Patient responses to physician disclosures of industry conflicts of interest: A randomized field experiment

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ABSTRACT

Most patients in the United States depend on physicians who have financial relationships with the healthcare industry. These physician-industry relationships represent a conflict of interest: a potential clash between the physicians' professional responsibilities and their self-interest. We conducted a randomized field experiment to assess the impact of written disclosures of physicians' conflict of interest on patients' appointment attendance, knowledge of these conflicts of interest, and their trust in their physician and hospital. Patients (N = 1903) attending outpatient clinics at a large U.S. academic hospital from 2015 to 2016 who had appointments with physicians earning more than $20,000 from industry in the last year were randomized to receive (or not receive) disclosures of their physicians' financial conflicts of interest (with or without explanation of the risks and/or benefits of such conflicts) in their appointment-reminder letters. There were no differences across condition in missed or cancelled appointments. For patients who attended eligible appointments with their physician and completed the post-appointment survey (N = 867/1276; 68% response rate), the disclosure intervention revealed significant improvement in patients' knowledge of their physicians' financial relationships but no significant differences in patients' trust in their physician or hospital. Risk and benefit framings of financial relationships did not significantly affect any outcomes. These findings highlight that although mailed financial conflict of interest disclosures are effective as an educational tool, disclosure cannot be a panacea to addressing physician-industry relationships if the intended purpose is for patients to assimilate the information into their decision-making and account for potential physician bias.

1. Introduction

A conflict of interest (COI) exists when there is a potential clash between professional responsibilities and personal (often material) interests (Carson, 1994). Such conflicts are ubiquitous in society and across professions (Davis & Stark, 2001). For example, an estimated 65% of patients in the United States see physicians who have financial relationships that constitute a COI with the healthcare industry, including compensation for consulting, education, honoraria, and royalties (Pham-Kanter, Mello, Lehmann, Campbell, & Carpenter, 2017). Financial advisors may earn substantial bonuses if their clients invest in particular funds (Boatright, 2006; Mullainathan, Noeth, & Schoar, 2012); and employees across a variety of industries may accept gifts, travel, or entertainment from potential vendors (Malmendier & Schmidt, 2017).

Such conflicts can lead advisors to give biased advice (Davis & Stark, 2001; Moore, Tetlock, Taniu, & Bazerman, 2006; Mullainathan et al., 2012; Sah, 2015; Wazana, 2000). For example, physicians may prescribe branded drugs made by companies who give them gifts or fund their research (Dana & Loewenstein, 2003; Hadland, Creda, Li, Kriger, & Marshall, 2018; Larkin et al., 2017). Financial advisors may give advice that benefits their own self-interests over their clients' interests, potentially leaving their clients financially worse off (Mullainathan et al., 2012; Sah, 2018), and bloggers may write more positive reviews for products and services from companies that give them money or material gifts (Sah, Malaviya, & Thompson, 2018).

Although a range of potential policy solutions have been recommended for managing COIs, including sanctions and mandated
second opinions, disclosure has been most frequently recommended and implemented (Sah, 2017). In medicine, for example, the American Medical Association’s 2005 Code of Ethics states that physicians who recommend that patients enter a clinical trial should disclose to those patients any referral fees the physicians would receive if patients entered the trial. More recently, the 2010 Physicians’ Payment Sunshine Act requires that any transfers of value of $10 or more from industry to a physician must be disclosed on a website. In finance, registered investment advisors are required to disclose all potential COIs that might incline an advisor, either consciously or unconsciously, to render advice which was not in the best interest of the advisor’s clients (Investment Advisors Act, 1940).

However, disclosure has been shown to have several unintended consequences on both advisors and advisees. Cain, Loewenstein, and Moore (2005, 2011) demonstrated that advisors give more biased advice with disclosure than without when giving advice on the value of coins in a jar or the sales prices of houses. However, recent work in other contexts reveals a more optimistic view of disclosure’s effect on advisors: disclosure can often lead advisors to give less biased advice (Sah, 2019), often in the medical context (Guo, Sriram, & Manchanda, 2017) or when advisors have more experience (Koch & Schmidt, 2010) or sanctions are available for biased advice (Church & Kuang, 2009). Sah (2019) found that the perceived norm of the advice-giving context (i.e., whether it is appropriate to place clients, or profits, first) moderates the effect of COI disclosure on advice quality. Disclosure serves as a reminder to advisors of the perceived norm: thus, disclosure tends to increase bias in contexts in which self-interested advice is deemed to be the norm (e.g., for non-experts, giving financial advice or advice on house sale prices) and decrease bias in settings in which placing advisees first is deemed to be the norm (e.g., giving medical advice). Interestingly, when participants were actual practicing advisors (e.g., financial investment advisors, physicians etc.), COI disclosure led to higher quality advice relative to nondisclosure in both the financial and medical context. This suggests that the perceived norm to place clients, or profits, first are different for expert practicing advisors and non-experts in the financial context. In sum, COI disclosure could be beneficial for advisees if it increases the quality of advice from professional advisors in contexts in which the norm is to place clients first.

2. The effect of conflict of disclosure on advisees

The focus of this paper is on the effect of COI disclosure on advisees, specifically patients in a medical context. Past research has shown mixed effects and some unintended consequences of COI disclosure on advisees. While COI disclosure often reduces trust in the advisor (Green, Masters, James, Simmons, & Lehman, 2012; Hwong, Sah, & Lehmann, 2017; Kesselheim et al., 2012; Licurse, Barber, Joffe, & Gross, 2010; Mainous, Hueston, & Rich, 1995; Robertson, 2011; Sah & Feiler, 2019; Sah & Loewenstein, 2014; Sah, Loewenstein, & Cain, 2013, 2018; Spece, Yokum, Okoro, & Robertson, 2014), most likely because recipients infer bias from the disclosed COI, it can also cause advisees to experience greater pressure to comply the advice. Sah, Loewenstein and Cain (2013, 2018) document two psychological mechanisms by which advisees may comply with advice they don’t trust in the presence of a COI disclosure: insinuation anxiety and the panhandler effect.

Despite COI disclosure leading to lower trust in recipients, insinuation anxiety (Sah, Loewenstein, et al., 2018) leads advisees to experience greater pressure to take the advice for fear of signaling distrust to the advisor. Patients may worry about insinuating that their physician may be biased by the COI if patients reject their physician’s recommendation to, for example, join a clinical trial (for which the physician has disclosed the receipt of a referral fee if the patient joins). The authors also demonstrated that it did not matter if the COI disclosure was voluntary or required by law: both (decrease in) trust and (increase in) insinuation anxiety was similar regardless. The panhandler effect (Sah et al., 2013) is the tendency for advisees to feel pressured to help satisfy their advisors’ personal interests once the COI disclosure is communicated. Disclosure becomes, in effect, a favor request from the advisor placing pressure on the advisee to give in to the advisor’s interests. These pressures can lead to more compliance with COI disclosure than without disclosure with advice that is trusted less.

Even when pressure to comply is low, advisees may still not react optimally to COI disclosure. Sah and Feiler (2019) demonstrate that advisees can often over-discount, reporting decreased trust in the advisor’s character (which they term the “disclosure penalty”) and discarding valuable advice accompanied by a COI disclosure. The disclosure penalty emerges irrespective of advice quality, whether the disclosure is voluntary or mandatory, and is present even when advice quality is high, and the advisor is honest (and advisees have full information to determine advice quality). Thus, valuable high-quality advice may be ignored or rejected if recipients discount it too severely.

Another unintended consequence of disclosure occurs when advisees have insufficient resources or motivation to pay adequate attention and deliberation to the disclosure. As a warning, to adequately perceive, process and react to COI disclosures (Cowley & Wogalter, 2011; Laughery & Wogalter, 2006; Mayhorn & Wogalter, 2010), recipients must have adequate levels of cognitive resources to access and integrate the information with existing knowledge and discern how it ought to inform judgments and behavior (Campbell & Kirmami, 2000; Johar & Simmons, 2000). Advisees may fail to incorporate the implications of the COI disclosure in the absence of adequate motivation, ability, and opportunity to process it. When advisees do not have sufficient resources to deliberate on the meaning of the COI disclosure, disclosure may paradoxically increase trust in the advisor due to increased perceptions of expertise (Carl, 2008; Hampson et al., 2006; Sah, Malaviya et al., 2018), an effect referred to as disclosure’s “expertise cue” (Sah, Malaviya et al., 2018). This is likely to occur when decisions are difficult and there is a lot of competing information to process; for example, when making medical decisions. The treatment options may attract the recipients’ attention and less deliberation is given to the COI disclosure which increases the likelihood that the disclosure is processed automatically leading to increased trust in the advisor (Sah, Malaviya et al., 2018).

To reduce some of the unintended consequences on advisees, COI disclosures could be given to advisees in private (i.e., not in the presence of the advisor), which can reduce social pressures to comply, such as insinuation anxiety and the panhandler effect (Sah, Loewenstein et al., 2013, 2018). In addition, giving the disclosures separately to other competing information, and ensuring recipients have sufficient time, motivation and ability to deliberate on the meaning of them, may reduce the unintended consequence of disclosure’s expertise cue (Sah, Malaviya et al., 2018).

Importantly, however, the prior literature often did not draw on real-world relationships with advisees receiving disclosures from their own real-world advisors. There are reasons to believe that real-world relationships may alter how advisees react to disclosures from their own advisors. Even though advisees may agree that COIs could lead to biased advice and state they would be less likely to choose advisors who have COIs (Evans, 2014), when advisees are actually faced with the situation that their advisor has a COI, their behavior may be quite different. People often make mispredictions about their emotions and behavior, most often due to underestimating visceral factors (Joel, Teper, & MacDonald, 2014; Nordgren, Harreveld, & Pligt, 2009; Patrick & MacInnis, 2006; Sommers & Bohns, 2018; Van Boven, Dunning, & Loewenstein, 2000). For example, Woodzicka and LaFrance (2001) found that most women think they would take action if sexually harassed in a job interview, but when in that situation few women actually did anything other than smile uncomfortably. Kawakami and colleagues found that people indicated that they would confront a person who uttered a racial slur, but again when in that situation, few people actually said anything (Kawakami, Dunn, Karmali, & Dovidio, 2009). Similarly, patients may believe that a disclosure about her physicians’
conflicting interests will be important to her evaluation of the physician—a national survey found that 74% of respondents believed that healthcare industry money influences how physicians treat patients and that half (51%) of respondents reported they would be less likely to choose a physician if they received such money (Evans, 2014)—but in reality, at the time they receive the information regarding a physician they have already made an appointment with, patients may feel unable to react adequately to it.

Furthermore, although prior research suggests that one of the most beneficial effects of a disclosure may be to cause the advisee to seek a second opinion (Robertson 2011), advisees often do not seek second opinions for a variety of reasons, such as cost, time, or perhaps an unwillingness to insult their primary advisor (Sah & Loewenstein, 2015; Sarvary, 2002; Schwartz, Luce, & Ariely, 2011). Tellingly, trust in your own advisor increases if the cost of switching advisors increases (Sah & Loewenstein, 2015), demonstrating the strength of motivated reasoning (Kunda, 1990) if one is dependent on an advisor. Consistent with motivated reasoning, a prior survey revealed that although patients acknowledged that physicians could give biased advice if they had industry relationships, patients were more likely to think such relationships were appropriate if their own physician had them (Gibbons et al., 1998). Furthermore, in one study, more than 90% of patients expressed little or no worry about financial ties that researchers or institutions might have had with drug companies and stated they would have entered a clinical trial regardless of knowing about such financial ties (Hampson et al., 2006). A high level of trust in physicians (Gallup Poll, 2015) and motivated reasoning to think that one’s own physician will not be affected by his or her COIs (Gibbons et al., 1998; Kunda, 1990) could lead patients to under-react to COI disclosures from physicians they are dependent on.

3. Conflict of interest disclosure in the medical context

Disclosing physicians’ COIs to patients could be implemented for at least two reasons (Spece et al., 2014). One reason is that disclosure may help ensure patient autonomy by decreasing the information gap between advisor and advisee, thus improving the advisee’s ability to make an informed decision (Crawford & Sobel, 1982). The doctrine of “informed consent” has essential value in the bioethics field and is consistent with the recent emphasis on consumer-directed healthcare and the “Choosing Wisely” movement, which encourages patients to play a more active role in their healthcare decisions (Cassel & Guest, 2012). Prior research suggests that the public are generally uninformed about their physicians’ financial ties to the healthcare industry (Mainous et al., 1995), although people of higher socioeconomic status and of younger age are more likely to believe that their physician receives gifts from industry sources (Grande, Shea, & Armstrong, 2012). Thus, one objective for COI disclosure is simply to make patients more knowledgeable about their physicians’ COIs.

Another reason to implement disclosure is consequentialist: disclosure may improve patients’ decisions, allowing, for example, a more accurate assessment of risk, and ultimately improved health outcome or lower costs of healthcare. Not only does disclosure alert recipients to their physicians’ COI, it, at least theoretically, could allow recipients to adjust for any potential bias (Campbell & Kirmani, 2000; Friestad & Wright, 1994; Kelley, 1973; Martin, Seta, & Crelia, 1990). Physicians’ financial COIs increase risks to patients because they can bias physicians’ clinical decisions towards sponsors’ products, which can lead to adverse health outcomes and an increase in patients’ healthcare costs (Pham-Kanter et al., 2017; Robertson, Rose, & Kesselheim, 2012; Sah, 2015; Sah & Fugh-Berman, 2013; Wazana, 2000). Indeed, a recent study found that payments from industry to physicians involving opioid products were associated with greater opioid prescribing (Hadland et al., 2018). Thus, physician financial relationships increase the risk that patients will receive suboptimal healthcare—treatment that is more invasive, less efficacious, and with greater cost. Given the potential for COIs to bias advisors, policymakers may recommend COI disclosure with the objective of reducing patients’ unquestioning trust in their physicians, and perhaps switching physicians. Arguably both increasing knowledge in recipients of disclosure and adjusting for potential bias are the “intended” purposes of disclosure (the normative recipient response) (Federal Trade Commission, 2013; Investment Advisors Act, 1940; Sah, 2017).

To meet these objectives of disclosure, several steps must be completed. First, the disclosure information must actually reach advisees. Yet, for physician-industry COIs, many state and federal disclosure mandates presently only require that such information be posted passively on a website database (for example, see www.cms.gov/ OpenPayments/index.html). These websites are not particularly well-designed for layperson users. Some intermediaries, such as ProPublica’s “Dollars for Docs” website (https://projects.propublica.org/docdollars/), have sprung up to try to make COI disclosures more accessible and to allow patients to contextualize through relative comparisons with other physicians. Even so, only 9% of participants in one study could find their own physician on the ProPublica database (Hwong et al., 2017).

If disclosures reach patients, their framing, whether presented negatively, highlighting risks, or positively, highlighting benefits, may play an important role in how patients process them. The risks of medical COIs on physicians’ decision making have been well-documented, and a negative frame in the disclosure statement highlighting the risks of physician bias may amplify any effect, such as decreased trust (Sah & Feller, 2019; Sah, Loewenstein, et al., 2013). Others claim that industry relationships could provide net benefits, fostering clinical and research innovations and their translation into patient care (LaMattina, 2016; Melese, Lin, Chang, & Cohen, 2009). Thus, disclosure of a physician’s financial relationship with a company could be framed positively, to be perceived as a benefit (for example, highlighting the physicians’ expertise), which may mitigate the patients’ decreased trust, or even increase patients’ trust in their physician.

The timing, delivery, mode and source of the COI disclosure will also play a role in the amount of deliberation patients give to the information. If disclosures are provided in the clinic, where time is scarce and other concerns may be much more salient, patients may be unable to pay sufficient attention to them, especially if the disclosure is buried amongst other paperwork (Ben-Shahar & Schneider, 2011). Furthermore, once in the clinic, it may also be too late or difficult for a patient to decide to switch physicians to avoid such conflicting interests. Previous research has documented that the greater the cost of switching advisors, the more likely advisees are to affirm high trust in their primary advisors, most likely due to motivated reasoning (Sah & Loewenstein, 2015). And, if the physician himself or herself provides the information directly to the patient, the patient may feel greater pressure to comply with the physician’s advice even if they trust the advice less (Sah, Loewenstein, et al., 2013, 2018). We designed our randomized field experiment with the goal of COI disclosures reaching patients and ensuring patients had sufficient time to deliberate on them away from their physician to reduce unintended consequences.

4. The present research

We investigated whether a single mailed COI disclosure letter to patients would improve patients’ knowledge about their physicians’ COIs, affect patients’ trust in their physician or hospital, and whether patients would be more likely to cancel or miss their physician appointment. We chose Cleveland Clinic as, in 2015, the hospital was in the process of implementing a new policy requiring physicians who receive $20,000 or more from industry sources to disclose their financial relationships directly to their patients. Previously, such disclosures had been merely presented on the hospital’s website. In our experiment, we recruited physicians who had substantial financial relationships with industry and agreed to mail written financial
disclosures to their patients before their scheduled appointments. We sent some patients, along with their appointment-reminder letter, detailed written financial COI disclosures that linked these relationships to specific products used by physicians and that included variations that explained either the risks and/or benefits of COIs. Other patients (in the control condition) received only the appointment-reminder letter. Giving the disclosures in simple, salient, written form prior to appointments without other competing information, as we do in our study, may increase the likelihood that patients receive such disclosures and have sufficient time and resources to consider them without the pressure of directly facing their physician. We surveyed patients after their appointments with physicians to assess their knowledge of their physicians’ financial COIs and their attitudes (trust in their physician and hospital). We also examined patient’s appointment attendance via electronic health records at the hospital to assess if missed or cancelled appointments were affected by the intervention.

4.1. Patients’ knowledge of their physicians’ financial COIs

Knowledge of the physicians’ financial COIs is intrinsically valuable and a predicate step for subsequent attitudes and behavior. Given that most patients are unaware of physician-industry relationships (Mainous et al., 1995; Sah & Fugh-Berman, 2013), there is room for an educational intervention to improve patients’ knowledge of their physicians’ COIs. As prior work demonstrated success in improving patients’ knowledge of their physicians’ compensation structure (for example, salaried or fee-for-service) with a single mailed disclosure letter (Pearson, Kleinman, Rustinak, & Levinson, 2006), we predicted that a single mailed disclosure letter informing patients of their own physicians’ financial relationships with industry would increase their knowledge (recall of the provided information) of their physicians’ COIs.

4.2. Patients’ trust in their physician and hospital

An effect on trust in the physician and/or the hospital could be the mechanism through which patients adjust for any potential physician bias. While compliance with the physicians’ recommendations is consequential to patients and to aggregate health spending, we opted to measure trust rather than compliance. Trust in physicians is a critical factor for compliance with medical treatment; patients who report trusting their physicians are more likely to take medications regularly and to request and receive needed medical services (Blackstock, Addison, Brennan, & Alao, 2012; Bonds et al., 2004; Thom, Kravitz, Bell, Krupat, & Azari, 2002). However, compliance can arise from other causes, such as when patients feel pressured to comply with advice that they trust less (Sah, Loewenstein, et al., 2013, 2018) or advises’ lack of expertise (Sniezek & Van Swol, 2001). Moreover, measuring compliance requires observation of both physicians’ specific recommendations and patients’ subsequent behavior, and our study focused on disclosures across a range of different medical conditions and treatments. As with prior studies examining the effect of COI disclosure on trust (Sah, Malaviya, et al., 2018), we measured trust using Mayer, Davis, and Schoorman’s (1995) tri-dimensional trustworthiness measure of perceptions of the advisor’s integrity, benevolence, and ability/expertise.

Our method of mailed written financial disclosures to patients before their appointments attempted to eliminate or reduce some of the unintended consequences of disclosure, for example social pressure to comply with the physician (Sah, Loewenstein, et al., 2013, 2018) and decreased cognitive resources to process and deliberate on the COI disclosure (Sah, Malaviya, et al., 2018) if the disclosures were given directly by the physician during the appointment. However, given that previous research has revealed mixed results on advisee trust and often did not draw on real-world relationships—that is, patients in clinical settings receiving physician-industry COI disclosures from their own physicians—in which motivated reasoning may play a more important role, we make no directional hypothesis about the effect of the written COI disclosure on patients’ trust, noting that it could decrease, increase or have no effect.

4.3. Appointment attendance

We also examined a behavioral indication of trust that could follow the same pattern as our attitudinal measure: whether patients, after receiving a financial COI disclosure, would be likely to miss or cancel their appointment with their physician. For example, patients could decide upon receiving the COI disclosure information to make an appointment with another physician. Again, we make no directional hypothesis.

5. Methods

5.1. Study design and procedure

The study design and analysis plan were approved by the Institutional Review Board at the Cleveland Clinic before data collection, and the study was registered prior to data analyses at Clinicaltrials.gov. Prior to the field experiment, the materials were piloted and revised based on detailed interviews with 17 patients (see Appendix for more details).

5.2. Physician participation

We identified physicians who practiced in Ohio and Florida and who received $20,000 or more in the past year from any company whose product they used in their clinical practice (including money received from consulting, serving on a board, and royalty payments). The $20,000 threshold matched the hospital system’s new policy requiring those physicians to disclose to patients. Recruitment emails were sent to 40 eligible physicians inviting them to participate in the randomized field study; after follow-up, 27 physicians (68%) provided informed consent to participate in the study. Of these, 25 had accessible appointment systems, allowing inclusion in the study (see Fig. 1). All 25 physicians were men and represented a range of specialties (64% in surgery specialties; the remainder in medical specialties).

Using the electronic health record, we identified 1903 of these physicians’ patients as having an appointment during the study period (September 2015 to April 2016) and meeting the inclusion criteria, which were: English-speaking, non-terminally ill, over age 18, able to consent to medical treatments, and having an outpatient appointment with a study physician.

5.3. Disclosures to patients: Pre-appointment

All 1903 patients were sent an appointment-reminder letter (see Appendix) approximately one week prior to their physician appointments. In the four disclosure conditions, the appointment-reminder letter also notified patients that their physicians received $20,000 or more from named companies, identified the companies’ products, and explained the typical uses of these products in clinical care. The letter was signed by a Cleveland Clinic professional staff member (not the physician themselves) and the disclosure started with “Cleveland Clinic wants you to know that your Physician < name > has a financial relationship...”. In addition, we tested if describing the potential risks and benefits of the physician’s COI affected patients’ trust and knowledge. Thus, there were four intervention conditions: COI disclosure alone, COI disclosure with information on the risks of physician-industry relationships, COI disclosure with information on the benefits of such relationships, and COI disclosure with both risks and benefits information (see Fig. 2 for the wording of the disclosure and risk/benefit information).
The control group received only the appointment-reminder letter with no COI disclosures. Stratified random assignment balanced for approximate equal distribution among physicians across the five conditions. Patients were blinded to the purpose of the study, and physicians were blinded as to which condition letter patients received.

5.4. Patient survey: Post-appointment

Patients who saw their physician for a consultative appointment (N = 1276) were mailed a cover letter and survey within a week after attending their appointment with their physician (see Appendix). Non-responders were sent a second survey two to three weeks later, were called if no response was received, and finally were sent a third mailing. Surveyed patients received a $25 gift card after completing the survey.

5.5. Dependent variables

As well as examining the electronic health records to identify patients who missed or cancelled their appointments, further dependent variables were in the patient survey given to eligible patients who attended their appointment:

5.5.1. Knowledge of physicians’ COIs

A primary outcome from the survey was patients’ knowledge of their physicians’ financial COIs, which we measured by simply asking patients, “Do you think your physician has financial relationships with drug and device companies?” Patients could respond “Yes,” “No,” or “I am unsure.”

5.5.2. Trust in the physician

We also measured patient-reported trust in their physician, measured on a scale of 1 (strongly disagree) to 5 (strongly agree), using an adapted version of Mayer et al.’s tri-dimensional trustworthiness measure (Mayer et al., 1995). Three questions measured integrity: “My physician has a strong sense of justice,” “I wonder whether my physician will stick to their word” (reverse coded), and “My physician tries hard to be fair in dealings with others.” Three questions measured benevolence: “My physician is not very concerned about my welfare” (reverse coded), “My physician would not intentionally do anything to hurt me,” and “My physician would go out of their way to help me.” Finally, three questions measured physician expertise: “My physician is very capable of performing their job,” “I feel confident about my physician’s skills,” and “My physician is well qualified.”

5.5.3. Trust in the hospital

Patient-reported trust in the hospital was measured with four questions on a scale of 1 (strongly disagree) to 5 (strongly agree), adapted from Gordon, Street, Sharf, Kelly, and Souchek (2006): “I trust the Cleveland Clinic to put my medical needs above all other things,” “The medical skills of Cleveland Clinic doctors and nurses are not as good as they should be” (reverse coded), “I trust the Cleveland Clinic will give me all the information I need about my treatment,” and “The Cleveland Clinic will not give me the best care possible” (reverse coded).
5.5.4. Additional questions

To measure patients’ preferences for receiving financial COI disclosures about a new physician, we also asked: “If you had an appointment scheduled with a physician whom you hadn’t seen before, would you want to receive information about their financial relationships with drug and device companies?” (yes/no). To examine the impact that a physician’s COI would have on a patient’s medical decisions, we asked: “Does your physician’s financial relationships with drug and device companies impact your decision making about a treatment or procedure?” (Yes/No). We also asked: “When choosing a physician, do their financial relationships with drug and device companies affect your decision to make an appointment with them?” (Yes/No).

Patients’ demographic information and whether this was their first visit with the physician and/or the Clinic were also asked in the survey and cross-checked with other appointment information from the electronic health record.

5.6. Sample size calculation

Sample size was determined prospectively based on a one standard-deviation change in the Mayer et al. trustworthiness scale between the conditions using the POWER procedure in SAS software (version 9.3; Cary, NC). A sample size of 850 patients would provide 82% power to detect a 0.30-unit difference in the scale after Bonferroni correction for the 10 possible comparisons, with \( p < .05 \) as the significance level. A more detailed description of sample size determinations is provided in the Appendix.

5.7. Statistical analysis

For each condition, we averaged the nine Likert questions of the physician trustworthiness scale (Cronbach’s \( \alpha = 0.83 \); which includes the three subscales for integrity, benevolence, and ability)\(^2\) and the four trust-in-hospital questions (Cronbach’s \( \alpha = 0.79 \)), reverse scoring when appropriate. We performed ANOVAs and/or chi-square tests on our dependent variables (two-tailed hypotheses for trust in the physician and in the hospital and missed/cancelled appointments; one-tailed hypothesis for knowledge of their physicians’ financial relationships with industry). We also conducted robustness checks and sensitivity analyses. Given the robust primary data-collection efforts, this study had little missing data; therefore, missing data was simply treated as missing during analysis. Sample sizes were adjusted accordingly for each statistical analysis.

6. Results

6.1. Appointment cancellations

We examined whether disclosure increased the number of patients missing or cancelling appointments, perhaps due to a desire to switch physicians. Fig. 1 shows the numbers of missed or cancelled appointments for each of the five conditions. Across our full sample of 1903 patients, approximately one third (a usual percentage for Cleveland Clinic) missed or cancelled their appointment in each condition. There were no significant differences in appointments cancelled, missed, and

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2 Each dimension of trust (integrity, benevolence, and ability) was also examined separately and revealed similar results (reported in the figures, tables, and the Supplement).
completed between patients in the control (117/367, 32%) versus all four disclosure conditions (456/1536, 30%), $\chi^2(1, N = 1903) = 0.68$, $p = .41$. There were no significant differences across the four disclosure conditions alone, $\chi^2(3, N = 1536) = 0.67, p = .88$, or when examining all five conditions, $\chi^2(4, N = 1903) = 1.24, p = .85$. This, COI disclosure did not increase or decrease patients’ appointment attendance.

6.2. Patient characteristics

For patients who attended the appointment ($N = 1276$), 68% completed the survey. Table 1 shows the characteristics of these 867 patients by study condition. Fifty-four percent of the sample were women ($n = 467$); 84% (725) were White, and 9% (78) were African American; and 56% (482) were over age 61. Patients who completed the survey and sent it to us were approximately four years older than non-respondents ($p < .001$) but did not differ in gender ($p = .62$), or race ($p = .39$) from non-respondents.

About one-third of the sample ($n = 271/867, 31$%) reported that this was their first visit with the study physician, with no significant differences between patients in the control group ($n = 41/164, 25\%$) versus the disclosure conditions ($n = 230/703, 33\%; p = .06$).

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Table 1: Characteristics of patients who responded to the survey by condition.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Total ($N = 867$)</th>
<th>Control ($N = 164$)</th>
<th>COI Disclosure Only ($N = 182$)</th>
<th>COI Disclosure + Risks ($N = 173$)</th>
<th>COI Disclosure + Benefits ($N = 171$)</th>
<th>COI Disclosure + Risks + Benefits ($N = 177$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender**</td>
<td>866</td>
<td>164</td>
<td>181</td>
<td>173</td>
<td>171</td>
<td>177</td>
</tr>
<tr>
<td>Female</td>
<td>467 (53.9)</td>
<td>88 (53.7)</td>
<td>104 (57.5)</td>
<td>89 (51.4)</td>
<td>81 (47.4)</td>
<td>105 (59.3)</td>
</tr>
<tr>
<td>Male</td>
<td>399 (46.1)</td>
<td>76 (46.3)</td>
<td>77 (42.5)</td>
<td>84 (48.6)</td>
<td>90 (52.6)</td>
<td>72 (40.7)</td>
</tr>
<tr>
<td>Race**</td>
<td>867</td>
<td>164</td>
<td>182</td>
<td>173</td>
<td>171</td>
<td>177</td>
</tr>
<tr>
<td>White</td>
<td>725 (83.6)</td>
<td>131 (79.9)</td>
<td>146 (80.2)</td>
<td>154 (89.0)</td>
<td>151 (88.3)</td>
<td>143 (80.8)</td>
</tr>
<tr>
<td>African</td>
<td>78 (9.0)</td>
<td>12 (7.3)</td>
<td>22 (12.1)</td>
<td>10 (5.8)</td>
<td>11 (6.4)</td>
<td>23 (13.0)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>38 (4.4)</td>
<td>12 (7.3)</td>
<td>8 (4.4)</td>
<td>4 (2.3)</td>
<td>4 (2.3)</td>
<td>10 (5.6)</td>
</tr>
<tr>
<td>Others</td>
<td>26 (3.0)</td>
<td>9 (5.5)</td>
<td>6 (3.3)</td>
<td>5 (2.9)</td>
<td>5 (2.9)</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Age†</td>
<td>866</td>
<td>164</td>
<td>181</td>
<td>173</td>
<td>171</td>
<td>177</td>
</tr>
<tr>
<td>18–30</td>
<td>32 (3.7)</td>
<td>3 (1.8)</td>
<td>8 (4.4)</td>
<td>6 (3.5)</td>
<td>6 (3.5)</td>
<td>9 (5.1)</td>
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<tr>
<td>31–40</td>
<td>51 (5.9)</td>
<td>5 (3.0)</td>
<td>8 (4.4)</td>
<td>13 (7.5)</td>
<td>12 (7.0)</td>
<td>13 (7.3)</td>
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<tr>
<td>41–50</td>
<td>110 (12.7)</td>
<td>24 (14.6)</td>
<td>19 (10.5)</td>
<td>32 (18.5)</td>
<td>16 (9.4)</td>
<td>19 (10.7)</td>
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<tr>
<td>51–60</td>
<td>191 (22.1)</td>
<td>41 (25.0)</td>
<td>42 (23.2)</td>
<td>34 (19.7)</td>
<td>29 (17.0)</td>
<td>45 (25.4)</td>
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<tr>
<td>61–70</td>
<td>242 (27.9)</td>
<td>49 (28.2)</td>
<td>51 (28.2)</td>
<td>46 (26.6)</td>
<td>49 (28.7)</td>
<td>47 (26.6)</td>
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<tr>
<td>Over 70</td>
<td>240 (27.7)</td>
<td>42 (25.6)</td>
<td>53 (29.3)</td>
<td>42 (24.3)</td>
<td>59 (34.5)</td>
<td>44 (24.9)</td>
</tr>
<tr>
<td>Education‡</td>
<td>851</td>
<td>161</td>
<td>178</td>
<td>172</td>
<td>167</td>
<td>173</td>
</tr>
<tr>
<td>Under Grade 8</td>
<td>4 (0.47)</td>
<td>1 (0.62)</td>
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<td>2 (1.2)</td>
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<td>Grades 9–11</td>
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<td>5 (3.1)</td>
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<td>5 (2.9)</td>
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<tr>
<td>Grade 12 or GED</td>
<td>169 (19.9)</td>
<td>28 (17.4)</td>
<td>37 (20.8)</td>
<td>38 (22.1)</td>
<td>28 (16.8)</td>
<td>38 (22.0)</td>
</tr>
<tr>
<td>College</td>
<td>283 (33.3)</td>
<td>54 (33.5)</td>
<td>65 (36.5)</td>
<td>46 (26.7)</td>
<td>58 (34.7)</td>
<td>60 (34.7)</td>
</tr>
<tr>
<td>1–3 years</td>
<td>College degree</td>
<td>188 (22.1)</td>
<td>36 (22.4)</td>
<td>40 (22.5)</td>
<td>48 (27.9)</td>
<td>32 (19.2)</td>
</tr>
<tr>
<td>4 years</td>
<td>Graduate degree</td>
<td>188 (22.1)</td>
<td>37 (23.0)</td>
<td>32 (18.0)</td>
<td>39 (22.7)</td>
<td>44 (26.3)</td>
</tr>
</tbody>
</table>

Note: COI = Conflict of interest.

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Fig. 3. Causal effect of the disclosure intervention on patients’ knowledge about their physicians’ COI.
6.3. Risk/benefit framing of the COI disclosure manipulations

Regarding the contextual information about the risks and/or benefits of financial COIs, we observed no differences in the primary dependent variables among the four disclosure conditions (trust in the physician, $p = .39$, trust in hospital, $p = .37$, and patients’ knowledge of their physicians’ COI, $p = .59$; see Table S-1 in the appendix). In short, priming respondents to think in terms of risks or benefits of financial COIs made no detectable difference on patient trust and knowledge of their physicians’ COIs. So, for further analyses, we pooled these four conditions together as a single disclosure condition to compare against the control condition.

6.4. Patients’ knowledge of the physicians’ COIs

The disclosure intervention significantly affected patients’ knowledge of their physicians’ financial COIs (Fig. 3). Consistent with our prediction, although nine percent (15/163) of respondents in the control group reported that their physician had a financial relationship, this was significantly less than the 57% of patients (392/693) in the disclosure condition ($p < .001$). The adjusted odds ratio for correctly reporting a COI given that the patient was in the disclosure condition was 14.9, 95% CI [8.2, 27.2]; $p < .001$, compared to those reporting “I am unsure” or “no.” In the disclosure condition, 26% remained unsure, as compared to 36% in the control.

6.5. Patient trust in the physician and the hospital

We found no statistically significant differences in patient trust in the physician between the control and disclosure conditions in unadjusted analyses (Fig. 4 shows control vs. collapsed disclosure conditions and Table 2 shows all five conditions). We found similar results in the adjusted model for overall trust in the physician: Least Squares Mean: control (4.3), 95% confidence-interval (CI) [4.2, 4.5] vs. disclosure (4.3), 95% CI [4.2, 4.4] conditions; $p = .48$. We also found no statistically significant effects for trust in the hospital: control (4.4), 95% CI [4.2, 4.6] vs. disclosure (4.4) 95% CI [4.2, 4.5]; $p = .87$. Tables S-2 to S-5 in the appendix present multivariable model summaries.

6.6. Robustness checks and sensitivity analyses for trust in the physician and hospital

Exclusion of patients who reported that their physicians disclosed their financial COI during their appointment ($n = 139$) did not change the significance of disclosure on physician trust, with a change in mean score of $-0.042$, 95% CI $[-0.130, 0.046]$; $p = .34$ (Table S-6), nor on trust in the hospital ($-0.051$), 95% CI $[-0.166, 0.063]$; $p = .37$ (Table S-7).

The effect of COI disclosure did not show any significant differences on trust when examining only the subset of patients who saw their physician for the first time (and thus had no established relationship with their physician; $n = 271$). The change in mean score with disclosure for trust in the physician was $-0.056$, 95% CI $[-0.250, 0.138]$; $p = .56$ (Table S-8) and for trust in hospital ($-0.081$), 95% CI $[-0.289, 0.127]$; $p = .44$ (Table S-9).

Finally, using only the subset of patients who correctly recalled (or correctly did not recall) receiving the COI disclosure letter ($n = 664$; $n = 504$ for disclosure condition and $n = 160$ for the control) also did not change the significance of disclosure on physician trust, with a change in mean score with disclosure of $-0.007$, 95% CI $[-0.095, 0.080]$; $p = .87$ (Table S-10), nor on trust in hospital ($-0.008$), 95% CI $[-0.120, 0.105]$; $p = .89$ (Table S-11).

Fig. 4 displays increased variance in trust at the high end of the trust scale. However, a top-box analysis (examining those with a high level of trust ($n = 430$ had greater than 4.5 on the 5-point trust in the physician scale) showed qualitatively similar results to the original adjusted model (Table S-12).

6.7. Association between knowledge and trust in physician

Patients’ knowledge of their physicians’ COI had a significant association with trust ($p < .003$), see Fig. 5. Patients who falsely believed that their physician had no financial COI reported the highest level of trust. Patients who correctly believed their physician had a financial COI reported a lower level of trust, but this result was not significantly different from that of those who falsely believed their physician had no COI ($p = .22$). However, patients who were unsure whether their physician had a financial COI reported significantly lower trust as compared to both patients who falsely believed no COI existed ($p = .001$) and patients who correctly believed their physician had a COI ($p = .017$). Thus, trust was associated with clarity about the financial relationship.

6.8. Additional questions: Patient disclosure preferences

Nearly half of the patients (409/853, 48%) reported that they...
wanted to receive COI information prior to making an appointment with a new physician. Strikingly, 75% (651/863) reported that their physicians’ COI had no impact (526/863) or little impact (232/863) on their medical decisions.

Fifty percent (435/867) of patients reported a preference for receiving COI disclosures by mail, while a quarter (222/867, 26%) preferred that they be presented verbally by their physician. Fewer patients (149/867, 17%) preferred to receive written disclosures in person from their physician, and very few (70/867, 8%) preferred online disclosures, including via the Internet, e-mail, and/or patient portal.

Only one in six (153/851, 18%) patients reported that when choosing a physician, their physician’s financial relationships affected their decision to make an appointment. Nonetheless, only four percent (31/863) of respondents reported that they had ever looked or asked for information about any of their physicians’ financial relationships.

Patients in the disclosure condition were more likely to say they preferred to receive disclosures by mail (\(p < .001\)) and less likely to prefer to hear the information directly from their physician (\(p = .047\)) as compared to patients in the control condition. Furthermore, patients in the disclosure condition were least likely to say that financial COIs would affect their decision when choosing a physician (\(p = .049\)), suggesting that although patients may forecast that COIs would influence their choice of physician, in actuality, once they receive a disclosure that their physician has a COI, they realize it does not influence their choices. However, those in the disclosure condition were more likely than those in the control condition (\(p = .04\)) to say that if they had an appointment with a new physician, they would still want information about COIs.

### Table 2

<table>
<thead>
<tr>
<th>Factor</th>
<th>Control (N = 164)</th>
<th>COI Disclosure Only (N = 182)</th>
<th>COI Disclosure + Risks (N = 173)</th>
<th>COI Disclosure + Benefits (N = 171)</th>
<th>COI Disclosure + Risks + Benefits (N = 177)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>164</td>
<td>182</td>
<td>173</td>
<td>171</td>
<td>177</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>4.5 ± 0.46</td>
<td>4.5 ± 0.45</td>
<td>4.5 ± 0.47</td>
<td>4.4 ± 0.51</td>
<td>4.4 ± 0.52</td>
</tr>
<tr>
<td>p valuea</td>
<td>0.45</td>
<td>0.58</td>
<td>0.88</td>
<td>0.27</td>
<td>0.49</td>
</tr>
</tbody>
</table>

\(P\) values: a = ANOVA.

Note: COI = Conflict of interest.

7. General discussion

Our randomized field experiment with patients in a hospital system explored how patients respond to disclosures of substantial financial relationships between their own physicians and industry. The disclosure letter gave patients explicit information on the magnitude of the financial relationship ($20,000 or more annually) and presented this relationship as a risk to the patient, a benefit, both, or neither.

Such disclosures succeeded in improving the actual knowledge of patients about their physicians’ financial relationships, with 57% in the disclosure conditions correctly reporting the physician-industry relationship. For a written education tool, this effect size (of increase in knowledge) is impressive. It appears that the disclosures were received and read by some patients. However, it still means that 43% of patients who were sent the letter either did not receive it, did not understand it, ignored it, or forgot it. To the extent that this knowledge-based outcome is an important policy goal, future research could explore whether additional mailings or an interactive online approach could further improve recipient knowledge.

Even though nearly half of the patients surveyed reported that they wanted to receive disclosure information, no matter the financial amount, most also reported that these disclosures were not important to their medical decisions.

We found no statistically significant differences in patients’ appointment attendance or in patients’ trust in their physician or the hospital due to disclosure of COI via our intervention appointment.
letters. These are important null findings given that our study was pre-registered and sufficiently powered to detect modest differences in patients’ trust and because we provided contextual information that highlighted the risks of financial COIs for some patients and the benefits of COIs for others, manipulations that could magnify any effects otherwise present.

In our study, actual patients responded to questions about their own physicians, which may generate much different responses than questions asking about their perceptions of physicians in general. Receiving COI disclosures from hypothetical physicians in an experiment may naturally lead to decreased trust if the disclosures are deliberated on (Sah, Loewenstein, et al., 2018; Spece et al., 2014). Indeed, the importance of real-world actors in examining the effects of COI disclosure has been highlighted in recent research which reveals that the effect of COI disclosure on real-world advisors (physicians, registered investment advisors etc.) is quite different to the effects of COI disclosure on non-expert advisors (research participants playing the role of advisors in an experiment) (Sah, 2019). Likewise, the effects of COI disclosure on recipients may differ depending on whether the recipients are receiving real-world disclosures that are relevant to them. Even so, many experiments examining the effects of COI disclosure on recipients use non-experts (research participants) (Sah, Loewenstein, et al., 2018; Spece et al., 2014). In contrast, our randomized field experiment allowed us to investigate whether receiving the information in a real-world context regarding the patient’s own physician made a real difference on the outcomes we measured.

In several respects, this experiment was a robust test of COI disclosure as a policy. Unlike passive web databases, such as CMS’ Open Payments site, this intervention delivered COI information directly from the hospital to patients. This is an important advantage, given that only 4% of respondents said they had ever looked up COI information about a physician, and in another study, when prompted to do so, only 9% of participants could find their own physician on the ProPublica database (Jhong et al., 2017). Moreover, this intervention sought to explain why patients should care about the disclosed information, systematically exploring both benefits and risks of COIs, and found that they did not impact patients’ trust. Although we pilot-tested and refined the materials to ensure that they were understandable, patients also indicated that financial COI information was simply not among the most important factors they considered when making decisions about their medical care. In this real-world setting in which patients already had an appointment with their physician, the patients’ dependence on their physicians may have overwhelmed any concern arising from their physicians’ COIs—in other words they were motivated to continue to trust their physician as it would be costly not to trust. Patients would have to search for and switch physicians which is time consuming, potentially delaying their treatment and/or reject their physicians’ recommendations—these actions would be burdensome to patients, much more so than continuing to trust their physician.

Although the disclosure intervention itself did not affect patients’ trust, the intervention did affect patients’ knowledge of their physicians’ COI, which in turn had a significant association with patient trust. Patients who incorrectly believed their physician had no COI reported the highest level of trust, but it was those patients who were unsure about their physician’s COI who reported the lowest level of trust. This demonstrates that uncertainty regarding physician’s COI may be a disconcerting factor for patients.

This association between knowledge and patient trust raises an alternative explanation for the null results on trust. We proposed that the null effect on trust was due to COI disclosures being in the real world regarding the patients’ own physician leading to motivated reasoning by patients to continue to trust their physicians. Such disclosures were not important to patients with regard to perceptions of trust and medical care: A reasonable conclusion supported by our other survey results. However, it is possible that because COI disclosures increased knowledge of the physicians’ COIs, those who initially believed that the physician had no COI (which in our study is associated with the highest level of trust) but were consequently informed of the COI decreased their level of trust in the physician, whereas those who were initially unsure about their physicians’ COI (associated with the lowest level of trust) and were consequently informed of the COI increased their level of trust in their physician. This possibility could be explored in future empirical investigations in which trust and knowledge of the physicians’ COI are measured before and after COI disclosures are given.

These results have several important implications for organizations, managers and policy makers. For healthcare, the concept of “informed consent” has particular salience and our findings suggest that a single mailed disclosure letter does reach patients and is informative, increasing knowledge of their physicians’ COIs. Also, receiving such information before an appointment did not lead to unintended consequences, such as increased trust seen when disclosures are processed automatically rather than deliberatively (Sah, Malaviya, et al., 2018). In fact, although COI disclosures informed recipients of their physicians’ financial ties with industry, the disclosures had little impact on patients’ trust in their physician or hospital. This finding could mitigate concerns that patients may overreact to COI disclosures, leading to adverse consequences such as ignoring valuable medical advice (Pham & Kanter, 2014; Sah & Feiler, 2019). Patients also appeared to value transparency since it was those patients who were unsure about their physicians’ COI that reported the least amount of trust in their physician. For medical organizations, therefore, encouraging COI disclosure could be beneficial as it not only provides transparency by giving relevant information to patients, it also appears to have no detrimental effect on patients’ trust in their physician or the organization. However, COI disclosure cannot be a panacea to addressing physician-industry relationships if the intended purpose was for patients to assimilate the information into their decision-making and account for potential physician bias.

Beyond healthcare, our findings may stand for a more general proposition that consumers value transparency and certainty (Ellsberg, 1961). Being unsure about potential negative or even ambiguous information could undermine trust more than having that information. Thus, for example, company investors, home purchasers, airline travelers, or buyers of durable goods (e.g., automobiles) as well as patients may be reassured by early disclosures. In contrast, uncertainty about whether the company will have a slower quarter, whether the home may have termites, whether the flight will be late, whether the car is subject to a safety recall, or whether you have a medical condition or not may actually be worse than knowing those facts (and accepting them).

7.1. Limitations and future directions

Our study has several limitations that should be considered for future research and optimal disclosure practices. First, we used a particular type of disclosure intervention and a particular method for measuring its effects (a survey after patients saw their physicians and electronic health records for missed and cancelled appointments). A different sort of intervention and measurement, such as physician verbal disclosures and immediate questioning, may have created or detected greater effects on trust. Additionally, disclosures at the time of choosing a physician rather than before an appointment with the physician may have led to different physician preferences; when changing advisors is costly, advisees tend to report increased trust in their primary advisor as compared to when changing advisors is relatively easy (Sah & Loewenstein, 2015). If patients could easily select unconflicted physicians by, for example having information on all physicians’ COIs readily available at the time of appointment scheduling, they may not have made appointments with physicians with COIs. Timely disclosures at the time of choosing advisors, perhaps via an online interactive approach, may be helpful across different professions and industries.

A personalized disclosure may also be better tailored to specific
treatments that are implicated by that financial relationship and withheld when irrelevant. This alternative approach may be difficult to implement because it depends on physician discretion, and the relevance of a financial relationship may not always be obvious. Our disclosure letters provided the predicate facts to patients, listing the products and their approved uses associated with the financial relationship.

Furthermore, our study sample reported very high levels of trust in their physicians and the hospital. Our sample of physicians, experts in their fields, may represent the typical recipients of substantial industry support and thus a worthwhile population for study (Tringale et al., 2017). Importantly, however, the findings may not be generalizable to clinical settings or other professions where baseline levels of trust are lower. Although motivated reasoning to trust your own advisor may still occur in advice situations outside of medicine (Sah & Loewenstein, 2015), it may not be as strong in professions with lower levels of trust, such as in financial services (Gallup Poll, 2015). Again, having the choice to easily choose conflicted advisors would diminish switching costs that are likely to lead to motivated reasoning to trust your advisor regardless of their COIs.

Notwithstanding its limitations, our intervention may be realistic as part of a policy intervention, given that it is inexpensive and does not impinge on physicians’ scarce clinical time. Furthermore, as compared to direct disclosure by physicians, mailed disclosures may decrease unintended consequences, such as feeling pressured to take physicians’ advice or interpreting the disclosure itself as a cue to the physicians’ expertise when scarce resources are available to deliberate on the disclosure (Sah, Loewenstein, et al., 2013, 2018; Sah, Malaviya, et al., 2018). Moreover, our delayed survey avoids creating demand or salience effects (i.e., false positives) that may come from more time-sensitive inquiries. Finally, more optimal disclosure practices could provide disclosures at the time of selecting advisors to encourage advisees to enact their advisor preferences before they are costly to change.

7.2. Conclusion

Many patients want information on physician-industry financial relationships. We found disclosure letters to be both feasible and effective in increasing patients’ knowledge of their physicians’ financial relationships with the healthcare industry. Some commentators have expressed the concern that patients may overreact to financial COI disclosures, leading to problematic consequences (Pham-Kanter, 2014), but we found no such evidence. In fact, patients who were unsure about their physicians’ COI reported the least amount of trust in their physician, which suggests some value in transparency.

Nonetheless, to the extent that financial COIs in fact undermine the quality of physician advice, our study does not suggest that disclosures harm trust or cause greater discounting than necessary. In fact, the remaining concern is whether patients should have discounted (with more missed/cancelled appointments or decreased trust) to account for potential bias but did not, perhaps because of perceived costs of switching physicians and the motivation to continue to trust their physicians. Future research needs to tease out how to best help patients and physicians meaningfully integrate COI disclosure knowledge into medical decision-making. Policymakers should also continue to consider more stringent efforts to manage COIs, such as proscriptions on certain kinds of relationships that yield little clinical benefit but create the greatest risk of bias.

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Appendix A. Supplementary material

Supplementary data to this article can be found at https://doi.org/10.1016/j.ohbiol.2019.03.005.

Trial Registration: Clinicaltrials.gov Identifier: NCT02793115.

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