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Beyond social influence: Examining the efficacy of non-social recommendations☆

Danae Arroyos-Calvera [a], Johannes Lohse [b,a,*], Rebecca McDonald [a]

[a] University of Birmingham, United Kingdom
[b] Leuphana University, Germany

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ABSTRACT

Do recommendations need to contain social information to change behaviour in allocation and risk tasks? We conducted two online experiments involving 1280 participants to compare the behavioural influence of recommendations based on normatively relevant information with that of recommendations that were transparently random. Although social recommendations generally shifted choices towards the recommended option, consistent with previous studies on norm compliance, their effects were statistically indistinguishable from those of random recommendations. This finding challenges the notion that norm compliance is the sole mechanism through which social recommendations exert their influence. In a follow-up study with 481 participants, we investigated four additional channels. Our results suggest that recommendations do not act as reminders of existing normative knowledge, but we find evidence partially consistent with recommendation following in order to deflect responsibility, because of an anchoring effect, and because of a social norm to follow recommendations.

1. Introduction

Recommendations are regularly employed by firms, charities, and policy-makers to influence the behaviour of consumers and citizens. They often involve providing information about the behaviour of others, so-called social information (Nyborg et al., 2016; Bicchieri and Dimant, 2022; Bicchieri, 2023). For example, an individual browsing an online shopping website may see recommendations for a product that is popular amongst other consumers, and sometimes specifically amongst consumers that share characteristics, preferences, or shopping histories with them (Senecal and Nantel, 2004). Charities often use recommendations that refer to the most common donation amount they receive, a version of an information nudge studied widely in the academic literature (e.g., Agerström et al., 2016; Frey and Meier, 2004; Martin and Randal, 2008; Shang and Croson, 2009; Linek and Traxler, 2021). In a policy context, recommendations to reduce energy use in the home may be accompanied by information about the energy use of others (e.g., Schultz et al., 2007; Allcott, 2011; Allcott and Rogers, 2014).

Providing social information in isolation or as part of a recommendation is intended to either shift the perception of what the social norm is, for example, by changing the perception about what amount the average donor gives to charity; or intended to make an existing social norm more salient, for example, by reminding viewers about a highly popular TV show to stream online. A rich experimental literature corroborates these real-world examples (e.g., Bicchieri and Xiao, 2009; Gächter et al., 2017; Dimant et al., 2023). This literature highlights that informing experimental participants about other people's most common or most desired

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* Corresponding author at: Leuphana University and University of Birmingham.
E-mail addresses: d.arroyoscalvera@bham.ac.uk (D. Arroyos-Calvera), johannes.lohse@leuphana.de (J. Lohse), r.l.mcdonald@bham.ac.uk (R. McDonald).

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behaviour affects economic decisions across a wide range of domains by affecting their perceptions of descriptive or injunctive norms (Cialdini et al., 1990; Schultz et al., 2007; Bicchieri, 2016). Evidence of this has been found in allocation (Bicchieri and Xiao, 2009; Goeschl et al., 2018; Dimant, 2019) and risk tasks (Cooper and Rege, 2011; Trautmann and Vieider, 2012; Lahno and Serra-Garcia, 2015; Dannenberg et al., 2022).

The question we raise is whether recommendations *need* a social information component to influence behaviour. Consider, for instance, a case where the desired behavioural change contradicts the current norm. For example, a charity might like to increase their donation income above their current levels, or policymakers may wish to discourage an unhealthy habit that is engaged in by a large proportion of the population. In these cases, providing descriptive social information could potentially be counterproductive. Could recommendations that lack a social information component still be a powerful tool to change behaviour? In this study, we investigate whether this is the case by looking at what should be the least persuasive type of recommendation: those that are transparently random.[1]

This query can be broken down into three interrelated research questions. First, do social recommendations influence behaviour? If so, we would replicate standard findings from the social information literature, applied now to the context of recommendations. Second, do non-social recommendations shift behaviour, even when they are transparently random? That is, would recommendations that cannot operate via social norm compliance still be effective at inducing changes in behaviour. Third, is there a difference in the effectiveness of social and non-social recommendations in changing behaviour? If so, this should give us an idea of the (relative) importance of several channels, other than norm compliance, through which recommendations may influence behaviour.

To address these questions, we conducted two online experiments in which participants made choices in several incentivised binary choice tasks across the domains of allocation and risk. In the experimental treatments, participants in the role of Deciders were given recommendations about which option to select. Depending on the treatment, they received recommendations that were based on information about choices made by previous participants, or based on a random computer algorithm. In all cases, the source of the recommendation was made clear.

Regarding our first research question, we find that social recommendations influenced behaviour in all tasks, largely in line with what was expected. In each task type, there was some variation in the strength of this effect according to the specific content of the recommendation. In binary dictator games, only recommendations of the fair option affected behaviour; in allocation tasks without a tradeoff between own payoff and others' payoff, recommending a more equitable allocation had a stronger effect than recommending a less equitable allocation. In risky choice tasks, recommending the riskier lottery reduced the choices of the safer lottery but not vice versa.

Answering the latter two research questions is where the main novelty of this paper lies. We find that random recommendations do shift behaviour and in most instances as strongly and in the same direction as social recommendations. In the light of these results, we conducted a follow-up experiment to investigate why people may follow random recommendations. Better understanding these mechanisms contributes to the wider literature on recommendations, and information nudges more generally, by probing whether there are further reasons for following an information nudge other than norm compliance which is the most common explanation in the literature. In the follow-up experiment, we also explore whether these mechanisms only occur for recommendations or are also at play in information provision experiments more widely.

The remainder of this paper is organised as follows: in Section 2, we summarise the existing literature and describe some possible reasons for following recommendations. Section 3 describes the details of the design. Section 4 contains the results. We conclude with a brief discussion in Section 5.

2. Literature review: Reasons why people may follow recommendations

In this section, we discuss five possible channels through which both social and non-social (random) recommendations could affect behaviour and relate them to existing findings in the literature. While the first channel (norm compliance) should only be present for social recommendations, the remaining four channels should work similarly for social and non-social recommendations.

Existing studies that attribute social information effects to norm compliance distinguish between two main mechanisms: making social norms more salient or shifting what the norm is perceived to be (Bicchieri and Xiao, 2009; Bicchieri, 2016; Goeschl et al., 2018; Bicchieri and Dimant, 2022; Dimant et al., 2023). Early theories of norm compliance stipulate that individuals desire to conform to the perceived social norm to protect their status or esteem (Jones, 1984; Elster, 1989; Bernheim, 1994), and the internalisation of these norms is often assumed to lead to a direct preference against violating them (López Pérez, 2008). Even without internalising a norm, people may wish to avoid being viewed negatively, by others or by themselves, for violating it (Sugden, 2000; Bénabou and Tirole, 2006; Grossman, 2015).[2] In the context of our study, where social recommendations provide information about others' behaviour, such recommendations may operate exclusively through a preference for norm compliance.

[1] We intentionally focus on random recommendations in our experimental design as they promise the cleanest identification of the effects of non-social recommendations, deliberately abstracting from the opacity of many real-world examples such as a ‘‘chef's recommendation" or ‘‘Amazon's choice''. Studying opaque recommendations would require a thorough understanding of their effects on beliefs. Eliciting beliefs accurately comes with its own experimental challenges (Danz et al., 2022).

[2] Norms have been distinguished along further dimensions, including whether they are intrinsically held moral norms (in which case violating them leads to emotions like guilt) or externally motivated social norms (in which case the violation leads to shame) (Schram and Charness, 2015). For norms to become social and affect behaviour it is also deemed important that descriptive and injunctive norms are aligned (Bicchieri et al., 2018; Bicchieri and Dimant, 2022).

Channel I: When a social recommendation works via *norm compliance*, we expect behaviour to change in the direction of the recommendation's content.

In contrast, non-social recommendations, which in our case even originate from a transparently random source, lack the motive of norm compliance as they provide no insights into others' behaviour that might influence norm perceptions. There are, however, additional reasons why individuals might follow a (social or random) recommendation. Some of these reasons may still apply when presenting social information as in most studies investigating norm compliance; the different channels that underpin reactions to non-social recommendations may thus apply to the social norms literature more generally.

A survey by Bonaccio and Dalal (2006) details a body of work that has identified five key reasons why people might follow a recommendation: (i) receiving new information, (ii) enhancing decision accuracy, (iii) seeing the problem from a new perspective, (iv) sharing responsibility with its source, and (v) feeling social pressure to follow a recommendation.

Basing our non-social recommendation treatments on a transparently random source intentionally rules out any motives related to instrumental information: a transparently random recommendation cannot offer new insights (i); additionally, within the tasks we examine, there is no objectively optimal choice independent of preferences, meaning that recommendations cannot offer instrumental information that would improve subjective decision-making accuracy (ii).[3] The remaining reasons highlighted in the survey may however apply to the non-social recommendations we study. Similarly, the social recommendations we use in our experiment are not informative, beyond providing information about a social norm by highlighting a choice that was popular among previous participants.

Broadly in line with (iii), a recommendation could still influence behaviour by serving as an anchor or default, particularly when there is no strong existing preference for either of the two options. In psychology and experimental economics, the phenomenon of anchoring and adjustment is well-established (Lichtenstein and Slovic, 1971; Tversky and Kahneman, 1974) but, in most cases, the anchor is not framed as a recommendation.[4] When a decision maker is uncertain or indifferent between two choices, they might use the recommendation as a tie-breaker.

For instance, some charities suggest donations based on the typical amounts given by others, while others propose default amounts without disclosing the basis for these suggestions. Both methods can effectively influence donation sizes. For example, in a comprehensive review, Goswami and Urminsky (2016) find that defaults significantly impact donation decisions. Even a transparently random recommendation might thus serve as a tie-breaker that simplifies the decision-making process.

Channel II: When a recommendation works as a *tie-breaker or anchor*, we expect them to shift behaviour in the direction of the recommendation content.

In a variant of this explanation, both social and non-social recommendations could act as cues that retrieve pre-existing normative knowledge. Even when confronted with a random recommendation that contradicts this knowledge, decision-makers may be prompted to remember and consequently make choices that align with their homegrown normative knowledge. Such reminder effects may be especially strong in decision tasks where there is a strong and commonly held norm such as the 50:50 norm in allocation tasks (Andreoni and Bernheim, 2009).

Channel III: When a recommendation works as a *reminder*, we expect behaviour to change in the direction of the pre-existing normative knowledge (independent of its content).

In line with (iv), a random recommendation may serve as a way to diffuse responsibility for the consequences of the decision, extending the concept of moral wiggle room introduced by Dana et al. (2007) to the context of recommendations. Moral wiggle room suggests that people may seek ways to justify self-interested behaviour to protect their self-image and/or their social image. For example, consider a consumer shopping online for a bag of coffee. It is plausible that in the absence of a recommendation, the consumer opts for a relatively expensive brand of coffee if it is ethically and sustainably produced. Yet, the same consumer may choose the cheaper yet less ethically produced coffee if recommended. Essentially, the customer may be able to hide behind the recommendation to justify their self-interested behaviour. Evidence demonstrating people's exploitation of moral wiggle room and licensing has been found in contexts from the experimental laboratory (Dana et al., 2007; Van der Weele et al., 2014; Larson and Capra, 2009; Jarke-Neuert and Lohse, 2022), through to real-world settings like charitable donations (Exley, 2020; Garcia et al., 2020), and framed laboratory experiments, for example in the context of environmental behaviour (Momsen and Ohndorf, 2020). However, to our knowledge, the link between moral wiggle room and recommendations has not yet been explored. Insights from the literature on delegation also resonate with this idea, typically showing that people feel less responsible for an outcome once they have delegated a decision (e.g., Bartling and Fischbacher, 2012; Steffel et al., 2016)

Channel IV: When a recommendation facilitates the *diffusion of responsibility*, we expect behaviour will only change when there is a conflict between the benefit to oneself and the benefit to others. Specifically, we expect that recommendations favouring the self-serving option will influence behaviour, whereas recommendations promoting the fairer option will not.

Finally, decision-makers may simply follow a recommendation because it is labelled as a recommendation. While sounding somewhat tautological, such pure recommendation effects could arise from an internalised norm or social pressure to follow recommendations as suggested in point (v) of Bonaccio and Dalal (2006)'s review and was also found by Harvey and Fischer (1997).[5] As in studies presenting social information, participants may feel pressured to react to the presence of any information or recommendation.

[3] Independent from their content and source, recommendations may still invite participants to revisit their preferences or normative knowledge, a possibility which we investigate further in the context of (iii).

[4] We also note that there is some debate on the strength of anchoring effects in some of the paradigms used in this research (Maniadis et al., 2014).

[5] An alternative and behaviourally indistinguishable source of this pure recommendation effect would be experimenter demand effects (De Quidt et al., 2018).

Channel V: When there is a pure recommendation effect, we expect behaviour to change in the direction of the recommendation's content but only if the recommendation is clearly labelled as such.

In Section 4.3, we explore whether channels I–IV can rationalise some of the reactions to social and particularly random recommendations we observe in Studies 1 and 2. To explore the empirical validity of channel V, as well as to probe the robustness of previous results, we conducted a third, follow-up study.

We have established at least four channels by which non-social recommendations can still impact behaviour, although possibly less strongly than social recommendations. Given how effects from these various channels accumulate, we anticipate that social recommendation treatments, which introduce an additional channel of norm compliance, should influence behaviour at least to the same extent as non-social recommendation treatments. The existing literature is mostly inconclusive regarding the relative importance of the different channels, and most of the existing studies focus on information provision more generally.

Concerning anchoring, one paper that compares the effects of social vs. non-social information (but not recommendations) is that by Goeschl et al. (2018), who demonstrate that providing ostensibly irrelevant information (which could still serve as a behavioural anchor) does not affect giving compared to normatively relevant social information. In contrast, Cason and Mui (1998) show that subjects who were shown irrelevant information (i.e., the birthday of another experimental participant who was neither the dictator nor receiver) between an initial and final choice tended to increase their own allocation in a standard dictator game, whereas those shown normatively relevant information (i.e., the donation decision of another experimental participant) did not.[6] Neither of these studies framed the irrelevant information as a recommendation.

In the context of risky decision making, Lahno and Serra-Garcia (2015) show that individuals are more likely to imitate a peer's lottery choice if the peer chose the lottery (hence conveying social information) than when the peer was randomly allocated a lottery. This (social) imitation effect is stronger for peers' safe lottery choices than for risky lottery choices. Their design differs from our setting in that risks for each pair of participants were correlated, giving rise to relative payoff concerns.

There is also a more general literature on the role of recommendations or advice on economic behaviour. All studies we are aware of in this literature focus on social advice; i.e., advice originating from another person and hence providing information about a personal or descriptive norm. In some studies, the person providing the advice is impartial to the outcome of the decision situation (Schotter and Sopher, 2007; Schram and Charness, 2015), while in others they are impacted by the choices the advisee makes (Charness and Rabin, 2005).

In sum, the literature on the impact of recommendations or advice on economic behaviour is fairly limited and where it exists it focuses mainly on the role of social recommendations. In contrast, there is almost no direct evidence on the role of non-social recommendations or their relative persuasiveness and underlying mechanisms, which is our study's main contribution.

3. Methods

3.1. Overview

There were two roles in our study: Decider and Receiver. Participants in the role of Deciders were presented with 12 choice problems, each requiring them to decide between two options that impacted their own payoff and/or that of the Receiver(s) they had been paired with. Deciders were randomly allocated to a no-recommendation baseline or one of three (Study 1) or two (Study 2) recommendation-source treatments: random, social simple, or social smart. Deciders received recommendations (when relevant) and submitted their final choices.

Study 2 was designed and conducted as a replication of Study 1, and a follow-up to investigate the impact of the timing of a recommendation. In Study 1, recommendations were given *after* participants had made an initial choice. Participants were informed that they would revisit their decisions, they were shown their initial choice and a recommended choice, and were asked to resubmit a decision. In this setup, it is possible that people's desire to be consistent with their previous choices might reduce any effect of recommendations (Cialdini and Trost, 1998). Thus, in Study 2, we dropped the initial choice stage. Instead, recommendations were shown on the decision screen *while* participants were making their first and only decision.

3.2. Task types and choice problems

The 12 choice problems were divided into task types: there were 6 binary dictator games (BDG), 2 pure allocation tasks (AT), and 4 risk task (RT) choice problems. By varying the task types, we aimed to investigate whether differences between random and social recommendations occur in both allocation and risk tasks, and whether random and social recommendations affect choices through the mechanisms previously outlined. Including the 4 RTs allows us to explore the impact of recommendations in tasks where the normative dimension is less pronounced, as the choices involved do not require balancing the personal interests of Deciders against those of Receivers. Having more than one choice problem per task type allows us to vary parameters such that such tradeoffs become more or less pronounced.

In each BDG choice problem, Deciders faced a trade-off between their own payoff and the payoff of a Receiver. Option A, which we will call the *selfish* option, offered a relatively high payoff to the Decider and a relatively low payoff to the Receiver. Option B,

[6] The interpretation of this finding may be that in the absence of relevant information, typical participants would become more self-serving, whilst when relevant information is provided they do not — which would be in line with a hypothesis that relevance does matter in influencing behaviour.

Table 1
Choice problem payoffs.

Task type	Option A		Option B	
	Decider[a]	Receiver	Decider[a]	Receiver
BDG-1 (1)	100	40	80	55
BDG-1 (2)	100	50	80	55
BDG-1 (3)	70	10	50	50
BDG-1 (4)	60	10	50	50
BDG-2 (1)	100	[0.5, 10; 0.5, 70]	80	[0.5, 50; 0.5, 60]
BDG-2 (2)	100	[0.5, 30; 0.5, 70]	80	[0.5, 50; 0.5, 60]
AT (1)	100[a]	40	80[a]	55
AT (2)	100[a]	50	80[a]	55
RT-1 (1)	[0.5, 10; 0.5, 70]		[0.5, 50; 0.5, 60]	
RT-1 (2)	[0.5, 30; 0.5, 70]		[0.5, 50; 0.5, 60]	
RT-2 (1)		[0.5, 10; 0.5, 70]		[0.5, 50; 0.5, 60]
RT-2 (2)		[0.5, 30; 0.5, 70]		[0.5, 50; 0.5, 60]

[a] In the AT tasks the first payoff is for another passive receiver, not for the Decider.

the *fair* option, offered a higher payoff to the Receiver and a lower payoff to Decider, compared to Option A.[7] The six BDG choice problems differed in the payoffs they offered to the Decider and the Receiver, and payoffs are displayed in Table 1, alongside payoffs for the other task types explained below.

The first four choice problems were standard binary dictator games (BDG-1). The remaining two choice problems (BDG-2) were derived from a variant of the binary dictator game that is ostensibly more receptive to moral wiggle room because the Receiver's payoff depends on a lottery (Dana et al., 2007). Payoffs in most of the BDG tasks are structured to deliver payoff comparability within and across task types. For example, the Decider's payoffs are equivalent between problems BDG-1 (1) and BDG-2 (1), and the Receiver's expected payoff in BDG-2 (1) is equal to their certain payoff in BDG-1 (1). The exceptions, BDG-1 (3) and BDG-1 (4), are drawn directly from the literature on Moral Wiggle Room (Dana et al., 2007; Larson and Capra, 2009; Grossman, 2015) and provide further variation.

The pure allocation tasks (ATs) were a variant of the BDG-1 choice problems. Deciders could choose between the same options as in BDG-1, but this time their choice affected the payoff of two other Receivers, and not their own payoff. We included this variant to observe whether presenting (social) information via recommendations influences decision-making in an allocation task without an interpersonal trade-off.

In the Risk Tasks (RTs), Deciders made choices that did not involve a trade-off between own and others' payoffs. In each choice problem, they could choose between two lotteries, each offering a different level of risk and expected value such that Option B would be more attractive for risk-neutral and risk-averse participants while Option A would be more attractive to risk-loving participants. In total, Deciders made four lottery choices. In the first two, the Decider's lottery choice affected payoffs for themselves (RT-1). In the second two, the Decider's lottery choice affected payoffs for a Receiver (RT-2). The lottery payoffs mirrored the Receiver's payoffs in the BDG-2 tasks, again maintaining payoff comparability.

The order in which the task types were presented was fixed. Participants always encountered the BDG choice problems first, then the RT choice problems (appearing in random order) and lastly the AT choice problems. This structure helped with the explanation of the separate tasks. The label (Option "A" or "B") of the options in each choice problem was randomised at the participant level.

3.3. Experimental treatments

The primary experimental manipulations in studies 1 and 2 concerned the source and content of the different recommendations provided to participants. Participants were randomly assigned to different recommendation-source treatments in a between-subjects design. In the baseline, participants did not receive a recommendation but were simply reminded of their initial choice and had to confirm or change that choice (in Study 1), or made a single choice (in Study 2). In the different recommendation treatments, participants saw a recommendation before finalising (in Study 1) or whilst making (in Study 2) their decision.

The random recommendation treatment (*RandRec*) informed participants that the recommendation was randomly determined by a computer. It said "To create the recommendation, the computer algorithm follows a random process. It is equally likely to recommend either option".

The social simple recommendation treatment (*SocSimpRec*) informed participants that the recommendation was determined by a computer algorithm that considered the most common choice among a sub-sample of prior participants. The text said "To create the recommendation, the computer algorithm uses data from previous participants who faced the same decisions you are facing now. The computer will suggest actions that were popular amongst these previous participants".

[7] To exclude disadvantageous inequality concerns, neither option made the Receiver better off than the Decider.

Table 2
Number of Deciders across recommendation treatments and studies.

	Study 1	Study 2
No recommendation baseline	242	115
Random	242	103
Social simple	241	102
Social Smart	240	

In the social smart recommendation treatment (*SocSmartRec*), the recommendation was determined by a computer algorithm that considered the most common choice among a sub-sample of prior participants who share at least one of the individual characteristics that we asked participants about (i.e., their age, gender, household income, general willingness to take risks, and Big 5 personality traits). These characteristics were elicited from participants in all treatments (including the baseline), through a questionnaire that they completed before the decision tasks. These data allowed us to avoid deception when describing the recommendation's source. The instructions explained that "to create the recommendation, the computer algorithm uses data from previous participants who faced the same decisions you are facing now, and who gave similar answers as you did for some of the characteristics we asked you about at the beginning of this study. The computer will suggest actions that were popular amongst these participants".[8]

The content of the recommendation was also randomly determined between and within subjects. Half of the participants were recommended Option A, and the other half Option B. The content was randomised at the participant–task type level: a given participant received the same recommendation for questions of a given task type (i.e., BDG, RT, AT), but could receive different recommendation contents in different task types. For both social recommendation treatments we hence presented information from different non-randomly selected sub-samples of the baseline population. This is the most common approach of studies that share with our paper an interest in the differential impact of social norms by displaying different pieces of social information derived from selected parts of the baseline population (see e.g. Bicchieri and Xiao, 2009; d'Adda et al., 2020; Dimant et al., 2023).[9]

Table 2 summarises the number of Deciders per study and treatment. In Study 2, we dropped the social smart recommendation treatment, keeping only the random and social simple recommendation treatments. This was due to the lack of significant differences between the two social recommendation treatments in Study 1.

3.4. Receivers and norms elicitation

Receivers were matched to Deciders ex-post and received their payoff from the relevant randomly selected choice problem. Afterwards, some Receivers were invited to take part in an additional study. In this study, we asked them to consider a subset of the tasks completed by Deciders. For each of these, we elicited social norms concerning the appropriateness of choosing a given option and following a recommendation of a specific source and content.

The procedure was incentivised as in Krupka and Weber (2013): one in five Receivers received a £1 bonus if they correctly anticipated the most common norm in the sample of Receivers for a randomly chosen question and option within that question.

These data were collected from participants not in the decider role to assess whether strong social norms exist for choosing either of the two options and to explore the norms related to following recommendations based on their source and content.[10] Specifically, we analysed these data to determine whether random recommendations act as cues triggering pre-existing normative knowledge. If this channel exists, such effects should be observable in contexts where strong norms are in place, but absent otherwise. Additionally, the data help to ascertain whether different norms apply when following social versus random recommendations.

3.5. Procedures

We conducted the experiments online, hosting them in Qualtrics and distributing them to a UK-resident general population sample via Prolific. The studies' pre-registration, as well as the instructions and data can be retrieved from https://osf.io/a5jhg/ for Study 1, https://osf.io/bgz3d/ for Study 2.

Participants first learned about the structure of the study, and then found out whether they were Deciders or Receivers.[11] Experimental payoffs were determined by the choices Deciders made in one randomly determined question. Participants in both roles were informed that the payoff-relevant decision would be disclosed to Deciders and Receivers and the bonus payment would be made accordingly.

[8] As is common in the literature, the baseline treatment was conducted prior to the recommendation treatments to avoid deception, as it provided the data to generate the recommendations in the social recommendation treatments.

[9] To avoid deception, we are careful in the wording of our instructions to not suggest that the computer draws on *all* previous participants to generate recommendations. Not informing participants that other participants in other treatments see different information derived from a different sub-sample is considered appropriate by most in the profession (Charness et al., 2022), and is a common practice in the literature on social norms and social information.

[10] In Studies 1 and 2, these data were gathered for exploratory purposes. In the follow-up Study 3, explained further in Section 4.3, we pre-registered both the collection and analysis of these additional data.

[11] For logistical reasons, we matched Deciders and Receivers ex-post. Receivers would still see the instructions about the general setup of the study. Receivers were then informed about their bonus earnings via the Prolific messaging system.

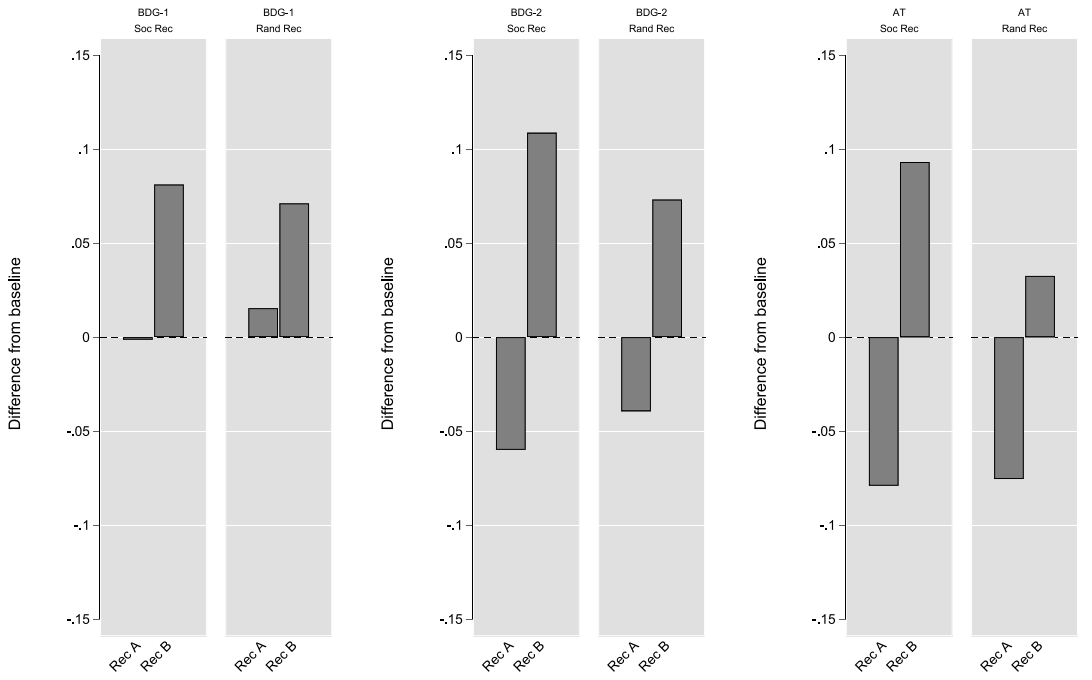

Fig. 1. Recommendation effects in the BDGs and ATs.
Note: For each task we show the deviation in Option B choices from baseline levels by task, recommendation source and recommendation content.

4. Results

We present empirical tests for the three research questions posed in the introduction. Firstly, we probe a well-established finding in the social norms literature: do recommendations that include social information influence behaviour? Secondly, do transparently random recommendations also affect behaviour? And thirdly, what is the relative impact of these random recommendations compared with those that offer social information? Subsequently, we use data from Studies 1 and 2 as well as data from a follow-up Study 3 to explore whether our findings are consistent with any of the five channels we describe in the literature review.

4.1. Overview

We start by providing a broad overview of the effects of both social and random recommendations in the allocation tasks and risk task in the two studies.

Without recommendations, 57.3% of participants chose the fair option (Option B) in the BDG-1 task, 53.6% did so in the BDG-2 task, and 52.9% in the AT.[12] Fig. 1 summarises how recommendations changed behaviour relative to these baseline rates, featuring each task (sub)type in a separate panel.

For the BDGs and ATs, three common patterns emerge. First, social recommendations lead choices to align more with the recommended option, with the exception of recommendations for the more selfish option (Option A) in the BDG-1 tasks. Second, we observe a similar pattern for random recommendations, where choices also tend to follow the direction of the recommendation. Third, the impacts of social and random recommendations appear comparable in both strength and direction. Recommendations of either type influence behaviour, shifting it by about 5-10 percentage points, or 10–20 percent relative to baseline levels.

Fig. 2 reproduces the previous figure but for the risk tasks instead. In both of the RTs, where the lotteries were set out to be equivalent to the Receiver's payoff in BDG-2, Option B was chosen by 91.1% of participants in the no-recommendation baseline. A similar pattern as with the previous tasks emerges for the risk tasks in our study. Both social and random recommendations shift

[12] BDG-1: (Study 1: 57.9%; Study 2: 55.9%). BDG-2: (Study 1: 52.7%; Study 2: 55.7%). AT: (Study 1: 49.1%; Study 2: 59.9%). The small and statistically insignificant difference in BDG baseline behaviour across the two studies suggests that the opportunity to revise an initial choice did not play a role when no recommendations were shown (BL Study 1 vs Study 2: M.W. Rank-sum test; $p = 0.0.768$). In the AT this difference is larger and significant (BL Study 1 vs Study 2: M.W. Rank-sum test; $p = 0.014$)

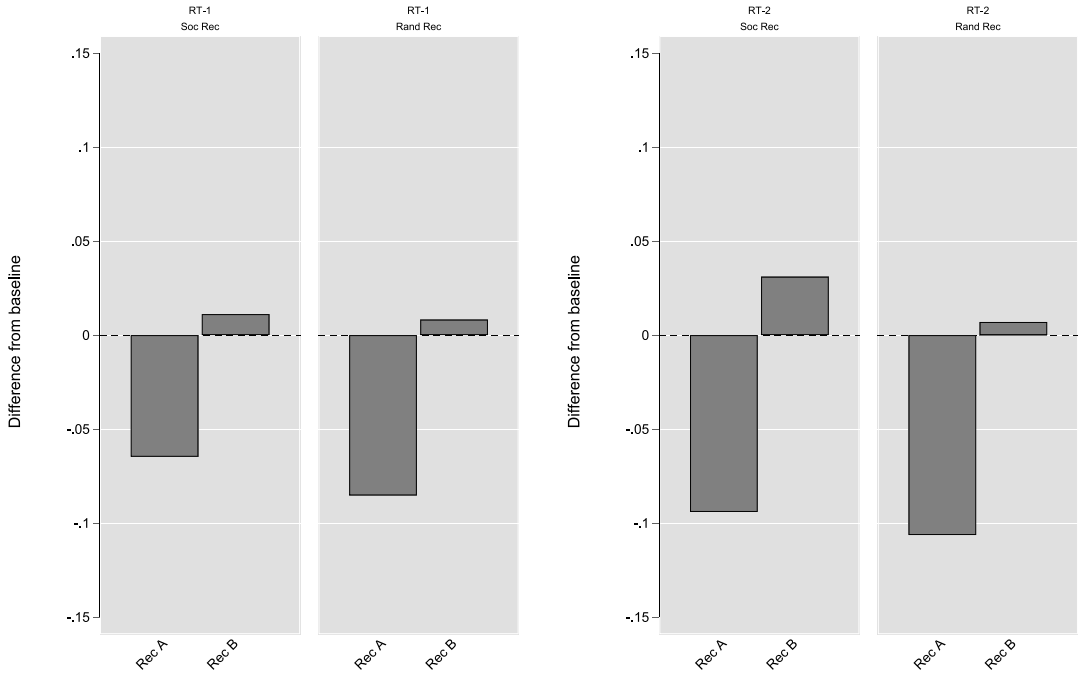

Fig. 2. Recommendation effects in the RTs.
Note: For each task we show the deviation in Option B choices from baseline levels by task, recommendation source and recommendation content.

choices relative to the baseline, and the size of the shift is similar. Across choice problems, recommending Lottery A reduced choices of Lottery B by 6-11 percentage points, while recommending Lottery B had a small effect of increasing Lottery B choices by 1-4 percentage points relative to the baseline level of 91.1%.[13]

In the appendix, we provide more detailed results for single tasks and studies (Figs. 3, 4, 5 and surrounding material). In Table 7 of the appendix we also show that the timing of recommendations (i.e. the main difference between Study 1 and Study 2) does not matter.

4.2. The (relative) effects of social and random recommendations

To formally test the three observations from the figures above, we run a set of Probit regression models that compare the size and direction of the effects of social and random recommendations across task types. In each model, four treatment dummies allow us to compare the effect of each randomly assigned combination of recommendation source and content, relative to that of the omitted no-recommendation baseline. The source of the recommendation could be social or random, and the content could be Option A or Option B. In the BDGs and the ATs, we use "B" to refer to the fairer option, and in the RTs, to the safer option.

The below equation summarises the structure of each regression model:

$$P(y=1)_{i,g} = \Phi(\beta_0 + \beta_1 \text{Soc_B}_{i,g} + \beta_2 \text{Soc_A}_{i,g} + \beta_3 \text{Rand_B}_{i,g} + \beta_4 \text{Rand_A}_{i,g} + \epsilon)$$

where $y_{i,g}$ is the choice of individual i in choice problem g, taking a value of 1 if Option B was selected.

We report the resulting Probit regression coefficients in Table 3. Model (1) looks at all choices jointly, disregarding any differences in task type. The remaining columns break down results by task type and subtype.[14] Models (2)-(4) feature choices in the BDGs; model (5), the ATs; and models (6)-(8), the RTs. In each specification, we include a fixed effect for each choice problem, study, and

[13] In the risk tasks, baseline levels did not vary significantly between Study 1 (93.5%) and 2 (90.0%) either; BL Study 1 vs Study 2: M.W. Rank-sum test; $p = 0.283$.

[14] As can be verified from Table 7 in the Appendix, the results reported here continue to hold when we break down our analysis by study instead. That is, the timing of the recommendation did not matter for our conclusions regarding the comparison of social vs random recommendations. Also due to the absence of significant differences, this time between the smart and simple social recommendation treatments in Study 1, we present the two treatments pooled in these regressions.

Table 3
Regression models: Choices of option B by recommendation source and content.

		Binary Dictator Games			Pure Allocation	Risk		
	(1) All Tasks	(2) BDGs	(3) BDG-1	(4) BDG-2	(5) ATs	(6) RTs	(7) RT-1	(8) RT-2
Rec Social (Option B)	0.349****	0.433****	0.430***	0.526***	0.600****	0.259	0.207	0.480**
	(4.78)	(3.63)	(2.98)	(3.16)	(3.61)	(1.59)	(0.97)	(2.05)
Rec Social (Option A)	−0.217***	−0.117	−0.0287	−0.297*	−0.286*	−0.575****	−0.480**	−0.824****
	(−3.03)	(−1.00)	(−0.20)	(−1.85)	(−1.73)	(−3.70)	(−2.35)	(−3.65)
Rec Random (Option B)	0.230***	0.387***	0.390**	0.368*	0.202	0.211	0.0827	0.122
	(2.83)	(2.87)	(2.28)	(1.95)	(1.10)	(1.15)	(0.35)	(0.45)
Rec Random (Option A)	−0.221***	−0.0207	0.0874	−0.182	−0.306	−0.825****	−0.726***	−0.899****
	(−2.82)	(−0.16)	(0.55)	(−1.01)	(−1.59)	(−4.84)	(−3.18)	(−3.67)
Fixed Effects								
Choice Problem Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Study Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Label Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15 420	7710	5140	2570	2570	5140	2570	2570
Wald Tests								
Random vs Social (Option B)	N.S.	N.S.	N.S.	N.S.	<	N.S.	N.S.	N.S.
Random vs Social (Option A)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

Note: t statistics in parentheses. Standard errors are clustered at the individual level.
For Wald Tests: N.S. No significant difference, < Random significantly smaller than Social, > Random significantly larger than Social; both with $\alpha = 0.05$.
* Significance level at $p < 0.10$.
** Significance level at $p < 0.05$.
*** Significance level at $p < 0.01$.
**** Significance level at $p < 0.001$.

the labelling of options. This approach holds constant variations across choice problem parameters and associated baseline rates of B choices.

Overall, as shown in model (1), both social and random recommendations are followed: a recommendation for Option B increases the frequency of Option B choices, and a recommendation for Option A decreases the frequency of Option B choices. The responses to social recommendations appear quantitatively stronger compared to the random recommendations for Option B (i.e., the fairer option in allocation tasks and the safer option in risk tasks), but not for Option A. We use Wald tests, reported at the bottom of the table, to compare the size of the variable coefficients of the random and social recommendations with a given recommendation content. These tests do not reveal any statistical differences (at a level of α=0.05) in the reactions to the two recommendation sources (social vs random). The remaining models provide a more nuanced picture for each task type and subtype.[15]

Paying closer attention to each of the tasks, we first turn to the BDGs. The coefficients for social recommendations (*Rec Social A* and *Rec Social B*) in models (2)-(4) provide results at different levels of aggregation: all BDGs in model (2), BDG-1 only in model (3), and BDG-2 only in model (4). In the social recommendation treatments, fair choices are significantly more common after receiving a recommendation for the fair option (B). Self-serving recommendations (A) have a negative effect on fair choices that is insignificant in BDG-1 and weakly significant in the BDG-2 choice tasks. Comparing across models, there is little variation in the size of the coefficients, corroborating our observation that the specific task subtype had no discernible influence on people's reaction to recommendations.

Coefficient estimates for *Rec Random A* and *Rec Random B* show that random recommendations delivered a similar pattern as social recommendations, with somewhat reduced coefficient sizes in some instances. The Wald tests at the bottom of Table 3 support a key result of our study: the lack of evidence, for any of the specifications or recommendation contents, that the effect of a social recommendation is significantly larger than the effect of the corresponding random recommendation. This indicates that adding normatively relevant social information to a recommendation does not lead to behavioural effects that are statistically distinguishable from those of a random recommendation.

This result raises questions about why people react to a random recommendation; we will discuss several possibilities in the next section. It also demonstrates that the typical approach to studying conformity, which is to provide social information and measure how behaviour responds, may require more careful consideration when it comes to the interpretation of its findings. Random recommendations in our setting elicit behaviour that looks just like conformity does in the social recommendation treatments, even though there is no social component in the recommendation that Deciders can attempt to conform with. In other words, the behavioural responses we observe to social recommendations may also be influenced by mechanisms other than norm compliance.

[15] Since we have several treatment arms, it may be warranted to correct for multiple hypothesis testing (List et al., 2019). We use the procedures and associated Stata commands described in Clarke et al. (2020) to calculate Romano–Wolf stepdown adjusted p-values. Applying this procedure to models (1),(2),(5) and (6), i.e. models for all data and each task type separately, we find no changes to our results for models (1) and (2). In model (5) the social recommendations lose their significance while in model (6) the social recommendation for Option B gains significance.

If similar mechanisms, such as anchoring, are at play when presenting social information, then attributing all observed effects solely to conformity could significantly overstate the importance of this mechanism.

The choice patterns in the allocation tasks are displayed in model (5) of Table 3. In these tasks, Deciders chose between the same two options as in the BDGs-1, but this time the decision would affect the payoff of two Receivers, rather than their own payoff and that of one Receiver.

For social recommendations, the allocation task results mirror those of the BDGs. When the fairer allocation (Allocation B) was recommended, Deciders were significantly more likely to choose this allocation. When the less fair allocation A was recommended, participants were more likely to choose it, and therefore less likely to choose allocation B; this effect is weakly significant. Different from the BDGs, the effects of the random recommendation, while directionally similar to the social recommendation, are weaker and not statistically significant in any of the model specifications.

The Wald tests at the bottom of the table show one instance where the social recommendation leads to a stronger behavioural response than the random recommendation. This difference to the BDGs could reflect differences in the task type, specifically the lack of tradeoffs between own and other's payoff.

Lastly, we move to the risk tasks. Model (6) pools the two choice problems within the risk tasks (RT-1 and RT-2). Model (7) features RT-1 only and model (8), RT-2. The only difference between these two task subtypes is that in RT-1 the Decider chose a lottery for themselves, whereas in RT-2, they chose a lottery for the Receiver.

Our results for the lottery tasks mirror those for the BDGs in that random and social recommendations have comparable effects on lottery choices; although in the risk tasks, both effects are somewhat larger than in the BDGs. Compared to the baseline, recommending Lottery A significantly reduces the choices of Lottery B. The impact of social recommendations is greater when participants choose a lottery for another participant (RT-2) than when they choose one for themselves (RT-1). This is not surprising since following a norm has no detrimental effects on the Decider's own payoff when the lottery is chosen on behalf of someone else. Effects for Lottery B recommendations are weaker and only reach significance in the RG-2 task.[16]

Central to our main question, the effects of random recommendations are once again comparable to those of social recommendations in size and direction. Wald tests indicate that there is no significant difference between random and social recommendations for either task subtype.[17]

4.3. Why do people follow (random) recommendations?

Participants in our study follow random recommendations and, in most instances, the effects of social and random recommendations are statistically indistinguishable. This observation raises the question of which of the channels, detailed in Section 2, may affect behaviour in the random (and/or social) recommendation treatments.[18] To answer this question, we draw on additional data collected in Studies 1 and 2, as well as a follow-up study (hereafter referred to as Study 3). The pre-registration, instructions and data for Study 3 can be found in https://osf.io/39rns/.

Study 3 is similar in structure and style to the first two studies, where participants engaged in a series of binary choice tasks with payoff structures akin to those in the original study.[19] As in the previous studies, participants receive no recommendation or a recommendation for one of the two options, depending on the treatment they had been randomly allocated to. Additionally, we introduced a new treatment arm, where the information provided is not labelled as a recommendation; instead, participants are informed that the computer will *highlight* one of the options, either randomly selected (*Info Random*) or based on its popularity among previous participants (*Info Social*). These new conditions allow us to investigate whether a pure recommendation effect exists, i.e., an effect due to a social norm or convention to follow recommendations (independently from their source or content).[20]

In the following, we discuss whether our results from Studies 1–2 as well as the additional results from Study 3 are consistent with each of the five channels summarised in Table 4.

4.3.1. Channel I: Norm compliance

Our results show that both social and random recommendations influence behaviour in all three task types, and there is no consistent evidence that social recommendations are more effective than random ones. According to Channel I, recommendations operate via norm compliance. However, we can discount this as a potential mechanism for following random recommendations, as they do not provide any information on social norms that individuals may wish to adhere to.

This observation does not eliminate the possibility that norm compliance contributes to the effects of social recommendations. However, if this channel was additive to the remaining four channels, we would expect a larger impact from social than from random

[16] The asymmetric reactions to lottery A and B recommendations may be partially due to ceiling effects since lottery B is the more popular choice (across the different choice problems, risk tasks and studies, 80–91 percent choose lottery B in the baseline) leaving less room for recommendations of B to shift behaviour.

[17] As shown in Table 7 of the appendix, when we look at Study 1 only, random recommendations have a larger effect than social recommendations.

[18] A possible misconception that participants did not recognise the distinction between random and social recommendations can be dismissed. In all studies, participants were required to respond to a question that assessed their understanding of how the recommendations were generated by the computer algorithm. Originally, this query served as part of an attention check; failure to pass this check resulted in exclusion from the study. However, in Study 3, participants were allowed to proceed regardless of their response. Only 4% of participants in the social recommendation group and 8% in the random recommendation group answered incorrectly. The findings presented in Table 7 remain valid even after excluding these participants' responses.

[19] We presented fewer choice problems and focused on problems with higher differences between Option A and B, which were more suitable to test the mechanisms at work. See Table 8 in the appendix for a summary of the choice tasks used in study 3.

[20] We collect data for 81 Deciders in the Baseline, 102 in *Rec Social*, 101 in *Rec Random*, 97 in *Info Social* and 100 in *Info Random*

Table 4
Channels summary.

Channel	Study	Consistent results, if ...
I: Norm compliance	1–3	... social recommendations affect choices and random recommendations do not.
II: Anchor/Tie Breaker	1–3	... social and random recommendations affect all choices similarly.
III: Reminder	1–3	... social and random recommendations affect choices according to normative expectations.
IV: Diffusion of responsibility	1–3	... social and random recommendations affect choices selectively in allocation tasks when recommending selfish option.
V: Pure recommendation effect	3	... social and random recommendations influence choices but information does not.

recommendations. Instead, we even observe the opposite in some instances. That is, the effect of random recommendations is larger than that of social recommendations. Alternatively, it might be that one of the other channels influences behaviour in the random recommendation treatments but not in the social recommendation treatments. However, we cannot think of an obvious reason why this should be the case.

4.3.2. Channel II: Anchoring or tie-breaker

Recommendations, whether random or social, may act as behavioural anchors. When unsure, participants might follow a recommendation regardless of its source. By extension, if participants are uncertain about their preferred option, they may use random recommendations as a tie-breaker or randomisation device. They may even hold explicit preferences for randomisation, as has been invoked to explain variations in lottery choices when participants are offered the same lottery multiple times (Agranov and Ortoleva, 2022).

This would entail that all recommendations are followed uniformly, i.e., independently from their content. Yet, the extent to which recommendations are followed does vary by their content. For example, in the BDGs, fair recommendations are more commonly followed than self-serving ones, and in risk tasks, recommendations for the riskier option are followed but not those for the safer option. These discrepancies suggest that the behaviour we observe is not consistent with anchoring or simple imitation.

A piece of evidence partially consistent with anchoring or imitation emerges from the information treatments of Study 3 (which we will fully discuss after Table 6). Relevant to Channel III, anchoring or imitation could already be triggered by displaying irrelevant information, as discussed in Cason and Mui (1998) and Goeschl et al. (2018). Indeed, there are instances where we observe responses to irrelevant information that are consistent with anchoring, evidenced by significant behavioural changes in the direction of the displayed information in the random information treatments. This observation is of clear importance to studies that utilise information designs to examine social norms and tend to attribute all reactions to social information to the normative aspect of the information displayed, rather than considering that some effects may be driven by imitation or anchoring. It should be noted, however, that this reaction does not occur uniformly across all recommendation contents and task subtypes. For instance, we do not see any such imitation effects in BDGs. One possibility is that imitation is more common in tasks where the stakes for oneself are lower and/or Deciders feel closer to indifference about the options.

4.3.3. Channel III: Recommendations as reminders

A third channel we identified posits that recommendations may act as reminders of pre-existing normative knowledge. That is, seeing a recommendation may prompt decision-makers to re-examine their normative knowledge before making a choice. With social recommendations, this process might lead individuals to revise their perception of the relevant social norm based on the new information they receive. In contrast, random recommendations could prompt them to recall and reassess their internalised normative beliefs, thinking "the computer randomly suggests A, but I know that I should choose B".

We would hence expect that when seeing a recommendation, Deciders' behaviour aligns more with the established social norm, regardless of the recommendation's content. This would lead to choices that are more in line with the social norm in the recommendation treatments than in the baseline. This effect should be more pronounced in the binary dictator games and pure allocation tasks, where strong norms of generosity and fairness exist (Andreoni and Bernheim, 2009), and less so in the risk tasks, where it is less clear a priori what the normatively superior option is.

The results presented in the previous section in Table 3, display a pattern that is inconsistent with a reminder effect. Under such an effect, we would expect recommendations for both Option A and B to influence behaviour in the same direction. However, we observe effects in opposite directions (in line with following the content of the recommendation) for both BDGs and ATs, and for RTs. In the BDGs, where the pre-existing social norm should be strongest, we observe behaviour that is partially consistent with reminder effects in the BDG-1 choice problems, but not in the BDG-2 ones.

Table 5
Testing for reminder effects.

	Studies 1 and 2				Study 3			
	(1) Option B Minority	(2) Option B Majority	(3) Norms Gap Low	(4) Norms Gap High	(5) Option B Minority	(6) Option B Majority	(7) Norms Gap Low	(8) Norms Gap High
Rec Social (Option B)	0.497****	0.248***	0.466****	0.474*	0.0981	0.201*	0.193**	−0.0145
	(4.75)	(3.07)	(4.66)	(1.77)	(0.75)	(1.91)	(2.07)	(−0.11)
Rec Social (Option A)	−0.0828	−0.293****	−0.139	−0.368	−0.406***	−0.199*	−0.265***	−0.316**
	(−0.79)	(−3.68)	(−1.40)	(−1.25)	(−3.13)	(−1.89)	(−2.89)	(−2.21)
Rec Random (Option B)	0.353***	0.167*	0.349***	0.486	−0.157	0.169	−0.0166	0.179
	(2.94)	(1.83)	(3.12)	(1.55)	(−1.26)	(1.53)	(−0.19)	(1.20)
Rec Random (Option A)	−0.109	−0.293****	−0.161	0.230	−0.395***	−0.381***	−0.372****	−0.434***
	(−0.93)	(−3.33)	(−1.46)	(0.77)	(−2.88)	(−3.24)	(−3.72)	(−3.01)
Fixed Effects								
Choice Problem Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Game Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Study Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Label Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5140	10 280	7710	2570	1924	2886	3848	962

t statistics in parentheses. Standard errors are clustered at the individual level.
* Significance level at $p < 0.10$.
** Significance level at $p < 0.05$.
*** Significance level at $p < 0.01$.
**** Significance level at $p < 0.001$.

A more stringent test for this mechanism draws on data we collected from Receivers in Studies 1–3.[21] These data allow us to understand the strength of norms for each choice problem. In the appendix, we provide several figures summarising the normative expectations elicited from Receivers (see Figs. 6–11 and surrounding discussions).

As previous tables, Table 5 examines how recommendations from different sources and content influence the choice of Option B. This time, we provide two separate tests for reminder effects, one based on the majority choice in the baseline (which can be interpreted to reflect an internalised descriptive norm) and another one based on normative judgments elicited from the Receiver sample.

For Studies 1 and 2, models (1) and (2) divide the choice problems depending on whether Option B was chosen more or less than 50% of the time in the baseline, indicating whether it was the majority choice. Specifically, model (1) focuses on choice problems where Option B is the less common choice, and model (2), those where it was the more common choice. If reminders were guiding participants to choose based on normative knowledge rather than the content of the recommendation, we would expect all four coefficients in model (1) to be negative and in model (2), to be positive. As social recommendations could alter normative knowledge, potentially offsetting reminder effects, focusing on random recommendations provides the cleanest test of these effects. For Study 3, the same test is shown in models (5) and (6). The coefficients for random (and social) recommendations do not align with the majority choice in either of the studies. Rather, recommending Option B (A) significantly increases (decreases) choices of Option B or has an insignificant effect.

The last two models in each panel, models (3),(4),(7) and (8), repeat the analysis, this time splitting the sample based on normative judgments from the Receiver sample. Models (3) and (7) include choice problems where there is a narrow gap between how appropriate Receivers consider choosing Option A compared to Option B. Models (4) and (8) cover cases with a large gap, i.e., those where choosing Option B is seen as significantly more appropriate than choosing Option A. Again, if recommendations served as a reminder of a strong norm, we would expect to see recommendations to shift behaviour towards Option B independent of their content in models (4) and (8). We see no evidence of this for social recommendations, at most tentative evidence of this for random recommendations in Study 1 and 2, and no evidence of this for Study 3.

In sum, the pattern we observe both in choice data and in the more stringent tests of reminder effects is not consistent with their existence.

4.3.4. Channel IV: Diffusion of responsibility

This channel is about recommendations facilitating the diffusion of responsibility. We would expect this channel to operate in instances where the image of the Decider may be jeopardised depending on the choice they make, such as in the BDGs, that pose a trade-off between the Decider and the Receiver's payoffs. In these instances, recommendations for the self-serving option would be followed more, as they would allow Deciders to get the better payoffs without appearing to be selfish, due to them "just following a

[21] In Studies 1 and 2 we only collect normative expectations data for the BDG and AT and only preregistered these for exploratory purposes. In Study 3, we collected data for BDG, AT and RT and pre-registered their use to investigate Channel III.

Table 6
Study 3: Effects of recommendations vs information.

	All	Binary Dictator games			Allocation tasks	Risk tasks		
	(1) All	(2) Pooled	(3) BDG-1	(4) BDG-2	(5) Pooled	(6) Pooled	(7) RT-1	(8) RT-2
Rec Social (Option B)	0.100	0.0999	−0.0468	0.163	−0.0987	0.264	0.150	0.285
	(0.99)	(0.50)	(−0.17)	(0.74)	(−0.44)	(1.49)	(0.71)	(1.50)
Rec Social (Option A)	−0.332****	−0.410**	−0.446*	−0.318	−0.717***	−0.218	−0.404**	0.0815
	(−3.34)	(−2.17)	(−1.76)	(−1.55)	(−3.02)	(−1.36)	(−2.40)	(0.40)
Rec Random (Option B)	−0.0287	−0.0585	0.117	−0.169	−0.361	0.142	−0.0445	0.206
	(−0.29)	(−0.32)	(0.49)	(−0.81)	(−1.51)	(0.83)	(−0.25)	(1.05)
Rec Random (Option A)	−0.436****	−0.471**	−0.668**	−0.440**	−0.817****	−0.349**	−0.473**	−0.193
	(−4.19)	(−2.36)	(−2.24)	(−2.02)	(−3.56)	(−2.00)	(−2.52)	(−0.94)
Info Social (Option B)	0.00125	0.0419	−0.0183	0.114	−0.315	0.0814	0.00850	0.103
	(0.01)	(0.22)	(−0.07)	(0.59)	(−1.46)	(0.50)	(0.05)	(0.52)
Info Social (Option A)	−0.201**	−0.121	−0.0888	−0.327	−0.276	−0.281*	−0.00280	−0.363**
	(−1.99)	(−0.59)	(−0.35)	(−1.27)	(−1.16)	(−1.73)	(−0.01)	(−2.07)
Info Random (Option B)	0.0694	0.138	0.116	0.241	−0.174	0.0689	−0.277	0.350*
	(0.70)	(0.73)	(0.44)	(1.20)	(−0.71)	(0.41)	(−1.46)	(1.78)
Info Random (Option A)	−0.170*	0.0781	0.00547	−0.00161	−0.697***	−0.196	−0.297	−0.0246
	(−1.81)	(0.42)	(0.02)	(−0.01)	(−3.19)	(−1.19)	(−1.63)	(−0.13)
Fixed Effects								
Choice Problem Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Label Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4810	1924	962	962	962	1924	962	962
Wald Tests								
Random Rec vs Social Rec (Option B)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Random Rec vs Social Rec (Option A)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Random Rec vs Random Info (Option B)	N.S.	N.S.	N.S	N.S.	N.S.	N.S.	N.S.	N.S.
Random Rec vs Random Info (Option A)	>	>	>	N.S.	N.S.	N.S.	N.S.	N.S.

Note: t statistics in parentheses. Standard errors are clustered at the individual level.
For Wald Tests: N.S. No significant difference, < Random significantly smaller than Social, > Random significantly larger than social; both at $p < 0.05$.
* Significance level at $p < 0.10$.
** Significance level at $p < 0.05$.
*** Significance level at $p < 0.01$.
**** Significance level at $p < 0.001$.

recommendation". This pattern should be even more pronounced in the BDG-2 choice problems, where the payoffs of the Receiver are probabilistic, adding a further layer of responsibility diffusion.

If this channel was exploited, we would expect to see that recommendations for the self-serving option, Option A, would be followed (more) in the BDGs. The results in Table 3 do not support this: while recommending the fairer option, Option B, significantly increases the choices of this option, recommendations for the less fair option, Option A, do not generally have a significant effect on choice. There is one instance where an Option A recommendation has a significant effect on choice (*Rec Social* in BDG-2). While following a recommendation for the more self-serving Option A would be consistent with this mechanism, the source of the recommendation is social. Hence, it would also be consistent with the social recommendation working through norm compliance (channel I) or as a tie-breaker when the decision is difficult as is the case, for example, of the BDG-2 task (channel II).

Random recommendations for Option A are not followed for the BDGs in Studies 1 and 2. In contrast, Table 6 shows that in the BDG games both social and random recommendations for the more selfish Option A are followed. Following a random recommendation for A (and not for B) is consistent with the mechanism of using recommendations to diffuse responsibility.

This is also reflected in the additional date we collected from a sample of Receivers. In both studies we elicited beliefs regarding the normative appropriateness of choosing each option, with and without having received a recommendation for it. Receivers found it more appropriate to choose Option B without than with a recommendation, and the opposite for Option A. That is, it was seen as more moral to choose option A after having been recommended to do so, than without a recommendation. In short, Receivers believed receiving a recommendation could redeem the decision maker from making a self-serving decision.

4.3.5. Channel V: Pure recommendation effects

A last possible channel of influence for recommendations is that decision-makers are more likely to conform with a piece of information if it is labelled as a recommendation. To explore this possibility, Study 3 contains recommendation treatments where information is presented with an explicit recommendation label and treatments where the same kind of information (random or social) is presented on its own.

If a pure recommendation effect exists, we would expect to see a stronger reaction to information provided as part of a recommendation than to the information alone. In particular, we may see a reaction to a random recommendation even when it does not provide instrumental information.

Similarly to previous tables, Table 6 contains coefficient estimates for the effects of our recommendation and information treatments relative to a baseline where neither information nor recommendations were displayed. We note in passing that in the

recommendation treatments we replicate several key findings from the previous studies. First, overall, participants react to both random and social recommendations by changing their behaviour in line with the recommendation. Second, in no instance do social recommendations have stronger effects than random recommendations.

The main interest and novelty of Study 3 lies in the information treatments, and in particular in the comparison between the random recommendation and random information treatments. This comparison allows for the clean identification of pure recommendation effects, being undiluted by the provision of social information.

For all data combined, we indeed observe that random recommendations elicit a stronger response than random information; this is consistent with the existence of a pure recommendation effect. This effect is mostly driven by the BDGs, while it is weaker and insignificant in the remaining task types and sub-types.

There are instances (AT and RT) where displaying random information leads to a change in behaviour, which is consistent with anchoring/imitation (channel III).

In the social information treatments, we observe behaviour that is broadly in line with the typical information provision experiments in the social norms literature: a change in behaviour in the direction of the recommendation. Here it is interesting though that providing social information elicits a response that is weaker than that towards the corresponding social recommendation and in some instances not stronger than that of random information. This again highlights that using information provision as a tool for studying norm compliance needs to carefully consider additional channels by which information provision can alter behaviour such as those we discuss here.

5. Discussion and conclusion

In this paper, we ask whether recommendations are only effective when they provide information about the behaviour of others, or whether providing recommendations devoid of social information (or, as in our case, recommendations generated at random) could be equally persuasive. To answer this question, we conducted three online experiments exploring the impact of social and random recommendations on choice in a range of allocation and risk tasks.

Our findings indicate that social recommendations influence behaviour, in line with earlier findings in the social norms literature and consistent with the notion that social recommendations may work through norm conformity. However, random recommendations also influence behaviour in our experiments. Because these recommendations did not feature any social or otherwise instrumental information, there must be reasons other than a desire to conform with a social norm to explain why people follow them.

Our key finding is that the extent to which social and random recommendations influenced behaviour was similar, and statistically indistinguishable in most instances. This observation refutes the notion that the *only* channel through which recommendations affect behaviour is a preference for norm compliance.

This observation has significant implications for two literatures. First, for the extensive literature on social norms and economic behaviour, as summarised in Bicchieri et al. (2022), our results suggest that the standard approach of measuring and manipulating norms in experiments by providing social information may have unintended effects on behaviour. These effects could potentially be misinterpreted as norm compliance if left unaccounted for. Future research should hence examine the generalisability of our findings and the extent of these effects outside of the studied context of recommendations.

Second, our findings also contribute to the growing literature on recommender systems (Jannach et al., 2010). This is a natural application of our work, as recommendations encountered while shopping online, streaming television or music, or accessing online financial advice are sometimes non-social in nature or their origin is opaque.

Our results indicate that recommendations based on non-social information might be just as effective as those based on social information, challenging the assumption that social influence is always a more impactful form of recommendation. Future research in this area may look at different levels of opacity to understand how beliefs on the informativeness of a recommendation interact with the mechanisms we study.

The fact that social and random recommendations were followed to the same degree also raises the question of why, other than complying with a norm, people may be following recommendations. We consider four additional channels: that recommendations are followed because they are recommendations and there is a norm to follow them (“pure recommendation effect”), that they help diffuse responsibility (akin to “moral wiggle room”), that they serve as reminders of a pre-existing norm, and that they serve as anchors or tie-breakers. Our results allow us to rule out that recommendations are serving as reminders of a pre-existing norm. We do find some, although not conclusive, evidence for each of the remaining channels but none of them can fully explain our results.

Our findings are most directly applicable to the specific setting we studied: relatively low-stakes decisions in the domains of allocation and risk. It remains unknown whether the channels we examine would hold the same importance in environments with higher stakes or for different populations.[22] For example, using recommendations as a tie-breaker may become less common in decision contexts where decision-makers have strong preferences for one of the outcomes. Instead, diffusion of responsibility might play a more significant role in situations with higher moral stakes. In sum, our results support several plausible channels through which non-social or even random recommendations can influence behaviour. We leave it to future research to investigate which factors moderate the relative importance of these various channels.

[22] This concern of course applies to most experimental studies using fairly low stake sizes and convenience samples. Interestingly, most investigations into the importance of stakes and different subject pools show smaller effects than perhaps would be expected (e.g., Amir et al., 2012; Exadaktylos et al., 2013; Larney et al., 2019; Brañas-Garza et al., 2021).

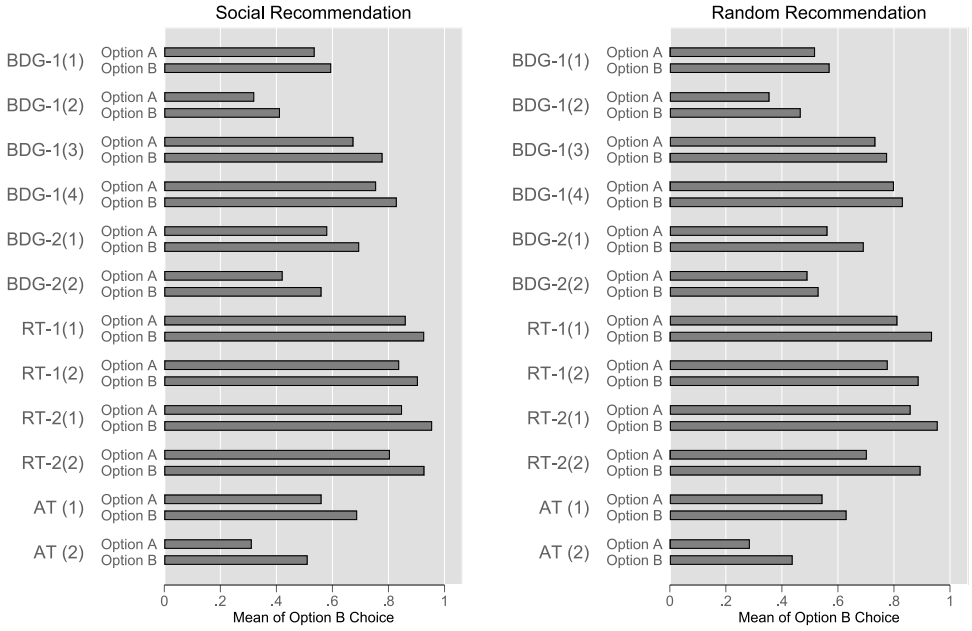

Fig. 3. Study 1 - Choices by recommendation source and content.

Appendix A

Results by choice problem. Figs. 3, 4, and 5 display the mean of Option B choices for each choice problem for each study, broken down by recommendation source and content. Collectively, these figures illustrate that, although there is some variation in the level of B choices, in virtually every choice problem, B choices are more frequent following a recommendation for Option B than after a recommendation for Option A. Thus aggregating choices within tasks and task subtypes in our main analysis does not mask important heterogeneity among different choice problems.

Moreover, a comparison between the left and right panels for each study shows that both social and random recommendations exert similar effects across every choice problem. Furthermore, when comparing across studies, these observations hold consistent despite slight variations in study design and choice problem parameters.

Results by study. Studies 1 and 2 are equivalent in structure and style, with the main difference being that Study 1 included an initial and a final choice stage, with recommendations presented in between, while Study 2 featured only one choice stage where recommendations were displayed on the decision screen. We initially introduced this difference to explore whether the timing of recommendations influences whether decision makers follow a recommendation. It is possible that participants in Study 1 might want to remain consistent with their initial choice, thereby disregarding the recommendation.

Table 7 replicates the main analysis, presented in Table 3, where we show coefficient estimates for recommendation effects but now breaks it up for Study 1 and Study 2 separately. Our primary findings are upheld when we analyse the data for each study independently: we continue to observe significant responses to both social and random recommendations, aligning with the direction of the recommendation. The magnitude of these effects remains consistent across both studies. Importantly, with the exception of the risk tasks, we find no significant differences between social and random recommendations when examining the studies separately. In the risk task in Study 1, the random recommendation for Option A elicits a significantly larger response than the corresponding social recommendation.

Study 3 choice problems. Table 8 summarises the payoffs for each of the choice problems used in Study 3.

Normative judgments: Study 1 & 2. We used a separate group of 220 participants, who later became Receivers[23], to elicit judgments about the moral acceptability of choosing each of the two options, with and without receiving (social and random) recommendations. We incentivised these judgments using the methods introduced in Krupka and Weber (2013). In Studies 1 and 2, each participant faced a random subset of the BDG-1, BDG-2, and AT choice problems. For each problem, they had to state whether choosing each of the options would be considered by most participants of the study as "socially appropriate" (and hence "consistent with moral

[23] They did not know they would take part in a second part of the study as Receivers when answering the questions described here, which was the first task in their study.

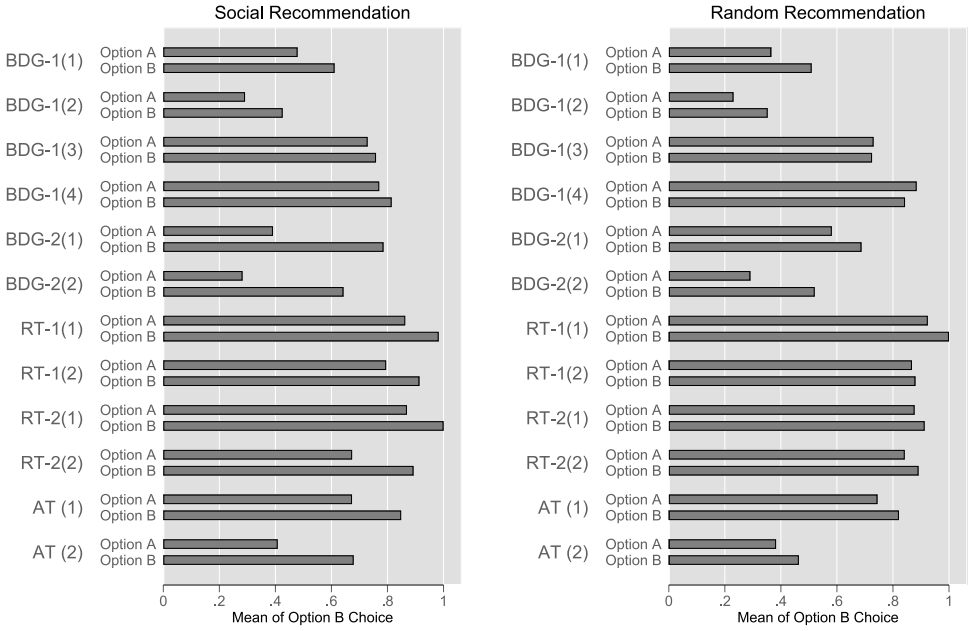

Fig. 4. Study 2 - Choices by recommendation source and content.

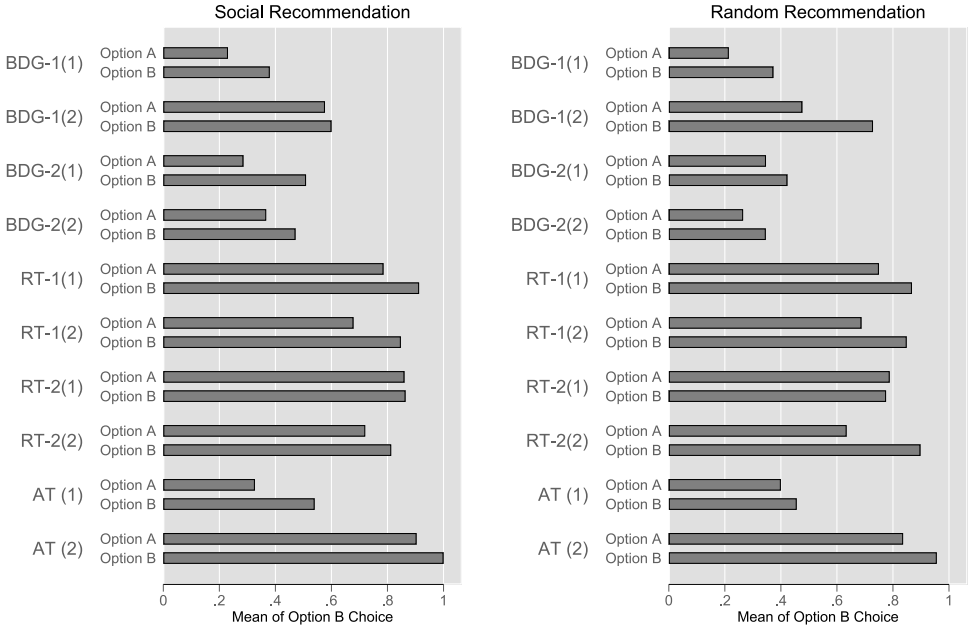

Fig. 5. Study 3 - Choices by recommendation source and content.

or proper social behaviour") or "socially inappropriate" (and hence "inconsistent with moral or proper social behaviour"). Ratings were elicited on a scale from 1 ("very morally inappropriate") to 6 ("very morally appropriate"). One of out five participants were randomly selected for payment: if their evaluation corresponded to the one that most participants of the study gave in a randomly selected choice problem, they received a £1 additional payment.

We leveraged the variation in these ratings to probe how different parameter constellations altered the social norms surrounding options A and B. Analysing these shifts helped us discern whether adherence to (random or social) recommendations stemmed from participants' intrinsic beliefs about the social norms governing these actions (see discussion about channel III: recommendations as reminders).

Table 7
Regression models: Choices of option B by recommendation source and content broken down by study.

	Binary Dictator Games			Allocation Tasks			Risk Tasks		
	(1) Pooled	(2) Study 1	(3) Study 2	(4) Pooled	(5) Study 1	(6) Study 2	(7) Pooled	(8) Study 1	(9) Study 2
Rec Soc (Option B)	0.433****	0.430***	0.471**	0.600****	0.558***	0.781**	0.259	0.296	0.139
	(3.63)	(3.03)	(2.06)	(3.61)	(2.82)	(2.43)	(1.59)	(1.56)	(0.42)
Rec Soc (Option A)	−0.117	−0.110	−0.148	−0.286*	−0.302	−0.298	−0.575****	−0.482***	−0.976***
	(−1.00)	(−0.79)	(−0.70)	(−1.73)	(−1.51)	(−0.99)	(−3.70)	(−2.71)	(−2.98)
Rec Rand (Option B)	0.387***	0.436**	0.276	0.202	0.226	0.150	0.211	0.253	0.0958
	(2.87)	(2.55)	(1.30)	(1.10)	(0.97)	(0.52)	(1.15)	(1.15)	(0.29)
Rec Rand (Option A)	−0.0207	0.0974	−0.257	−0.306	−0.364	−0.190	−0.825****	−0.927****	−0.551*
	(−0.16)	(0.59)	(−1.32)	(−1.59)	(−1.47)	(−0.65)	(−4.84)	(−4.56)	(−1.70)
Fixed effects									
Choice Problem Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Study Dummy	Yes	No	No	Yes	No	No	Yes	No	No
Label Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7710	5790	1920	2570	1930	640	5140	3860	1280
Wald Tests									
Random vs Social (Option B)	N.S.	N.S.	N.S.	<	N.S.	N.S.	N.S.	N.S.	N.S.
Random vs Social (Option A)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	>	N.S.

Note: t statistics in parentheses. Standard errors are clustered at the individual level.
For Wald Tests: N.S. No significant difference, < Random significantly smaller than Social, > Random significantly larger than social; both at $p < 0.05$.
* Significance level at $p < 0.10$.
** Significance level at $p < 0.05$.
*** Significance level at $p < 0.01$.
**** Significance level at $p < 0.001$.

Table 8
Study 3 - Choice problem payoffs.

Task type	Option A		Option B	
	Decider[a]	Receiver	Decider[a]	Receiver
BDG-1 (1x)	70	20	50	50
BDG-1 (2x)	100	50	80	55
BDG-2 (1x)	70	[0.5, 15; 0.5, 25]	50	[0.5, 5; 0.5, 95]
BDG-2 (2x)	100	[0.5, 30; 0.5, 70]	80	[0.5, 50; 0.5, 60]
AT (1x)	70[a]	20	50[a]	50
AT (2x)	100[a]	50	80[a]	55
RT-1 (1x)	[0.5, 15; 0.5, 25]		[0.5, 5; 0.5, 95]	
RT-1 (2x)	[0.5, 30; 0.5, 70]		[0.5, 50; 0.5, 60]	
RT-2 (1x)		[0.5, 10; 0.5, 25]		[0.5, 5; 0.5, 95]
RT-2 (2x)		[0.5, 30; 0.5, 70]		[0.5, 50; 0.5, 60]

[a] In the AT tasks the first payoff is for another passive receiver, not for the Decider.
The payoffs of the "2x" choice problems were also featured in Studies 1 and 2, but those in the "1x" choice problems were introduced to achieve a bigger difference between the options.

Fig. 9 displays these judgments across three panels. The left panel demonstrates that choosing option A, which provided the more unequal payment schedule, was consistently considered somewhat morally inappropriate, with little variation in these judgments across different tasks and decision problems. The middle panel indicates that selecting option B, which entailed more equal payments, was always seen as somewhat morally appropriate. Notably, in the two instances where option B involved a 50:50 split, the choice of option B was even regarded as highly morally appropriate. The right panel merges these ratings to illustrate the variation in the gap between the perceptions of options A and B. It becomes clear that this gap is particularly large for BDG-1 (3) and (4), while it is narrower for other decision problems.

In a separate rating task, incentivised in the same way as above, participants were asked whether following a recommendation for each of the two options would be considered morally (in)appropriate by others.

We first investigate whether participants differentiate between following a social or a random recommendation for a given option (A or B) and task (BDG1, BDG2, AT). As illustrated in Fig. 7, the source of the recommendation has little impact on whether participants perceive following the recommendation as (im)moral. This is true for both following a recommendation for option A (top row) and option B (bottom row). As observed previously, following a recommendation for option A, associated with a more unequal outcome, is perceived as less morally appropriate than following option B.

Finally, we investigate whether acting on a recommendation is perceived as more morally appropriate than making the choice without having received a recommendation. We compute the difference in morality ratings for each recommendation source and

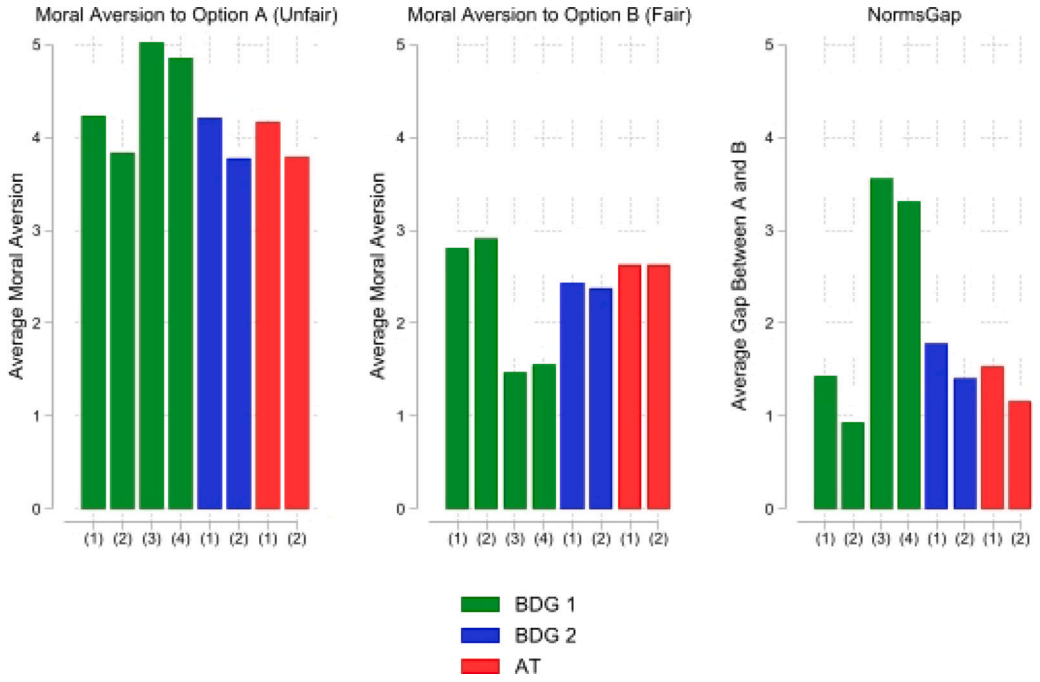

Fig. 6. Study 1 & 2 - Moral Aversion towards Choosing Options (without Recommendations).

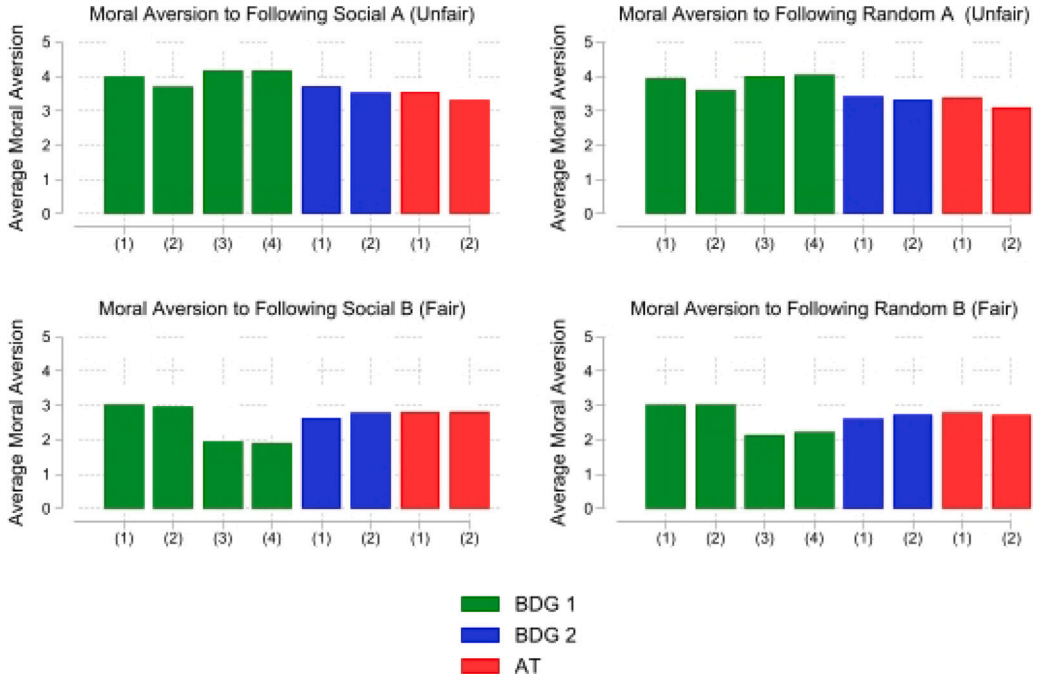

Fig. 7. Study 1 & 2 - Moral Aversion towards Following Recommendations.

option, which are displayed in Fig. 8. In this figure, a positive number indicates that selecting an option without a recommendation is viewed as more immoral compared to following a recommendation for the same action, and vice versa. The figure reveals that recommendations sway the perceived morality of choices in both directions. For action A, originally rated as more immoral, adhering to the recommendation diminishes the perceived immorality. In contrast, choosing the more equal option B independently, that is

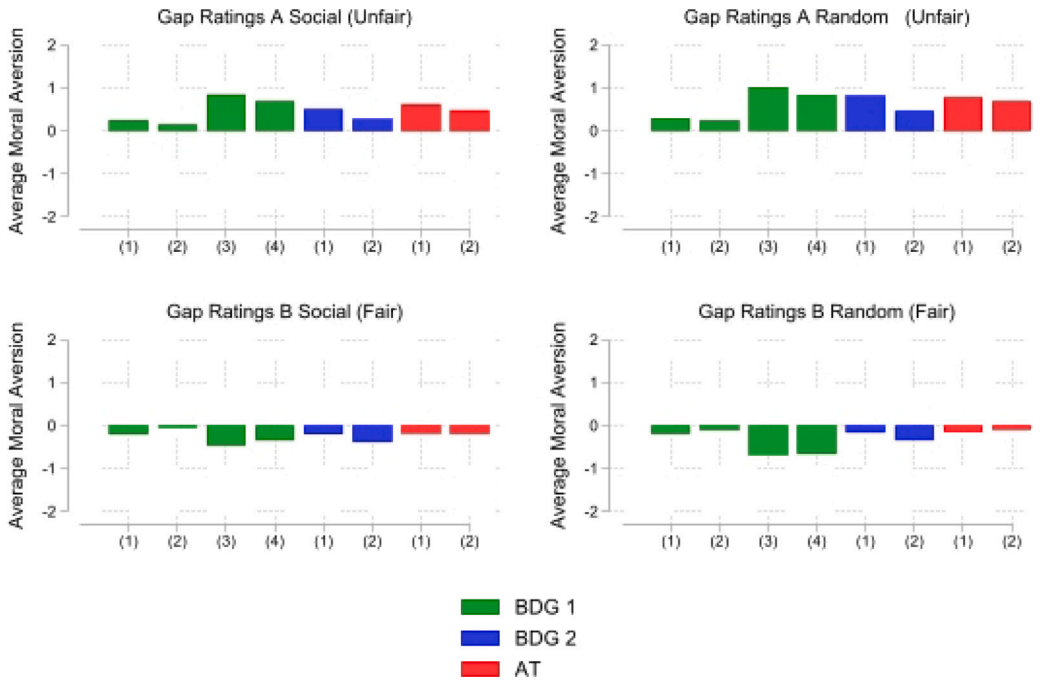

Fig. 8. Study 1 & 2 - Moral Aversion towards Following Recommendations vs Choosing without Recommendations.

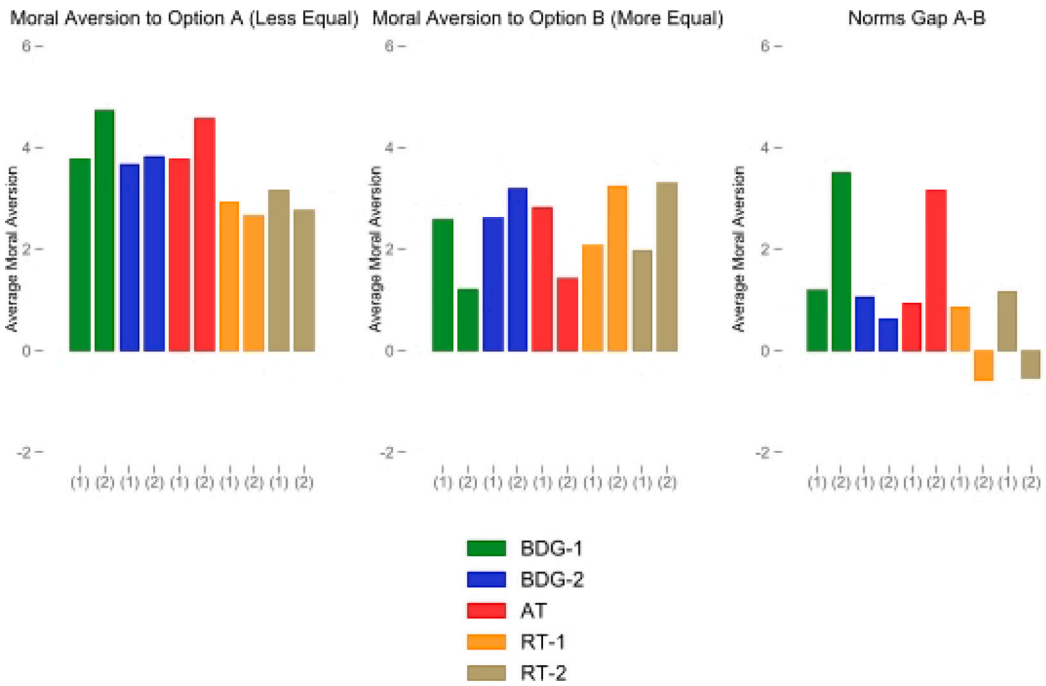

Fig. 9. Study 3 - Moral Aversion towards Choosing Options (without Recommendations).

without having been recommended to choose it, is regarded as more morally appropriate than merely heeding a recommendation for option B. Notably, the influence of the recommendation source is minimal, with both social and random recommendations resulting in comparable shifts in the perceived moral appropriateness of an action.

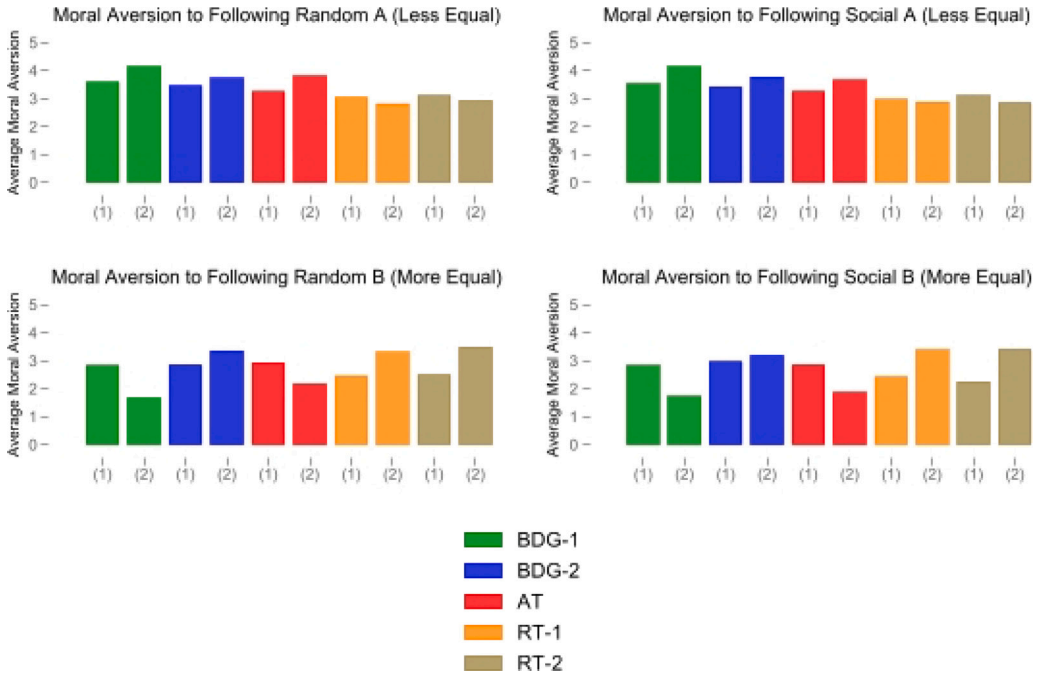

Fig. 10. Study 3 - Moral Aversion towards Following Recommendations.

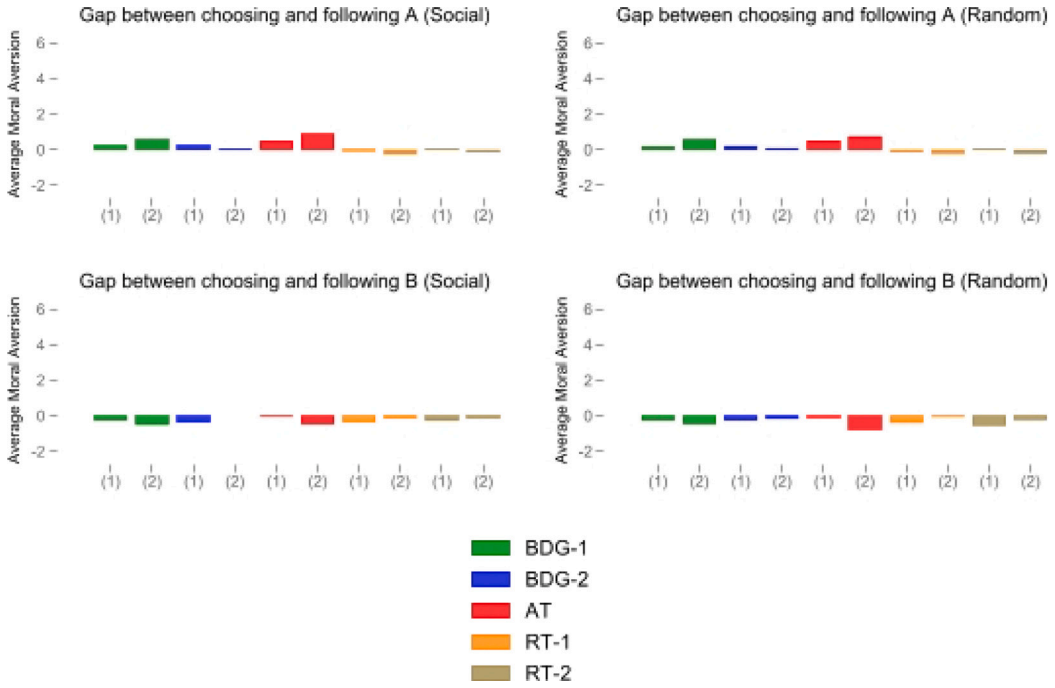

Fig. 11. Study 3 - Moral Aversion towards Following Recommendations vs Choosing without Recommendations.

Normative judgments: Study 3. Another group of 182 participants who would go on to become Study 3 Receivers, were asked the same set of questions but this time about all Study 3 tasks.

By looking at these, we reached the same conclusions as with data from studies 1 and 2. The responses about the risk task, which was not included in the previous study, reveal that participants believed that choosing each of the options had moral implications.

In line with the choices we observe from Deciders, Receivers perceived that choosing the less risky option B was more moral than choosing A; this corresponds to the negative norms gaps in the third panel of Fig. 9.

Appendix B. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.euroecorev.2024.104801.

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