability of pro-self

nudges (indirect effect = -.11[-.16, -.07], direct effect = .12[.05, .19]) and particularly pro-social nudges (indirect effect = -.14[-.19, -.09], direct effect = .04[-.03, .11]) through restriction of freedom ratings of the respective nudges. In other words, restriction of freedom ratings mediated primarily the effects of the binding moral intuitions on acceptability judgments. These results show that perceptions of whether nudges encroach on an individual's freedom matter for support for nudges primarily among persons who have strong binding moral intuitions.

Cluster analyses

We were able to identify two groups of participants who opposed nudges through cluster analysis. When we had increased the number of clusters to four, there was one cluster of participants (n = 113) who disliked both the pro-self and the pro-social nudges (acceptability: M = 2.07/2.06, SD = .54/.56; restriction of freedom of choice: M = 2.50/2.55, SD = .77/.67). At six clusters in total, this cluster of opponents of nudging split into two separate clusters. The first cluster (n = 56; acceptability: M = 2.20/2.26, SD = .54/.57; restriction of freedom of choice: M = 1.87/1.93, SD = .47/.44) was characterized by levels of individualizing moral intuitions and egalitarianism far below the mean ($p < .001$) and individualism slightly above the mean ($p = .014$). The second cluster (n = 72; acceptability: M = 2.14/2.02, SD = .60/.55; restriction of freedom of choice: M = 2.91/2.95, SD = .63/.51) was characterized by individualism far above the mean and egalitarianism far below the mean ($p < .001$) and also exhibited levels of intuition that were slightly above the mean ($p = .021$). The profiles of personality characteristics (moral foundations, cultural cognition, and processing styles) for all six clusters are illustrated in Figure 1. The two clusters of participants who disliked nudges recurred in seven to ten-cluster solutions, although they became somewhat smaller and sharper in terms of their personality profiles. The first cluster

was consistently characterized by low individualizing intuitions and egalitarianism, while the second was characterized by high individualism, low egalitarianism, and high intuition in all six to ten cluster solutions. The members of the second cluster were older (M = 53.1, SD = 16.1) than the sample average, $t(71) = 3.41$, $p = .001$, $d = .40$; there were no other differences between the two clusters and the full sample in terms of average age, average income, or gender distribution ($p \geq .31$)

[Insert Figure 1]

Discussion

The moral roots of opposition to nudges

We found support for a robust positive association between individualizing moral intuitions and the rated acceptability of both pro-self and pro-social nudges. This association held up when we controlled for individualism, egalitarianism, preferences for deliberative and intuitive processing, sex, age, and income. There was a weak negative association between binding moral intuitions and the rated acceptability specifically of the pro-social nudges, which is what we had expected, but this association did not hold up when we controlled for individualism and egalitarianism. These results suggest that individualizing moral foundations matter more for acceptance of nudges than the binding moral foundations do. The results from cluster analyses show even more clearly that this was indeed the case. One of the two clusters of individuals who were opposed to the nudges we took into consideration was characterized by a notable lack of individualizing intuitions coupled with a lack of egalitarianism, but none of these clusters had particularly strong binding moral intuitions.

Consistent with the well-established finding that people tend to support nudging as long as they believe that the nudges serve legitimate purposes (Sunstein et al., 2018), the present results suggest that persons with an individualizing moral orientation, who are concerned with

reducing suffering, promoting equality, and treating people fairly, are inclined to find nudges acceptable insofar as they believe that the nudges are aligned with these moral values. The fact that the vast majority of persons (including those with strong binding moral intuitions) do hold individualizing moral values to some degree (Graham et al., 2009) may help to explain why most people tend to support nudges. Although nudging is theoretically consistent with a wide array of moral goals, the vast majority of nudges (including the pro-self and pro-social nudges we addressed) have been tailored to further individualizing moral goals—indeed the very notion of nudge-based social policy introduced by Thaler and Sunstein (2008) appears to be embedded within an individualizing moral framework.

Yet the individualizing moral values are likely not the only ones that matter for people's general sense that pro-self and pro-social nudges are acceptable. We found a very robust positive association between an individualist opposition to government intervention in people's lives and acceptance of nudges, consistent with past research (Hagman et al., 2015; Jung & Mellers, 2016). Unlike the past studies, we also investigated the role of egalitarianism—the other core construct in Kahan's (2012) cultural cognition model—finding it to be very robustly associated with high acceptability ratings of pro-social nudges and similarly but less robustly associated with ratings of pro-self nudges. In addition, the second cluster of opponents of nudging that we found in this research was characterized by very strong individualism, coupled with very low levels of egalitarianism.

These results illuminate a second potentially significant source of opposition to nudges (in addition to a lack of individualizing moral values) in the form of a belief that governmental intervention in human lives to solve social problems or promote equality is morally objectionable. Even persons with a degree of individualizing moral values seem

inclined to reject nudges insofar as they feel that nudging is not a morally justifiable method of realizing these values.

The role of feeling that nudges restrict the individual's freedom of choice

Compared to the acceptability ratings, the restriction of freedom ratings exhibited largely the opposite pattern of associations with moral foundations—it was the binding rather than the individualizing moral intuitions that were robustly associated with these ratings. The individualizing intuitions were negatively associated with the restriction of freedom ratings, as expected, but the associations were weak and only the one concerning pro-self nudges held up when we controlled for the other personality and demographic variables.

The findings suggest that the binding moral intuitions concerning loyalty, authority, and purity play a more central role in whether a person feels that nudges encroach on an individual's freedom of choice. Given that the binding moral intuitions are associated with an ingroup-centric moral outlook (Graham et al., 2019; Nilsson et al., 2016), it is conceivable that persons with these moral intuitions are opposed to universalist moral agendas that seek to impose moral values on all individuals, thus threatening to restrict their freedom to support their own ingroup goals, causes, traditions, and values. This concern with restrictions of the individual's freedom among persons with strong binding intuitions seems to have reduced their support of nudges somewhat, as there were indeed indirect associations between binding intuitions and acceptability ratings through restriction of freedom ratings. But it does not itself appear to have led to a rejection of nudges, as neither of the groups who opposed the nudges had particularly strong binding intuitions. Rather, it appears to be the individualist opposition specifically to governmental interference in human lives that leads both to a sense that nudges encroach on the individual's freedom of choice *and* to a rejection of the nudges, because individualism was robustly associated with both low acceptability and high restriction of

freedom ratings, and one of the groups who opposed the nudges was characterized by a very strong individualism.

These results demonstrate that people's attitudes to nudging do indeed reflect their general intuitions about what is morally right and what is not. But they also suggest that acceptability ratings and restriction of freedom ratings have different moral roots. Acceptance of nudges appears to be shaped by a moral concern with harm prevention, fairness, and equality that takes precedence over a concern with liberty, while the sense that nudges restrict freedom of choice appears to be shaped by a concern with ingroup loyalties, traditions, and values and a prioritization of liberty over equality.

Furthermore, the ratings of the acceptability of the nudges were far more closely related to the perceived benefit of the nudges to individuals and society than to perceived infringements of the individual's freedom. In other words, judgments of whether nudges encroach on an individual's freedom appear to play a peripheral role in judgments of the acceptability of nudges. Although the freedom of choice issue has played a prominent role in intellectual debates over nudging (Hausman & Welch, 2010; Yen, 2012), it seems to matter much less from the people's perspective, if our results prove to be replicable.

In addition to this, we found that thinking styles were associated with restriction of freedom ratings rather than acceptability ratings. But our findings suggest that it is intuitive thinking that increases the restriction of freedom ratings rather than deliberative thinking that decreases them. In addition, one of the clusters of opponents of nudges had above-average levels of intuitive thinking. One possible explanation is that persons who rely on their intuition are more susceptible to external influences and therefore more concerned about being manipulated by nudges (Hagman et al., 2015).

Preregistered study

The fact that the first study was not preregistered increases the risk that confirmation bias reflected in analytical choices and interpretations of the results could have affected the conclusions. We therefore proposed a preregistered follow up study that would closely replicate our first study as a basis for this registered report. The methods used in this study were identical to those used in the non-preregistered study in relevant respects, except for three things. First, because the newest version of the moral foundations model (Graham et al., 2013) includes a foundation for intuitions concerning liberty and resentment toward those who restrict liberty, alongside the binding and individualizing moral foundations, we added a measure of this foundation. Although we believe that Kahan's (2012) individualism scale taps into the liberty foundation, the addition of a validated measure of this foundation (Iyer et al., 2012) enabled us to address the role of a concern with liberty in opposition to nudges in a more direct way. Second, the results of the initial non-preregistered study gave us the opportunity to formulate the following more precise hypotheses:

(H1a) Individualizing moral intuitions are robustly positively associated with the rated acceptability of pro-self and pro-social nudges

(H1b) Individualizing moral intuitions are below average in at least one cluster of opponents of nudging

(H2) Binding moral intuitions are robustly positively associated with restriction of freedom ratings of pro-self and pro-social nudges

(H3a) Concern for liberty and individualism are robustly negatively associated with the rated acceptability of pro-self and pro-social nudges

(H3b) Concern for liberty and individualism are robustly positively associated with restriction of freedom ratings of pro-self and pro-social nudges

(H3c) Concern for liberty and individualism are significantly above average in at least one cluster of opponents of nudging

Third, the measure of attitudes to nudges we used in the initial non-preregistered study did not allow us to distinguish pro-social nudges that are designed to benefit the ingroup from those than are designed to benefit an outgroup, even though it is conceivable that persons with binding moral intuitions are more favorably disposed toward nudges that benefit the ingroup. We therefore asked each participant in this study to rate either an ingroup-focused pro-social nudge or a parallel outgroup-focused pro-social nudge after rating the eight nudges that were included in the first study. This enabled a stronger test of whether binding intuitions are indeed associated with higher ratings of the extent to which nudges in general restrict freedom, regardless of the content of the nudges.

Materials, data, laboratory log, and results from non-preregistered analyses are accessible through the Open Science Framework: https://osf.io/4z873.

Methods

Sample

The effects that pertain to our revised hypotheses were medium-sized to strong in the non-preregistered study (with all controls in place, the weakest one was .15). Analyses of *a priori* power conducted in G*power 3.1.9.4 (Faul et al., 2007) indicated that 600 participants would give us more than 95% power (two-tailed) to detect a correlation of of $|\rho| = .15$. This sample size also seemed to us likely to be sufficient for allowing us to identify sizable clusters of opponents of nudging, similar to the first study.

We recruited a new sample of 607 Swedish adults (49.6% men; 50.2 % women; M_{age} = 50.30, SD = 16.6; Md_{income} = 25000 to 33000 SEK) from the same panel that was used in the non-preregistered study, with the help of the same research firm, while making sure not to

"recycle" participants. As in the non-preregistered study, quota sampling was used to make sure that the sample was nationally representative in terms of age, gender, and geographic region. The sample was slightly more educated than the national average (37.2% had a college or university degree, compared to 28% in the total population, Statistics Sweden, 2019) and slightly to the right (M = 5.29, SD = 1.97) of the theoretical midpoint (M = 5) of left-right self-placement, $t(604) = 3.63$, $p < .001$, $d = 0.15$[.07, .23] (95% CI).

Materials

The participants completed the instruments in the exact same order as in the non-preregistered study (see "Full survey.pdf", https://osf.io/4f5q2, for details). We used a forced-choice format for all items to prevent reduction of power through missing data.

Attitudes to nudges. The participants rated the same four pro-social nudges (acceptability: α = .67, ω_h = .63; restriction of freedom: α = .62, ω_h = .57; benefit to individuals: α = .67, ω_h = .65; benefit to society: α = .66, ω_h = .65) and four pro-self nudges (acceptability: α = .70, ω_h = .62; restriction of freedom: α = .68, ω_h = .64; benefit to individuals: α = .70, ω_h = .63; benefit to society: α = .74, ω_h = .67) as in the non-preregistered study (Hagman et al., 2015). After this, they were randomly assigned to rate one of two versions of an additional nudge on the same dimensions. Half of the participants rated a nudge designed to solicit donations to an ingroup-focused charity organization, and the other half rated a nudge designed to solicit donations to an outgroup-focused charity organization. The descriptions of the nudge were identical in key regards. For both cases, customers in a shop or grocery store are asked whether they are willing to round up the amount they are due and donate the difference to a charity organization; the only difference is the description of the organizations the donations will be given to (see the supplementary document "Nudge vignettes.pdf", https://osf.io/dwbxf, for a full description). The descriptions of the ingroup-

and outgroup-focused charities were based on prior research validating this distinction (Erlandsson, Nilsson, Tinghög, Andersson, & Västfjäll, 2019; Nilsson et al., 2016).

The participants did indeed rate the four pro-self nudges as more beneficial to individuals (M = 3.12, SD = .72) than the four original pro-social nudges (M = 2.83, SD = .75), and the nudges concerning charitable giving toward ingroups (M = 2.27, SD = 1.10) and outgroups (M = 2.09, SD = 1.05), $t(606)$ 10.7, $p < .001$, $d \geq .43$. They rated the prosocial nudges as more beneficial to society (M = 3.20, SD = .73) than the nudges concerning charitable giving toward ingroups (M = 2.85, SD = 1.09) and outgroups (M = 2.68, SD = 1.11), $t(304) \geq 5.88$, $p < .001$, $d \geq .33$, but not the pro-self nudges (M = 3.19, SD = .70), $t(606)$ = .59, p = .55, d = .01[-.06, .08] (95% CI). Ratings of acceptability and restriction of freedom for the ingroup and outgroup nudges were substantially associated with corresponding ratings for the original pro-self and pro-social nudges (rs ranging from .32 to .47).

Moral foundations, cultural cognition, processing styles, and demographics. We measured binding (α = .84, ω_h = .52) and individualizing (α = .80, ω_h = .51) moral intuitions with the Moral Foundations Questionnaire (Graham et al., 2009, 2011). We also included a nine-item measure of the liberty foundation (α = .68, ω_h = .47) developed by Iyer et al. (2012), which covers both economic/government liberty (six items, e.g., “The government interferes far too much in our everyday lives.”) and lifestyle liberty (three items, e.g., “I think everyone should be free to do as they choose, so long as they don't infringe upon the equal freedom of others.”). Each of the two sub-groups of items includes one item addressing the moral relevance of liberty concerns (e.g., “Whether or not everyone was free to do as they wanted”). We placed these items among the similar relevance items of the Moral Foundations Questionnaire. We placed the seven remaining liberty items among those items of the Moral Foundations Questionnaire that address moral judgments (an attention check item was also

included among these items). We used back-translations to check and refine the Swedish translations of the liberty items. In line with our expectations, the liberty scale correlated strongly with individualism ($r = .54$, $p < .001$).

We measured individualism ($\alpha = .75$, $\omega_h = .59$), egalitarianism ($\alpha = .76$, $\omega_h = .59$), preference for intuition ($\alpha = .90$, $\omega_h = .76$), preference for deliberation ($\alpha = .92$, $\omega_h = .73$), gender, age, and income with the exact same scales and items as in the non-preregistered study. We also included a multiple-choice item asking participants to report the highest level of education they had completed (1 = *Compulsory school not completed*, 2 = *Compulsory school completed*, 3 = *Upper-secondary school completed*, 4 = *University/college studies started*, 5 = *Graduated from university/college*), a left-right self-placement item ("Do you see yourself as politically to the left or right on the political scale?"; 1 = *Very far to the left*; 9 = *Very var to the right*), and a multiple-choice item measuring party preference ("Which party would you vote for if there was a national election today?"; options included each party that was represented in the parliament, "Other", and "Don't want to say"). We placed these new items after the demographic items that were included in the non-preregistered study (sex, age, and income).

Statistical analyses. As in the first study, we performed all statistical analyses except for tests of reliability in SPSS 26.0. The data are openly accessible (see "Data preregistered study.csv", https://osf.io/9qdxv). As a reality check for whether the collected data would permit us to meaningfully test our hypotheses, we decided to require Cronbach's alpha coefficients of at least .50 and the absence of very strong ceiling or floor effects. These requirements were in general satisfied for all our variables. There was negative skew in the rated acceptability of prosocial nudges (skewness = -.63) and pro-self nudges (skewness = -.78; i.e., the scales did not pick up any variation among participants with the very strongest

support for nudges). But as in the non-preregistered study, comparable parametric and non-parametric tests of our hypotheses yielded very similar results. Analyses with outliers (identified in terms of an *a priori* threshold of ±3*1.4826*the median of the absolute deviations from the median score, see Leys, 2013) and analyses without these outliers also yielded very similar results. We therefore report results without exclusion of outliers. Full documentation of results from correlation analyses and regression models when all outliers were excluded is provided in supplemental documents (see "Tables without outliers.pdf", https://osf.io/5ybuq). We used Holm's sequential Bonferroni correction for the significance tests of our primary hypotheses (H1-H3).

We assessed the robustness of the relations between moral foundations and attitudes to nudges (acceptability and restriction of freedom of choice for 1. pro-self nudges, 2. pro-social nudges, 3. the ingroup donations nudge, and 4. the outgroup donations nudge) through hierarchical regression models, as in the initial non-preregistered study. In the first step, we entered individualizing, binding, and liberty intuitions as predictors. In the second step, we added deliberative and intuitive processing styles, and in the third, we added individualism and egalitarianism. In the final fourth step, we added sex, age, income, and education. We assessed potential multicolinearity in terms of tolerance, which was consistently above our a priori threshold of .25 for all predictor and control variables (tolerance $\geq$ .55). We also ran planned analyses of whether ratings of the extent to which pro-self and pro-social nudges restrict freedom of choice statistically mediate relations between moral foundations and the perceived acceptability of the nudges in question with the same procedure as in the non-preregistered study. All reported confidence intervals are based on a 95% confidence level.

We finally ran the same series of k-means cluster analyses that we ran in the non-preregistered study in order to identify groups of participants who disliked the nudges. We

decided to treat an average rated acceptability of both pro-self and pro-social nudges below the theoretical mean (2.5) as an indication that the members of the cluster disliked the nudges. We based the analysis on the rated acceptability and restriction of freedom for all eight nudges (i.e., 16 variables in total). We started with two clusters and then gradually increased the number of clusters to ten. We investigated whether the cluster members were significantly above or below the mean of variables measuring moral intuitions, individualism and egalitarianism, intuitive and rational processing styles, age, income, and education, and whether the frequencies of men and women in these clusters varied from the gender distribution in the full sample, similar to the non-preregistered study. We transparently report variations and similarities between the cluster solutions.

Results

Preliminary analyses of levels of support for pro-self and pro-social nudges

The average ratings of the nudges included in this study are displayed in Table 4. Preliminary exploratory analyses indicated that the levels of acceptance of pro-self nudges (M = 3.09, SD = .74) and pro-social nudges (M = 3.02, SD = .74) in the preregistered study were approximately as high as those we obtained in the earlier non-preregistered study, $t(1234) = .07$, $p = .94$, $d < .01$ and $t(1234) = 1.53$, $p = .13$, $d = .09$[-.02, .20], respectively. Similar to results of previous studies, the participants rated the pro-self nudges as slightly more acceptable than the pro-social nudges, $t(606) = 2.19$, $p = .029$, $d = .08$[.01, .16], although there were both pro-self and pro-social nudges among those with the highest acceptability (e.g., deterrent cigarette pictures and promotion of tax payment) and the lowest acceptability (e.g., quit-smoking program and climate-compensation). Support for the new nudge concerning donations to ingroup charity (M = 2.37, SD = 1.18) and outgroup charity (M = 2.29, SD = 1.10) was substantially lower than support for the standard pro-self nudges, $t(303) \geq 11.0$, $d \geq$

.82, and pro-social nudges, $t(303) \geq 10.7$, $d \geq .80$ ($p < .001$), with total acceptance rates around 45% (see Table 4).

[Insert Table 4]

There was no difference in the extent to which the participants rated the pro-self nudges ($M = 2.21$, $SD = .75$) and the pro-social nudges ($M = 2.22$, $SD = .79$) as restrictive of the individual's freedom of choice, $t(606) = .74$, $p = .46$, $d = .02$[-.08, .04]. But participants in this study rated both the pro-self nudges, $t(1234) = 3.96$, $d = .23$[.11, .34], and the pro-social nudges, $t(1234) = 4.36$, $d = .25$[.14, .36], as substantially more restrictive of freedom than participants in the non-preregistered study did ($p < .001$). Between 25% (healthy food labeling) and 60% (quit-smoking program and charity donation nudges) of the participants found the nudges restrictive or very restrictive of freedom of choice (see Table 4). The participants found the ingroup donations nudge ($M = 2.76$, $SD = 1.15$), $t(303) \geq 8.27$, $d \geq .54$, and the outgroup donations nudge ($M = 2.78$, $SD = 1.11$), $t(303) \geq 9.01$, $d \geq .57$, to be even more restrictive of freedom than the standard pro-self and pro-social nudges ($p < .001$).

Regression analyses replicated the finding from the first study that the acceptability of nudges was more strongly determined by whether the nudges were perceived as beneficial to individuals (pro-self nudges: $\beta = .72$[.63, .81]; pro-social nudges: $\beta = .43$[.37, .49]; $p < .001$) and to society (pro-self nudges: $\beta = .13$[.04, .21], $p = .004$; pro-social nudges: $\beta = .40$[.34, .47], $p < .001$) than by the extent to which they were perceived as restricting freedom of choice (pro-self nudges: $\beta = -.11$[-.15, -.07]; pro-social nudges: $\beta = -.18$[-.22, -.13]; $p < .001$; total $R^2 = 75.4\%$ for pro-self nudges and total $R^2 = 74.8\%$ for pro-social nudges). However, the ratings of whether the nudges restrict the agent's freedom did have somewhat stronger effects on the rated acceptability of the nudge promoting ingroup donations ($\beta = -.26$[-.34, -.18]) and outgroup donations ($\beta = -.29$[-.36, -.22]; $\beta \geq .46$ for benefit to individuals; $\beta \geq .21$

for benefit to society; $p < .001$; total $R^2 = 66.1\%$ and 66.7% respectively). In other words, the participants were frequently opposed to the new nudges that we included in this study, and this opposition was driven in part by the perception that these nudges encroached on the individual's freedom.

Associations between personal characteristics and ratings of nudges

Correlations between attitudes to nudges, moral foundations, cultural cognition constructs, and processing styles are shown in Table 5. The results of the hierarchical regression analyses we ran to gauge the robustness of relations between moral orientations and attitudes to nudges are presented in Table 6.

[Insert Table 5-6]

Preregistered hypothesis tests. Consistent with (H1a), individualizing intuitions correlated with higher rated acceptability of the standard pro-self and pro-social nudges, as well as the outgroup donations nudge (and lower ratings of restriction of freedom for the standard pro-self and pro-social nudges; see Table 5). However, the correlation between individualizing intuitions and the acceptability rating of the ingroup donation nudge was not significant when we adjusted for the number of tests of our hypotheses ($p = .038$, corrected $p = .23$). Furthermore, only the association between individualizing intuitions and the rated acceptability of pro-social nudges (and restriction of freedom ratings for pro-self and pro-social nudges) was even marginally significant when all predictors were included in the model (see Table 6). In other words, individualizing intuitions had little unique effect on the perceived acceptability of nudges, over and above effects of other predictors, in this study.

Consistent with (H2a), binding moral intuitions correlated with higher ratings of restriction of freedom for the standard pro-self and pro-social nudges (but not the outgroup donation nudge, see Table 5), and these associations were highly robust when the effects of

other predictors were accounted for (see Table 6). Binding intuitions correlated with the rated restriction of freedom for the ingroup donation nudge as well, and this association was marginally significant in the model that included all predictors. But binding intuitions did not correlate with ratings of the outgroup donation nudge at all, contrary to (H2), and did not correlate with the rated acceptability of any of the pro-social nudges. In other words, binding intuitions were *not* associated with a favorable attitude even to a pro-social nudge with a clear ingroup focus.

Consistent with (H3a) and (H3b), individualism correlated with lower ratings of acceptability and higher ratings of restriction of freedom for all types of nudges; and moral intuitions concerning liberty correlated with lower ratings of the acceptability of the standard pro-self and pro-social nudges (but not ingroup and outgroup donation nudges) and higher ratings of restriction of freedom for pro-self, pro-social, and outgroup donation nudges (but not the ingroup donation nudge; see Table 5). Individualism was by far the most robust predictor of attitudes to nudges in this study, with effects on acceptability and restriction of freedom ratings that held up in every step of the regression models. The associations between intuitions concerning liberty in general and the acceptability and restriction of freedom ratings held up when other moral foundations and processing styles were included in the models but much less so when individualism was included as well (see Table 6). The individualism scale was clearly the better predictor of attitudes to nudges overall.

Additional preregistered analyses. Preferences for intuition and deliberation had little consistent association overall with attitudes to nudges in this study. Egalitarianism, on the other hand, was consistently associated with higher ratings of acceptability and lower ratings of restriction of freedom for all types of nudges (see Table 5). Similar to the results of the initial non-preregistered study, the association between egalitarianism and attitudes to pro-

social (but not pro-self) nudges was very robust when other predictors were included in the model. Age also had unique effects on attitudes to nudges in some cases (see Table 6).

Binding and individualizing moral intuitions, individualism, and intuitions concerning liberty in general had indirect effects, in expected directions, on acceptability ratings through restriction of freedom ratings for pro-self nudges (individualizing: indirect effect = .046[.007, .087], direct effect = .118[.047, .189]; binding: indirect effect = -.087[-.132, -.049], direct effect = .177[.105, .248]; individualism: indirect effect = -.095[-.134, -.060], direct effect = -.306[-.376, -.236]; liberty: indirect effect = -.069[-.109, -.034], direct effect = -.068[-.140, .004]) and pro-social nudges (individualizing: indirect effect = .086[.041, .137], direct effect = .195[.128, .261]; binding: indirect effect = -.092[-.143, -.042], direct effect = .157[.090, .225]; individualism: indirect effect = -.127[-.176, -.086], direct effect = -.321[-.386, -.256]; liberty: indirect effect = -.097[-.144, -.054], direct effect = -.043[-.111, .026]). These results suggest that the effects of moral convictions on attitudes to nudges are indeed statistically mediated by perceptions of whether the nudges encroach on the individual's freedom.

Non-preregistered analyses. In supplemental documents ("Factor analysis of concern with liberty.pdf", https://osf.io/ubj5v), we also report results of exploratory psychometric analyses of the fifteen items used to measure individualism and concern with liberty. These analyses were, in contrast to all other analyses reported above, not planned prior to the data collection. The results revealed that items (from both scales) that concerned the legitimacy of governmental intervention in people's lives were strongly associated with attitudes to nudges, whereas those items (from the concern with liberty scale) that express the notion that people should be free to do as they want to loaded on a separate factor that was largely unrelated to attitudes to nudges.

Preregistered cluster analyses

We identified one group of participants who clearly opposed nudges and two groups with neutral to mildly negative attitudes to nudges in this study. The first group emerged consistently across four- to ten-cluster solutions, while the two more neutral groups emerged in seven- to ten-cluster solutions. The attitudes to nudges were slightly more negative for the two latter clusters in the eight-cluster solution than in the seven-cluster solution; we therefore report results primarily based on the eight-cluster solution. The profiles of personality characteristics (moral foundations, cultural cognition, and processing styles) for all eight clusters are shown in Figure 2.

[Insert Figure 2]

The results supported our hypotheses that there would be below-average levels of individualizing moral intuitions (H1b) and above-average levels of individualism and intuitions concerning liberty (H3c) in at least one cluster of opponents of nudging. The cluster of participants who clearly disliked the nudges (n = 56; acceptability for pro-self/pro-social nudges: M = 1.88/1.74, SD = .66/.55; restriction of freedom: M = 3.31/3.29, SD = .50/.51) was characterized by individualism and moral intuitions concerning liberty above the mean ($p <$ .001) and by individualizing intuitions and egalitarianism below the mean ($p \leq .004$; see "Nudge opponents" in Figure 2)—these associations held up across four- to ten-cluster solutions with the exception that concern with liberty was not significantly above the mean in six-, seven-, nine-, and ten-cluster solutions ($p \geq .070$). This cluster is very similar to one of the clusters of opponents to nudging we found in the initial non-preregistered study (see "Nudge opponents 2" in Figure 1).

One of the clusters with more neutral participants (n = 56; acceptability for pro-self/pro-social nudges: M = 2.58/2.40, SD = .48/.47; restriction of freedom: M = 2.51/2.54, SD = .55/.34) also exhibited a similar although less extreme profile, with individualism and moral

intuitions concerning liberty above the mean ($p \leq .002$) and egalitarianism below the mean ($p = .008$; see "Neutral to nudges 2" in Figure 2). This profile was similar in seven-, nine-, and ten-cluster solutions except that concern with liberty was not significantly above the mean in the ten-cluster solution ($p = .34$).

The second cluster of participants with neutral (or mildly negative) attitudes to nudges ($n = 54$; acceptability for pro-self/pro-social nudges: $M = 2.25/2.62$, $SD = .52/.57$; restriction of freedom: $M = 2.34/2.25$, $SD = .53/.53$) was characterized by individualizing intuitions below the mean ($p = .001$) and binding intuitions slightly below the mean as well only in the eight-cluster solution ($p = .033$; see "Neutral to nudges 1" in Figure 2). This cluster has some similarities with the second cluster of opponents to nudging we found in the non-preregistered study (see "Nudge opponents 1" in Figure 1). In nine- and ten-cluster solutions, individualism was above the mean ($p < .001$), and egalitarianism ($p \leq .044$) and individualizing intuitions ($p \leq .038$) were below the mean.

Discussion

The moral roots of opposition to nudges

The results of the correlation and cluster analyses were by and large consistent with our hypotheses and similar to those we obtained in the initial non-preregistered study. Ratings of the acceptability of both pro-self nudges and pro-social nudges were indeed associated with higher individualism (Kahan, 2012) and moral intuitions concerning liberty (Iyer et al., 2012), as well as lower individualizing moral intuitions concerning harm and fairness (Graham et al., 2011), consistent with (H1a) and (H3a). We did identify one cluster of opponents of nudging characterized by individualism (and less consistently concern with liberty) well above the mean and individualizing moral intuitions below the mean, consistent with (H1b) and (H3b).

When we investigated the unique effects of each predictor through regression analyses, we found that the individualism scale had by far the most robust effects on (lower) ratings of the acceptability of pro-self and pro-social nudges, and egalitarianism also contributed robustly to the prediction of the rated acceptability of pro-social nudges. These results are similar to the results of another recent study (Hagman, Erlandsson, Dickert, Tinghög, & Västfjäll, 2019). Moreover, the only cluster of participants who clearly opposed nudges in this study was most strongly characterized by high individualism and low egalitarianism. By contrast, individualizing moral intuitions had little unique effect on ratings of the acceptability of nudges over and above the effects of individualism and egalitarianism. Although we did identify one cluster of participants that was characterized primarily by a lack of individualizing intuitions (rather than high individualism and low egalitarianism), these participants expressed neutral (or mildly negative) attitudes to nudges rather than a clear opposition to nudges in this study. In this respect, our results diverge from those we found in the original non-preregistered study.

Taken together, these results suggest that opposition to nudges is rooted primarily in attitudes concerning the conflict between public promotion of social goals, such as well-justice, or equality, and respect for the individual's freedom from interference from the government. Moral intuitions concerning liberty do not seem to result in opposition to nudges by themselves; rather, it is intuitions specifically concerning freedom from governmental intervention in human lives that appear to matter for acceptance of nudges (see particularly the supplemental document "Factor analysis of concern with liberty.pdf", https://osf.io/ubj5v). A lack of individualizing moral intuitions about harm and fairness may by itself lead to indifference rather than opposition toward nudges, unless it is coupled with the idea that nudges illegitimately impose individualizing or egalitarian moral values on individuals. At the

same time, the robust effects of egalitarianism on the rated acceptability of pro-social nudges specifically provide further evidence that values aligned with the goals of nudges do, at least in some cases, matter to the endorsement of nudges irrespective of attitudes regarding the legitimacy of imposing these values on others.

Binding moral intuitions concerning ingroup loyalty, respect for authority, and purity (Graham et al., 2011) did *not* lead to reduced acceptability ratings of any type of nudge. This was true even though we included a nudge with the explicit purpose of promoting ingroup helping—a moral goal that is congruent with a binding moral orientation according to past research (Graham et al., 2019; Nilsson et al., 2016, 2020)—along with a parallel nudge with the purpose of promoting outgroup helping. Binding moral intuitions were not above average in any of the clusters of participants who were opposed or neutral to nudges either. In fact, binding moral intuitions were associated with a slightly *higher* acceptability rating of pro-self nudges and were far above the mean in one cluster of *proponents* of nudging (n = 80; see "Nudge proponents 1" in Figure 2).

These results are highly consistent with the findings of the initial non-preregistered study, corroborating the notion that opposition to nudges has little to do with binding intuitions concerning ingroup loyalty, authority, and purity *per se*. But it remains possible that persons with binding moral intuitions are more favorably disposed to other kinds of nudges than the ones we considered in this study. The nudge for promoting ingroup and outgroup donations we designed for this study was approved by an unusually low proportion of the participants, and this was in part because most of the participants felt that it restricts the individual's freedom. In other words, it did not optimally tune into people's moral taste buds. A potential explanation for this is that this nudge puts the agent in a social position in which s/he is observed by others and pressured to act (or to "give in" rather than autonomously give,

see Cain, Dana, & Newman, 2014). It is possible that antipathy toward the intrusive nudging technique overshadowed the potential significance of the content of the nudge (i.e., ingroup vs. outgroup focus) in this case. Pro-social nudges that enable the agent to make autonomous decisions anonymously may be more helpful for evoking approval of nudges among individuals with strong binding intuitions.

The role of feeling that nudges restrict the individual's freedom of choice

Ratings of the extent to which pro-self and pro-social nudges restrict freedom of choice were robustly associated with binding moral intuitions (except for the case of the outgroup donation nudge). They were also particularly robustly associated with high individualism (Kahan, 2012), rather than concern with liberty in general (Iyer et al., 2012); and ratings of the pro-social nudges specifically were, once again, associated with (low) egalitarianism. All of this is largely consistent with our hypotheses (H2 and H3c) and with our findings from the original non-preregistered study.

At the same time, it should be noted that some of the exploratory analyses yielded results that differed from those we obtained in the non-preregistered study. Most notably, individualizing moral intuitions were fairly robustly associated with (lower) perceptions that nudges restrict freedom of choice in this study, and the effects of individualizing intuitions on higher acceptability ratings were mediated by the perception that nudges do not restrict freedom of choice. In this respect, the asymmetries in the relations between binding and individualizing moral intuitions and attitudes to nudges were not as clear as they were in the original study. Furthermore, preference for intuition had no effects on ratings of whether nudges restrict freedom of choice at all in this study (similar to results by Hagman et al., 2019); the only effect of thinking styles that replicated in this study was a marginal effect of preference for deliberation on acceptability of pro-self nudges.

This pattern of findings is consistent with the supposition that binding moral intuitions about ingroup loyalty, authority, and sanctity evoke a sense that nudges encroach on the individual's freedom to support his or her own personal or ingroup goals, causes, traditions, and values, although this is not enough, in itself, to lead to opposition to nudges. By contrast, an individualist concern with freedom from governmental interference in human lives is clearly associated both with the sense that nudges encroach on the individual's freedom *and* with opposition to the nudges. Furthermore, values that are congruent with the goals of nudges, such as harm prevention, fairness, and equality, appear to assuage concerns that nudges restrict people's freedom and, at least in some cases, reduce opposition to nudges.

Finally, our preliminary analyses replicated the finding that the perceived acceptability of the pro-self and pro-social nudges that were included in the original non-preregistered study was a lot more closely related to the perceived benefits of the nudges to individuals and society than to perceived infringements of the individual's freedom of choice. However, ratings of acceptability and restriction of freedom were more closely associated for the charity donations nudge that we introduced in this study. Furthermore, we found more consistent indirect effects of moral foundations on acceptability ratings through restriction of freedom ratings than in the original study. Taken together, these differences in the results between the non-preregistered study and the preregistered study suggest that the moral roots of acceptance of nudges and concern that nudges encroach on the agent's freedom are not as separate as we conjectured when interpreting the findings of the original non-preregistered study.

General Discussion

Why do some people oppose nudges? This research was based on the proposal that moral foundations theory (Graham et al., 2009; Haidt & Graham, 2007) can shed new light on

this issue, because this theory provides a general framework for understanding individual differences in what people feel is morally right and wrong.

We started out with the general supposition that individualizing moral intuitions, which concern caring for others and protecting their rights, would yield support for nudges, while binding moral intuitions, which concern ingroup loyalty, respect for authority, and purity, may yield opposition to nudges (particularly those with prosocial goals). We reasoned that nudging is typically rooted in an individualizing moral concern with improving the welfare of *all* individuals, which could, within a binding moral framework, be perceived as a threat to people's right to decide for themselves what groups, goals, and causes to support. We subsequently formulated more precise hypotheses based on the results of a first non-preregistered study of attitudes to nudges among Swedish adults (N = 629). This registered report is based on a close replication of the initial non-preregistered study (N = 607) with more precise hypotheses based on the results of the initial study. The replication study also more explicitly considered moral intuitions concerning liberty (Iyer et al., 2012; Kahan, 2012) as a source of opposition to nudges and took an additional nudge into consideration to permit stronger tests of the hypotheses.

The results were largely supportive of our hypotheses. Individualizing moral intuitions were associated with acceptance of nudges, binding intuitions were associated with the perception that nudges restrict freedom of choice, and intuitions concerning liberty were associated with lower acceptance of nudges *and* stronger perception that nudges restrict freedom of choice. Furthermore, participants who strongly opposed nudges stood out in terms of concern with liberty and lack of individualizing intuitions and egalitarianism. However, neither lack of individualizing moral intuitions (Graham et al., 2009) nor concern with liberty in general (Iyer et al., 2012) had *unique* effects on opposition to nudges over and above the

effects of all other predictors and control variables (moral intuitions, cultural cognition, processing styles, and demographics). Rather, an individualist concern with freedom specifically from governmental interference in human lives had the most robust direct effect on opposition to (vs. support for) nudges, and egalitarianism also had a very robust effect on (lower) opposition specifically to pro-social nudges (both scales are based on the cultural cognition model, Kahan, 2006, 2012). Taken together, the results suggest that opposition to nudges is rooted primarily in attitudes concerning the conflict between public promotion of social goals, such as well-being, justice, or equality, and respect for the individual's freedom from interference from the government, which is captured well by Kahan's (2006, 2012) cultural cognition model.

The clearest discrepancy between the non-preregistered study and the preregistered study was that a lack of individualizing moral intuitions was a unique source of opposition to nudges in the non-preregistered study but not in the preregistered replication study. It is quite possible that the specific result we obtained in the original study was a statistical fluke. Another possibility is that the phenomena under scrutiny have genuinely changed in the time span between the original study (2015) and the replication study (2019) because of the attention Richard Thaler's 2017 Nobel Prize in economics drew to nudge-based behavioral interventions. In a country such as Sweden, where science literacy is high and the Nobel Prize is extensively covered by the news media, it is likely that a lot more people are aware of the existence of nudges, and the debates concerning the legitimacy of nudges, today than a few years ago. The fact that the participants in the replication study found the nudges to be considerably more restrictive of the individual's freedom of choice than participants in the original study did could be an expression of these changes in public consciousness concerning nudges.

It is also possible that some differences between results of the original non-preregistered study and the preregistered replication study could be due to differences in political orientation. A relatively high proportion (26.7%) of the replication sample supported a social conservative populist party (the Sweden Democrat party) known for its opposition to a liberal, universalist "elite" (political orientation was not recorded in the original study, but support for the Sweden Democrat party was considerably lower in 2015 than in 2019). It would not be surprising if this specific group of voters would exhibit reactance toward public policies that threaten to impose liberal values on people's lives. Indeed, they did express the least support for nudges and the most concern that nudges encroach on the individual's freedom of all groups of voters (see the supplemental document "Party preference.pdf", https://osf.io/bp5rx). Further research across diverse contexts is thus needed to investigate the cross-temporal, cross-cultural, and socio-demographic robustness of associations between attitudes to nudges and general moral orientations.

Another critical issue concerns the role of the content of nudges. In both studies, we found large variations in support for a set of standard nudges (Hagman et al., 2015, 2019) depending on the content of the nudges. In addition, the participants tended to oppose a nudge designed to solicit donations for charity particularly strongly, and this was, to a great extent, because they felt that this nudge restricts the individual's freedom of choice, presumably because it places social pressure on the agent. The fact that the design and content of nudges matters in this way is encouraging, insofar as it suggests that there is plenty of opportunity for further research to help us hone the craft of formulating nudges that are not likely to trigger discontent and reactance.

The results appear to suggest that the content of the nudges matters much less to which moral dispositions predict opposition to (vs. support for) nudges. For instance, we did not find

that binding moral intuitions predict less support for pro-social nudges (which focus on social welfare) than pro-self nudges (which focused on individual welfare), or less support for an outgroup donation nudge than an ingroup donation nudge, even though past research has suggested that binding moral intuitions entail a moral circle focused on ingroup collectives, such as family, team, or nation (Graham et al., 2019; Haidt, 2007; Nilsson et al., 2016, 2020).

At the same time, there was one exception—egalitarianism did robustly predict support for pro-social nudges but not pro-self nudges in our research (see also Hagman et al., 2019)—and there is also some previous evidence that interactions between personality characteristics and the content or framing of nudges can affect support for nudges (Jung & Mellers, 2016), including evidence of the existence of partisan bias in support for nudges (Tannenbaum et al., 2017). In addition, we focused on attitudes solely to pro-self and pro-social nudges in this research. There are many other types of nudges and other types of conceptualizations of nudges in the literature (Felsen et al., 2013; Jung & Mellers, 2016; Sunstein, 2014), and further research is needed to develop a comprehensive, psychometrically validated taxonomy of nudges. It is quite possible that people support nudges more when the content of the selected nudges is more specifically tailored to their moral foundations. It is also possible that adjusting the framing of one and the same nudge so that it appeals to people with different moral foundations could further increase support for nudges. Past research has suggested that moral foundations framing can be used to improve the effectiveness of arguments or appeals in other contexts (Voelkel & Feinberg, 2018; Winterich et al., 2012).

Future research should also investigate the role of personality constructs covering both a person's traits and his or her worldview in a more systematic and comprehensive manner (Nilsson, 2014). For instance, Kahan's (2006) cultural cognition framework provides a very useful but selective model of political preferences relevant to decision-making, but it does not

cover all potentially relevant kinds of political preferences or values (e.g., Caprara, et al., 2006; Schwartz et al., 2011), let alone worldviews (Koltko-Rivera, 2004; Nilsson, 2014). Furthermore, refining models and measures of moral dispositions is an ongoing project (Curry, Chesters, & van Lissa, 2019; Graham et al., 2013; Iurino & Saucier, 2020).

Insights gained through this research could hopefully be used to develop nudges (or other kinds of behavioral interventions) that are sensitive to each person's moral outlook and personality. Given the availability of big data and machine learning techniques today, it may become possible to develop gentle, personalized forms of nudging (e.g., Peer et al., 2019) that do not risk compromising the individual's autonomy.

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Table 1.

Proportions of participants who rated the nudges as acceptable and as restricting freedom of choice in the non-preregistered study

	Pro-self nudges				Pro-social nudges			
	Cafeteria redesign	Deterrent cigarette pictures	Quit-smoking program	Healthy food labeling	Organ donation	Climate compen-sation	Energy consump-tion	Paying taxes
Acceptable								
4 (Very much)	50.7%	53.6%	37.3%	53.9%	43.4%	44.8%	32.8%	56.3%
3 (Yes)	30.4%	25.6%	22.6%	30.4%	26.4%	25.6%	32.4%	25.4%
2 (No)	12.1%	13.7%	18.0%	11.1%	15.7%	13.8%	17.5%	10.0%
1 (Not at all)	6.8%	7.2%	22.1%	4.6%	14.5%	15.7%	17.3%	8.3%
Restricting freedom								
4 (Very much)	12.9%	9.1%	29.7%	8.6%	18.6%	17.2%	15.7%	6.7%
3 (Yes)	23.5%	13.0%	21.8%	13.7%	17.8%	21.5%	21.8%	11.3%
2 (No)	26.1%	22.4%	19.6%	20.2%	31.8%	27.5%	24.6%	14.1%
1 (Not at all)	37.5%	55.5%	28.9%	57.6%	31.8%	33.9%	37.8%	67.9%

Table 2.

Correlations between attitudes to nudges, moral intuitions, cultural cognition, and processing styles in the non-preregistered study

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Accept pro-self									
2. Accept pro-social	.54***								
3. Restrict freedom pro-self	-.46***	-.31***							
4. Restrict freedom pro-social	-.29***	-.54***	.63***						
5. Individualizing intuitions	.26***	.24***	-.09*	-.11**					
6. Binding intuitions	-.02	-.12**	.27***	.28***	.23***				
7. Egalitarianism	.23***	.38***	-.22***	-.33***	.39***	-.36***			
8. Individualism	-.26***	-.35***	.22***	.26***	-.18***	.10*	-.39***		
9. Preference for intuition	.00	-.08*	.18***	.24***	.10*	.34***	.16**	.08#	
10. Preference for deliberation	.12**	.06	-.06	-.07#	.17***	.09*	.03	-.05	.15***

Note: # $p \leq .10$, * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$. The correlations involving attitudes to nudges are Spearman rank-order correlations; the remaining correlations are Pearson product moment correlations.

Table 3.

Standardized beta coefficients of moral foundations, cultural cognition, and processing styles predicting attitudes to nudges in hierarchical regression models in the non-preregistered study

	Pro-self nudges		Pro-social nudges	
	Acceptable	Restrict freedom	Acceptable	Restrict freedom
Step 1	(R^2 = 8.3%)	(R^2 = 8.3%)	(R^2 = 9.3%)	(R^2 = 10.8%)
Individualizing intuitions	.30[.22, .39]***	-.18[-.27, -.10]***	.30[.22, .38]***	-.19[-.27, -.11]***
Binding intuitions	-.08[-.16, .00]#	.29[.21, .37]***	-.19[-.27, -.11]***	.33[.25, .41]***
Step 2	(R^2 = 8.8%)	(R^2 = 9.7%)	(R^2 = 9.5%)	(R^2 = 13.4%)
Individualizing intuitions	.30[.21, .38]***	-.17[-.26, -.09]***	.30[.21, .38]***	-.18[-.26, -.10]***
Binding intuitions	-.08[-.17, .01]#	.25[.16, .34]***	-.19[-.28, -.10]***	.29[.20, .37]***
Preference for intuition	-.01[-.10, .07]	.12[.03, .20]**	-.01[-.10, .07]	.15[.07, .23]***
Preference for deliberation	.07[-.01, .14]	-.06[-.14, .02]	.05[-.03, .13]	-.10[-.17, -.02]*
Step 3	(R^2 = 14.6%)	(R^2 = 13.0%)	(R^2 = 20.4%)	(R^2 = 18.7%)
Individualizing intuitions	.20[.11, .30]***	-.13[-.23, -.03]**	.13[.04, .22]**	-.06[-.16, .03]
Binding intuitions	-.01[-.11, .09]	.22[.13, .33]***	-.06[-.15, .04]	.20[.10, .29]***
Preference for intuition	.00[-.08, .08]	.10[.02, .19]*	.00[-.08, .08]	.14[.06, .22]***
Preference for deliberation	.06[-.02, .13]	-.05[-.13, .03]	.04[-.04, .11]	-.09[-.16, -.01]*

Individualism	-.22[-.30, -.14]***	.19[.10, .27]***	-.25[-.32, -.16]***	.18[.10, .26]***
Egalitarianism	.08[-.03, .18]	.00[-.10, .10]	.20[.10, .29]***	-.13[-.23, -.03]*
Step 4	(R^2 = 16.3%)	(R^2 = 14.0%)	(R^2 = 22.3%)	(R^2 = 19.4%)
Individualizing intuitions	.22[.13, .32]***	-.14[-.25, -.05]**	.15[.06, .24]***	-.07[-.16, .03]
Binding intuitions	.01[-.09, .11]	.21[.11, .31]***	-.04[-.13, .06]	.19[.10, .29]***
Preference for intuition	.02[-.07, .10]	.10[.01, .18]*	.02[-.06, .09]	.14[.06, .22]***
Preference for deliberation	.03[-.05, .11]	-.04[-.12, .04]	.02[-.06, .09]	-.09[-.17, -.01]*
Individualism	-.22[-.30, -.13]***	.19[.10, .27]***	-.25[-.32, -.16]***	.18[.10, .25]***
Egalitarianism	.09[-.02, .19]#	-.01[-.11, .10]	.21[.11, .30]***	-.13[-.23, -.03]*
Sex	-.05[-.13, .03]	.01[-.07, .09]	-.04[-.11, .04]	-.02[-.10, .06]
Age	-.11[-.19, -.03]**	.07[-.01, .15]#	-.10[-.17, -.02]*	-.01[-.09, .07]
Income	.07[-.01, .15]#	-.09[-.17, -.01]*	.11[.03, .18]**	-.09[-.16, -.01]*

Note. # $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.

Proportions of participants who rated the nudges as acceptable and as restricting freedom of choice in the preregistered study

	Pro-self nudges					Pro-social nudges				
	Cafeteria redesign	Deterrent cigarette pictures	Quit-smoking program	Healthy food labeling	Organ donation	Climate compen-sation	Energy consump-tion	Paying taxes	Ingroup donations	Outgroup donations
Acceptable										
4 (Very much)	42.2%	59.6%	34.6%	56.0%	43.8%	35.6%	42.7%	52.6%	23.7%	17.5%
3 (Yes)	30.3%	21.9%	23.1%	27.0%	26.4%	30.0%	32.9%	25.9%	23.0%	26.7%
2 (No)	16.1%	10.4%	15.5%	10.2%	13.2%	15.3%	15.0%	11.7%	19.7%	23.1%
1 (Not at all)	11.4%	8.1%	26.9%	6.8%	16.6%	19.0%	9.4%	9.9%	33.6%	32.7%
Restricting freedom										
4 (Very much)	21.6%	14.2%	35.7%	11.9%	26.5%	23.7%	14.0%	11.0%	37.5%	34.3%
3 (Yes)	25.2%	18.1%	21.4%	14.5%	23.4%	24.5%	20.1%	14.2%	20.7%	27.1%
2 (No)	25.0%	18.1%	21.4%	20.1%	25.9%	24.9%	22.1%	19.9%	22.4%	20.5%
1 (Not at all)	28.2%	49.6%	21.4%	53.5%	24.2%	26.9%	43.8%	54.9%	19.4%	18.2%

Table 5.

Correlations between attitudes to nudges, moral intuitions, cultural cognition, and processing styles in the preregistered study

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Accept pro-self														
2. Accept pro-social	.54***													
3. Accept ingroup donations	.31***	.30***												
4. Accept outgroup donations	.48***	.42***												
5. Restrict freedom pro-self	-.44***	-.31***	-.16**	-.23***										
6. Restrict freedom pro-social	-.28***	-.54***	-.11#	-.21***	.71***									
7. Restrict ingroup donations	-.15*	-.18**	-.56***		.39***	.38***								
8. Restrict outgroup donations	-.22***	-.16**		-.58***	.39***	.39***								
9. Individualizing intuitions	.16***	.28***	.12*	.21***	-.11**	-.19***	-.05	-.10#						
10. Binding intuitions	.10*	.07#	.03	.03	.17***	.15***	.13*	.01	.31***					
11. Liberty intuitions	-.13***	-.14***	-.03	-.09	.17***	.19***	.05	.18**	.19***	.22***				
12. Egalitarianism	.13***	.33***	.23***	.32***	-.24***	-.35***	-.23***	-.28***	.36***	-.26***	-.25***			
13. Individualism	-.38***	-.42***	-.26***	-.35***	.24***	.28***	.17**	.30***	-.17***	-.04	.54***	-.34***		
14. Preference for intuition	.07#	.05	.14*	-.02	.07	.05	-.01	.04	.24***	.38***	.23***	-.06	.00	
15. Preference for deliberation	.10*	.05	.01	.01	.07	.05	.06	.02	.19***	.27***	.18***	-.07	-.06	.31***

Note: # $p \leq .10$, * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$. The correlations involving attitudes to nudges are Spearman rank-order correlations; the remaining correlations are Pearson product moment correlations.

Table 6.

Standardized beta coefficients of moral foundations, cultural cognition, and processing styles predicting attitudes to nudges in hierarchical regression models in the preregistered study

	Pro-self nudges		Pro-social nudges		Ingroup donations		Outgroup donations	
	Acceptable	Restrict freedom	Acceptable	Restrict freedom	Acceptable	Restrict freedom	Acceptable	Restrict freedom
Step 1	(R^2 = 6.1%)	(R^2 = 8.4%)	(R^2 = 11.7%)	(R^2 = 11.5%)	(R^2 = 1.5%)	(R^2 = 3.0%)	(R^2 = 6.3%)	(R^2 = 4.4%)
Individualizing intuitions	.18[.09, .26]***	-.20[-.29, -.12]***	.31[.23, .39]***	-.28[-.36, -.20]***	.11[-.01, .23]#	-.11[-.23, .01]#	.25[.13, .36]***	-.13[-.25, -.01]*
Binding intuitions	.07[-.01, .16]#	.22[.13, .30]***	.01[-.07, .09]	.21[.13, .29]***	.02[-.11, .15]	.19[.06, .32]**	.01[-.10, .13]	.05[-.07, .16]
Liberty intuitions	-.19[-.27, -.11]***	.15[.07, .22]***	-.21[-.28, -.13]***	.19[.11, .27]***	-.04[-.17, .08]	.00[-.12, .13]	-.13[-.24, -.02]*	.18[.07, .30]***
Step 2	(R^2 = 6.6%)	(R^2 = 8.6%)	(R^2 = 11.9%)	(R^2 = 11.7%)	(R^2 = 4.7%)	(R^2 = 4.1%)	(R^2 = 6.6%)	(R^2 = 4.4%)
Individualizing intuitions	.17[.08, .25]***	-.21[-.29, -.13]***	.31[.23, .39]***	-.28[-.36, -.20]***	.11[-.02, .23]#	-.11[-.23, .01]#	.26[.14, .38]***	-.13[-.25, -.01]*
Binding intuitions	.05[-.04, .14]	.21[.12, .29]***	-.01[-.09, .08]	.20[.12, .29]***	-.04[-.17, .10]	.22[.08, .35]**	.03[-.09, .15]	.05[-.08, .17]
Liberty intuitions	-.20[-.28, -.12]***	.14[.06, .22]***	-.21[-.29, -.13]***	.19[.11, .27]***	-.07[-.19, .05]	.02[-.11, .14]	-.12[-.24, -.01]*	.18[.07, .30]**
Preference for intuition	.04[-.05, .12]	.00[-.09, .09]	.04[-.04, .13]	-.01[-.10, .07]	.20[.08, .33]**	-.12[-.24, .01]#	-.06[-.19, .06]	-.01[-.13, .12]
Preference for deliberation	.06[-.02, .15]	.04[-.04, .13]	.02[-.07, .10]	.04[-.04, .12]	-.05[-.17, .08]	.04[-.08, .17]	.00[-.11, .12]	.01[-.11, .12]
Step 3	(R^2 = 18.1%)	(R^2 = 13.0%)	(R^2 = 27.7%)	(R^2 = 17.3%)	(R^2 = 16.0%)	(R^2 = 10.0%)	(R^2 = 19.1%)	(R^2 = 13.0%)
Individualizing intuitions	.03[-.06, .12]	-.10[-.20, -.01]*	.09[.01, .18]*	-.13[-.23, -.04]**	-.09[-.23, .05]	.04[-.10, .18]	.04[-.09, .17]	.05[-.08, .19]
Binding intuitions	.05[-.04, .14]	.18[.09, .28]***	.05[-.04, .13]	.15[.06, .24]**	.05[-.09, .18]	.15[.01, .29]*	.10[-.03, .22]	-.01[-.14, .12]

Liberty intuitions	.08[-.02, .18]	-.03[-.13, .07]	.11[.02, .20]*	.01[-.09, .11]	.22[.07, .37]**	-.19[-.34, -.03]*	.12[-.02, .25]#	-.02[-.15, .12]
Preference for intuition	.02[-.06, .10]	.01[-.07, .10]	.02[-.05, .10]	.00[-.09, .08]	.17[.05, .29]**	-.09[-.22, .03]	-.06[-.18, .06]	.00[-.13, .12]
Preference for deliberation	.03[-.06, .10]	.06[-.02, .15]	-.02[-.09, .06]	.06[-.03, .14]	-.08[-.20, .04]	.06[-.06, .19]	-.02[-.13, .09]	.02[-.09, .14]
Individualism	-.42[-.51, -.32]***	.23[.14, .33]***	-.42[-.51, -.33]***	.21[.11, .30]***	-.34[-.49, -.20]***	.24[.09, .39]**	-.29[-.42, -.16]***	.24[.10, .38]***
Egalitarianism	.07[-.03, .16]	-.09[-.19, .00]#	.21[.12, .30]***	-.18[-.27, -.09]***	.23[.10, .37]***	-.18[-.32, -.04]*	.26[.13, .39]***	-.22[-.35, -.08]**
Step 4	(R^2 = 19.7%)	(R^2 = 13.7%)	(R^2 = 27.8%)	(R^2 = 17.6%)	(R^2 = 19.2%)	(R^2 = 10.3%)	(R^2 = 20.6%)	(R^2 = 15.7%)
Individualizing intuitions	.06[.-04, .15]	-.12[-.21, -.02]*	.10[.01, .18]*	-.13[-.22, -.03]**	-.08[-.22, .06]	.04[-.11, .18]	.06[-.07, .20]	.01[-.13, .15]
Binding intuitions	.04[-.05, .14]	.19[.10, .29]***	.05[-.04, .13]	.15[.05, .24]**	.07[-.07, .21]	.16[.02, .30]*	.09[-.03, .22]	.01[-.12, .14]
Liberty intuitions	.06[-.04, .16]	-.03[-.13, .07]	.11[.02, .20]*	.00[-.10, .10]	.18[.03, .33]*	-.19[-.35, -.03]*	.10[-.04, .23]	.02[-.12, .15]
Preference for intuition	.03[-.06, .11]	-.01[-.09, .08]	.02[-.05, .10]	.00[-.09, .08]	.16[.04, .28]*	-.09[-.22, .04]	-.05[-.17, .07]	-.05[-.17, .08]
Preference for deliberation	.02[-.06, .10]	.08[.00, .17]#	-.02[-.09, .06]	.06[-.02, .14]	-.07[-.19, .06]	.05[-.08, .18]	-.03[-.14, .08]	.06[-.06, .17]
Individualism	-.39[-.49, -.29]***	.23[.13, .33]***	-.42[-.51, -.33]***	.21[.11, .31]***	-.30[-.45, -.16]***	.25[.09, .40]**	-.26[-.40, -.13]***	.20[.06, .33]**
Egalitarianism	.06[-.03, .16]	-.10[-.20, -.01]*	.21[.12, .30]***	-.18[-.28, -.09]***	.24[.10, .37]***	-.18[-.33, -.04]*	.25[.12, .39]***	-.23[-.37, -.09]***
Sex	.00[-.08, .07]	.08[.00, .16]#	.00[-.08, .07]	.00[-.08, .08]	.06[-.05, .18]	.01[-.11, .13]	.04[-.07, .15]	.07[-.04, .19]
Age	-.13[-.20, -.05]***	.02[-.06, .10]	.00[-.07, .07]	-.04[-.12, .04]	-.16[-.27, -.06]**	.00[-.11, .11]	-.11[-.22, .00]*	.13[.02, .24]*
Income	.01[-.06, .09]	.02[-.06, .10]	.01[-.07, .08]	-.02[-.10, .05]	.02[-.08, .12]	.02[-.09, .13]	.05[-.07, .16]	-.09[-.21, .03]
Education	-.02[-.10, .05]	-.03[-.11, .05]	-.03[-.10, .05]	-.02[-.10, .06]	-.04[-.15, .07]	.04[-.07, .16]	.03[-.09, .14]	-.06[-.17 .06]

Note. # $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

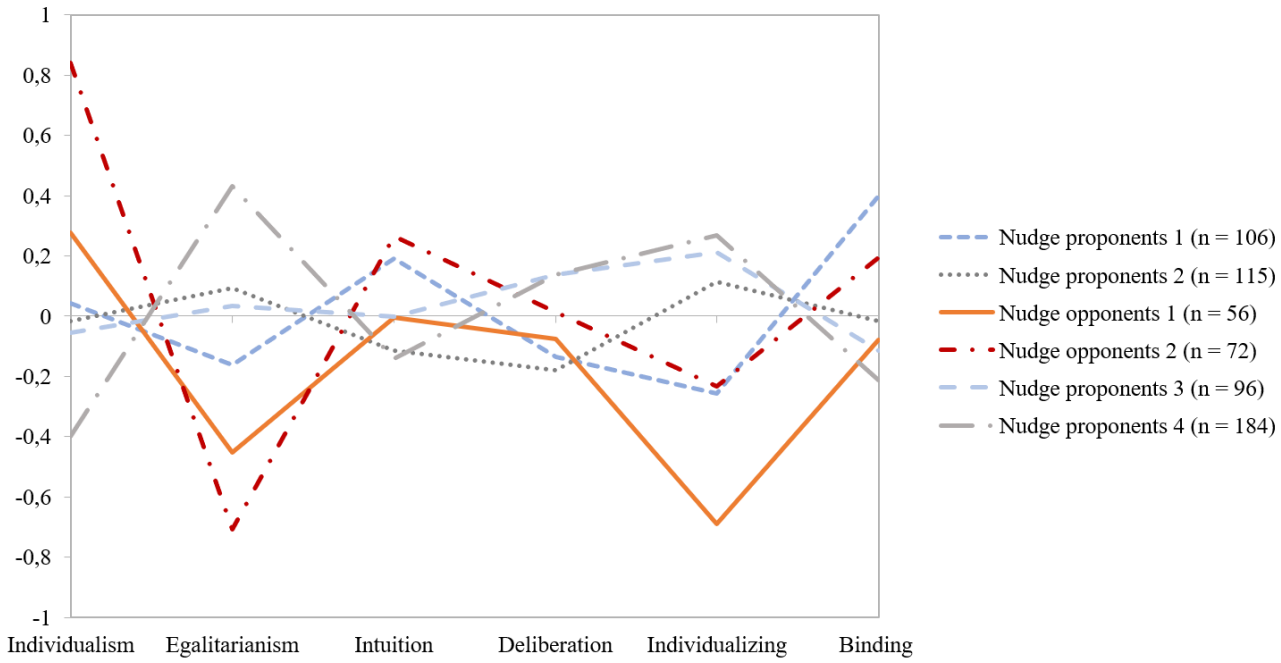

Figure 1.

Standardized cluster means based on a six-cluster k-means cluster analysis of attitudes to nudges. Nudge opponents: Clusters of individuals who opposed the nudges. Nudge proponents: Clusters of individuals who supported the nudges.

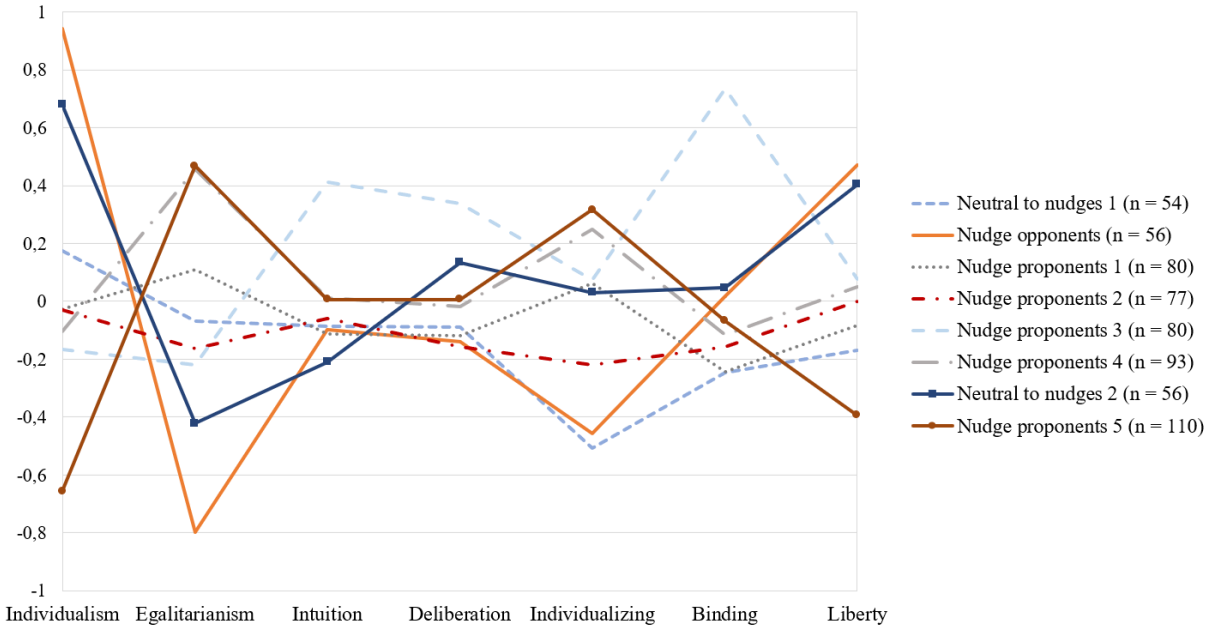

Figure 2.

Standardized cluster means based on an eight-cluster k-means cluster analysis of attitudes to nudges. Nudge opponents: Cluster of individuals who opposed the nudges. Neutral to nudges: Clusters of individuals with relatively neutral attitudes to nudges. Nudge proponents: Clusters of individuals who supported the nudges.