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Trust in Deliberation: The Consequences of Deliberative Decision Strategies for Medical Decisions

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Objective: Decision aids (DAs) play an increasingly critical role in supporting patients in making preference-sensitive treatment decisions. One largely untested assumption of DA design is that patients should be encouraged to deliberate carefully about their options after being informed of those options. The purpose of the present research is to test the impact of deliberative versus intuitive decision strategies in medical decision contexts. ***Method:*** In 3 experiments, participants were randomly assigned to make a hypothetical medical decision either intuitively, or using various deliberative strategies. In Study 1, we predicted that deliberation would improve decision confidence while not changing decisions. In Study 2, our aim was to establish whether the observed increase in confidence was due to decision-making effort, confirmation bias, or both. In Study 3, it was predicted that deliberation would cause participants to become more confident in suboptimal decisions. ***Results:*** Across 3 studies, participants who deliberated felt better about their decisions and decision process, even when the decision was the same as what would have been chosen intuitively (Studies 1 and 2), and even when the decision was normatively bad (Study 3). Study 2 additionally indicated that participants' confidence was driven by confirmation bias rather than effort justification. ***Conclusions:*** Deliberative tasks may often fail to be an effective debiasing tool, and components of patient decision aids that ask patients to deliberate may serve to improve how patients feel without improving the quality of their decisions.

Keywords: patient decision aids, decision making, intuition and deliberation, values clarification

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Psychologists and lay people alike make a distinction between decisions that are intuitive versus deliberative, the former being fast, effortless and relying on "gut feelings," and the latter being slow, effortful, and involving explicit strategies such as making lists of pros and cons (Evans & Stanovich, 2013). A large amount of research has been devoted to the various ways in which our intuitions are systematically biased (Gilovich, Griffin, & Kahneman, 2002). However, there is a relative paucity of research on the ways in which judgments and decisions can be improved or "debiased" (Lilienfeld, Ammirati, & Landfield, 2009), particularly in the medical field.

The judgments and decisions of both physicians and patients are known to be influenced by a variety of biases. For example, people may reverse their treatment preferences when choosing between many versus few options (Redelmeier & Shafir, 1995), and patients may fail to adjust their subjective risk perceptions to match objective health risks (Senay & Kaphingst, 2009). People who are low in numeracy often have trouble making trade offs and understanding the risk information that is an inherent part of most medical decisions (Reyna, Nelson, Han, & Dieckmann, 2009). Moreover, people are often compelled to get treatment for a frightening health issue like cancer, even if the treatment is more deadly than the cancer itself (Fagerlin, Zikmund-Fisher, & Ubel, 2005), and people may avoid treatments with a small chance of an aversive outcome (e.g., colostomy) even if that means accepting a

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treatment with a larger chance of death (Amsterlaw, Zikmund-Fisher, Fagerlin, & Ubel, 2006).

One critical question, then, is how medical decisions can be optimized. Often it is assumed that judgment biases and errors, such as those described above, arise from the fast, intuitive "System 1" and are corrected by the slow, deliberative and effortful "System 2" (Kahneman, 2003; Stanovich & West, 2000). However, this conceptualization has led to the persistent fallacy that deliberative reasoning usually produces better judgments (Evans, 2012). In some instances, the intuitive, quickly generated response may in fact be the optimal response (Reyna, 2004). Moreover, deliberative reasoning is likely to improve judgments only if other conditions are also met, such as having awareness of the degree and direction of bias, or having the resources and skills (e.g., working memory, numeracy) necessary to reason about the decision problem (Arkes, 1991; Stanovich & West, 2008; Wilson & Brekke, 1994).

In medical decision making, one method that has been proposed to improve decisions is patient decisions aids (DAs) and particularly values clarification exercises. Patient DAs are "evidence-based tools designed to help patients to participate in making specific and deliberated choices among healthcare options" (O'Connor et al., 2009, p. 7). In addition to providing information, DAs often also include values clarification exercises that are meant to help patients explore their values and preferences (Elwyn et al., 2006; O'Connor, Rostom, et al., 1999). Examples of values clarification methods include listing the reasons in favor and against each treatment option (O'Connor, Wells, et al., 1999), rating the importance of treatment attributes (Pignone et al., 2013; Wong et al., 2012), and writing or discussing one's thoughts about the treatments (Fraenkel et al., 2012). Although these exercises are diverse (Fagerlin et al., 2013), one feature that most share is that they ask patients to engage in some sort of deliberative reasoning, such as making lists of pros and cons and or weighing the treatment attributes (de Vries, Fagerlin, Witteman, & Scherer, 2013; O'Connor, Wells, et al., 1999). Hence, the broader assumption is that deliberative reasoning will result in better decisions. And yet, values clarification exercises and the assumptions underlying them have rarely been tested empirically (Fagerlin et al., 2013; Garvelink, ter Kuile, Stiggelbout, & de Vries, 2014; Pieterse, de Vries, Kunneman, Stiggelbout, & Feldman-Stewart, 2013).

One complexity involved in establishing whether values clarifications improve patient decisions is that it is often difficult to identify when a "good" decision has been made (Elwyn & Miron-Shatz, 2010; Ubel, 2013). Good decisions have been defined as those that are that are sufficiently informed (O'Connor, Rostom, et al., 1999) or that are consistent with the patient's stated preferences (Sepucha, Ozanne, Silvia, Partridge, & Mulley, 2007), or that minimize the influence of decision making biases like framing effects or emotions (Ubel, 2013). In the studies reported here, we focus on minimizing the biasing influence of emotional impulses and improving consistency between a person's decision and their stated preferences. Other scholars have argued that good decisions should be defined by the presence of a deliberative decision process (Elwyn & Miron-Shatz, 2010). However, the present studies provide evidence that this latter perspective may be inadequate, because a deliberative decision making process can result in decisions that are suboptimal according to other standards.

In sum, identifying good decisions is a complex endeavor, about which reasonable people may disagree. Perhaps as a result, the small amount of research that has examined the effects of values clarifications has often not agreed about what a successful intervention would look like, or what the primary outcome measures should be that would indicate success or failure of the intervention (Fagerlin et al., 2013). In light of these issues, the purpose of the present article is to address some basic questions pertaining to values clarifications and deliberative reasoning more generally. In particular, we asked two simple questions that we viewed as being most central to the methods and goals of values clarification: (a) Does deliberative reasoning change decisions or cause decisions to be more congruent with stated values? (b) Does deliberation change how people feel about their decisions, and if so, why?

From a default interventionist dual-process perspective, decisions are likely to improve following deliberation, because intuitive responses are often biased, and deliberative reasoning allows decision makers to select a better response (e.g., Kahneman, 2011). An alternative perspective suggests the opposite; namely, that deliberation can harm decisions because it causes people to focus on reasons that seem important, but that actually are not (Wilson & Schooler, 1991). A third perspective is one that we refer to as the *trust in deliberation* perspective, holding that deliberative reasoning will often not change decisions at all, but instead will increase confidence in the choice that people would have also made intuitively (Aldag & Power, 1986; Davis, McCaffery, Mullan, & Juraskova, 2014). In the studies reported below we predicted that deliberative reasoning would cause people feel better about the decision that they would have also made intuitively. Precedent for this prediction comes from the decision making literature, where research has shown that decision aids may potentially increase confidence while also not influencing decisions (Aldag & Power, 1986; Stacey et al., 2014). Further, in medical contexts there are often no cues that allow decision makers to unambiguously identify a "correct" choice, and so deliberative reasoning is likely to be guided one's intuitive preferences, while at the same time decision quality is likely to be inferred from the decision process rather than the quality of the decision itself (cf. Mata, Ferreira, & Sherman, 2013).

Study 1

Method

Participants. Participants were 710 adults located in the United States who were recruited using Amazon's Mechanical Turk (mTurk). The mTurk population was used for the present study because it is a source of high-quality data, with samples showing similar scale alphas and test–retest reliabilities as other Internet and student populations and is also more diverse in age, race, and education than undergraduate samples (Buhrmester, Kwang, & Gosling, 2011). Although one might worry that the mTurk population would be insufficiently conscientious for a deliberative decision-making study, we have consistently found that these participants are at least as conscientious as undergraduate participants, as evidenced by the time taken to read and answer questions, as well as writing quality and quantity. All participants completed the survey online and were paid $0.85 in exchange for their participation. Age range of the participants was

18–75 years ($M = 31$), 52% were female, the majority (75%) were White, and 43% had received an associate or bachelor's degree or higher.

Procedure. Participants read a scenario in which they were asked to imagine that they were diagnosed with unspecified cancer and had a choice between surgery and watchful waiting (Fagerlin et al., 2005). In the scenario, surgery was described as potentially curing the cancer, but involved pain and posed a 10% chance of death from surgery. Watchful waiting did not cure the cancer, but involved no pain and posed only a 5% chance of death from cancer. Past research using this scenario has shown that between 50 and 60% of participants choose surgery, in spite of the fact that surgery is the option with more pain and a greater risk of death (Fagerlin et al., 2005). Although there are certainly drawbacks involved in using hypothetical scenarios, such scenarios were the most ethical starting point considering the possibility that deliberation or intuition might have a negative impact on people's decisions. Moreover, we used this particular scenario because it is predictive of real cancer treatment preferences in men facing a prostate cancer diagnosis In particular, men who choose surgery in this scenario are much more likely to consider surgery and radiation as treatment options for early stage prostate cancer, and they are less likely to consider watchful waiting, as compared to men who choose watchful waiting in the scenario (Scherer, Ubel, & Fagerlin, in preparation).

After reading the scenario, participants were randomly assigned to one of three experimental conditions. In a control condition, participants made their choice immediately after reading the scenario, with no additional instructions (mimicking the original study). In the intuition condition, participants were told,

> It is critically important that you decide based on your immediate gut feelings. Don't think about it too hard, and just decide using your first gut feelings and intuitions about what is right for you.

In the deliberation condition, participants were told,

> It is critically important that you take some time to think carefully about this situation. If this was really you, which treatment would you choose and why? Don't let your gut feelings and emotions get in the way of making the best possible decision. In particular, we would like you to write about how a rational person would determine which option is objectively best.

The rationale behind these instructions was that the choice of surgery is often assumed to result from a kneejerk intuitive response to get the cancer out of one's body at all costs. To the extent that this is the case, instructions to think carefully, be rational, and ignore emotions should cause participants to be more likely to choose watchful waiting. Participants who deliberated were told that they must write for at least 2 min, after which they would be allowed to move on to the next part of the experiment. A timer on the page that was not visible to participants prevented them from advancing before 2 min had elapsed. After 2 min, an arrow button appeared below the textbox, and this allowed them to move on. After these instructions, all participants made a treatment choice and then completed the outcome measures.

Outcome measures. After making their choice, which was a primary outcome measure, participants responded to the following questions, which constituted two additional critical outcomes: (a) Decision confidence: "I feel satisfied with my decision"; "I feel confident in my decision"; "The decision that I made was the best possible for me personally"; "I feel comfortable with my decision, I have no reservations about my decision" (1 = *strongly disagree* to 5 = *strongly agree*, $\alpha = .89$). (b) Evaluations of the decision process: "Earlier, you made your decision [immediately, with no instructions/after taking time to think carefully/by going with your gut feelings]. Did you like this way of making your decision? Would you use it is the future? Did this way of making your decision help you to make a *better decision*?" (1 = *no, definitely* not, 5 = *yes, definitely*, $\alpha = .89$).

Two additional items served as manipulation checks: "When I made my decision, I went with my gut feelings and intuitions"; "When I made my decision I took time to think carefully about the treatments" (1 = *not at all*, 5 = *very much so*). Additionally, the written responses from the deliberation condition were coded. The most prominent feature of participants' writing was that they tended to either consider reasons for both treatment options (e.g., "On one hand I would choose surgery, . . . on the other hand . . ."), or for just one (e.g., "I would choose surgery because . . ."). Two research assistants independently coded the written responses as being either one- or two-sided (given codes 1 or 2, respectively). Kappa reliability between these coders was good (.84), and disagreements were resolved by the judgment of the first author. At the end of the survey, participants reported their age, gender, education level, and general health on a scale from 1 (*excellent*) to 5 (*poor*).

Results

Manipulation check means and *F* statistics are displayed in Table 1. Participants were most likely to report using their gut

Table 1
Study 1 Manipulation Checks and Primary Outcome Measure Means (Standard Deviations)

	Control	Intuition	Deliberation	*F* statistic
Manipulation checks				
Use of gut feelings	3.46 (1.11)	3.93 (.98)	2.62 (1.31)	75.33***
Engaged in careful thought	3.92 (.88)	3.48 (1.07)	4.28 (.73)	43.86***
Time taken to decide	11 s (10)	19 s (15)	249 s (128)	685.13***
Decisions and decision evaluations				
Percent choosing surgery	50%	54%	53%	0.35
Evaluations of the decision process	2.76 (1.10)	2.95 (1.04)	4.08 (0.77)	111.55***
Decision confidence	3.60 (0.80)	3.60 (0.82)	3.96 (0.75)	14.62***

* $p < .05$. ** $p < .01$. *** $p < .001$.

feelings in the intuition condition, and least likely to use gut feelings in the deliberation condition. Post hoc Tukey's honest significant difference (HSD) tests indicated that all groups were significantly different from each other (all $p < .001$, $\eta_p^2 = .04–.24$). Participants reported thinking most carefully in the deliberation condition, and least in the intuition condition. Again, Tukey's tests indicated that all groups were different (all $p < .001$, $\eta_p^2 = .04–.15$). All deliberators wrote at least a short paragraph relevant to the decision. Time taken to make the decision was assessed, starting from the intuition/deliberation instructions through to when a decision was made. Deliberators took longer to decide compared to intuition and control. The fact that the intuition group took longer than the control group can be attributed to the fact that these participants received extra instructions to be intuitive.

The decision strategy had no impact on the treatment that participants chose, $\chi^2(2) = 0.70$, $p = .70$ (see Table 1). Exploratory logistic regressions comparing the deliberation and control conditions sought to determine whether any of the manipulation check or demographic variables interacted with decision strategy to determine choice. These analyses revealed that greater use of gut feelings was associated with choosing surgery (B = −.23, *SE* = .11, $p = .037$), and that women were more likely to choose surgery than men (B = −.52, *SE* = .25, Wald = 4.42, $p = .035$). However, there were no main effects involving age, education or general health, nor were there interactions involving decision strategy (all $p > .20$).

In spite of the lack of choice effects, participants in the deliberation group felt more positive toward their decision strategy than participants in the control and intuition groups, $F(2, 707) = 111.55$, $p < .001$, $\eta_p^2 = .24$ (see Table 1). The deliberation group also reported greater confidence than the control and intuition groups, $F(2, 708) = 14.62$, $p < .001$, $\eta_p^2 = .04$. Tukey's post hoc tests indicated that these effects were all driven by the deliberation condition; in no case were the intuition and control conditions different from each other (all $p > .20$).

One question is whether the content of participants' writing could provide insight into why deliberators felt so confident in their decisions. A majority (73%) of participants in the deliberation condition wrote arguments in favor of just one choice option (e.g., "I would choose surgery because . . ."), which is indicative of confirmation bias (Nickerson, 1998). Writing one- versus two-sided arguments was not predictive of choice or evaluations of the decision process (ps > .50), but it was associated with confidence. Participants who wrote one-sided arguments reported greater confidence ($M = 4.07$, $SD = .72$) than those who wrote two-sided arguments, ($M = 3.67$, $SD = .79$), $F(1, 198) = 5.72$, $p = .004$, $\eta_p^2 = .05$.

Discussion

Participants in the deliberation group made decisions that were not distinguishable from decisions made by participants in the intuition group, and the large sample size reassures us that the null effects involving choice were not due to lack of statistical power. This lack of choice effect is surprising because the deliberation instructions might reasonably be expected to shift people toward choosing the treatment option with less pain and death. In spite of these null effects involving choice, participants who deliberated liked their strategy more, believed their strategy helped them to make a better decision, and reported significantly greater decision confidence, relative to participants who did not deliberate. Hence, deliberation improved how participants felt about their decisions and decision process, without changing decisions.

Study 2

Although a number of studies have demonstrated that decision aids can result in high decision confidence and satisfaction (Aldag & Power, 1986; Kmett, Arkes, & Jones, 1999), few have attempted to determine why these effects exist. This is important, because the answer to this question could allow us to anticipate what kinds of deliberative values clarification tasks might result in such effects. At least two different processes might be at work, both of which draw from classic psychology literatures: One possibility is that people might feel better about deliberative decisions because deliberation allows them to think of reasons for their intuitively preferred choice. In other words, deliberation could cause higher confidence because of *confirmation bias* (Nickerson, 1998). However, another possibility is that deliberation could increase confidence as a result of *effort justification*. That is, people might infer that a decision must have been good because it was effortful (Aronson & Mills, 1959).

Study 2 tested the confirmation bias versus effort justification explanations by experimentally manipulating both the amount of effort required by the deliberative task, as well as whether the deliberative task allowed participants to generate only choice-confirming arguments, or not. If decision confidence is the result of confirmation bias alone, then confidence should increase only when individuals are allowed to generate arguments in favor of their preferred option. However, if effort justification can explain these effects, then we should see increased confidence when the task requires more effort, even when that effort does not lead to stronger arguments for one choice over another.

Method

Participants. There were 810 adults located in the United States who participated in an mTurk survey in exchange for $0.75. We removed 44 participants who reported having seen the scenario before, and four participants who did not follow the writing instructions (i.e., either didn't write anything, or failed to write the specified number of reasons in the listing conditions), leaving a total sample size of 762 for the present analyses.[1] Mean participant age was 34.54 years ($SD = 12.03$, range = 18–77), 55.1% were female, 80% were White, and 50.3% had received a bachelor's degree or higher.

Design and procedure. The present study was a 2 (Effort: High vs. Low) × 2 (Task Allows Confirmation Bias: Yes vs. No) + 1 (Control) between subjects design. The scenario and control condition were the same as Study 1. In addition, there were two types of deliberative tasks: *free-writing* and *listing*. In the free-write groups, participants wrote their thoughts for "just a brief moment" (low effort) or a minimum of 2 min (high effort). In the listing groups, participants were asked to list an equal number of reasons why surgery and watchful waiting would be good options

[1] Exclusion or inclusion of these 48 participants did not change any of the reported results.

to choose, which induced effortful reasoning without allowing participants to justify a particular choice. One group listed two reasons (low effort) and the other listed five reasons (high effort; pilot testing indicated that five reasons was the maximum number that people could typically generate). Participants were presented with a corresponding number of textboxes, and were instructed to write full sentences. The order of these boxes was randomized such that some participants wrote reasons for surgery followed by watchful waiting, and others did the reverse. The time taken to write and make a decision was recorded for all participants.

The instructions in the deliberation groups were the same for all participants, except for the details about their assigned task (i.e., free-writing vs. listing). The instructions that were shared by all deliberation groups said,

> It is very important that you take some time to think carefully about this decision. If this was really you, which treatment would you choose and why? What features of each option are the most important to you personally? In particular, we would like you to try to make the best possible decision.

These instructions were less heavy handed than the instructions in Study 1, and encouraged participants to consider the features of the options that were most important to them personally, making these instructions more similar to what is found in typical values clarification methods (Fagerlin et al., 2013).

The primary outcome measures were all identical to Study 1. In addition, just prior to making their final choice participants were asked which option they were leaning toward (7-point Likert scale with anchors of *surgery* and *watchful waiting*) to provide a more sensitive measure than the dichotomous choice outcome. Also, participants responded to the statements, "I feel conflicted about this decision" and "This is a difficult decision" (5-point scales from *strongly disagree* to *strongly agree*; $\alpha = .75$) after reading the scenario but prior to deliberating. The purpose of this measure was to include it as a covariate in our planned analyses of the relationship between one- versus two-sided reasoning and confidence. Participants also completed a more comprehensive measure of their health and experiences with cancer, as well as subjective numeracy (see online supplementary materials). Finally, the predicted effects might be viewed as considerably less interesting if they are driven by a subset of participants who have a preexisting preference for deliberative strategies, and so we included the Preference for Intuitive and Deliberative Decision-Making (PID) Scale (Betsch, 2008). This scale has two subscales, preference for intuition and preference for deliberation. We used the latter because it was the most relevant to the present study. This nine-item scale showed adequate reliability, $\alpha = .78$.

Results

Means, standard deviations, and *F* statistics associated with the manipulation checks are presented in Table 2. There was a significant effect of decision strategy on participants' reports of thinking carefully, and Tukey's HSD post hoc comparisons showed that all of the deliberation conditions reported engaging in more thought than control (all $p < .05$, $\eta_p^2 = .019–.025$), except for the low-effort free-write condition, $p = .11$, $\eta_p^2 = .015$. Moreover, the high versus low effort manipulation was successful: Participants took longer in the high effort versus low effort free-write condition, $F(1, 327) = 14.48$, $p < .001$, $\eta_p^2 = .04$, and took longer in the five- versus two-reasons condition, $F(1, 308) = 77.07$, $p < .001$, $\eta_p^2 = .20$.

Next, we tested the effect of decision strategy on the critical outcomes. Decision strategy had no effect on treatment choice, either using the dichotomous choice outcome, $\chi^2(4) = 0.92$, $p = .92$ or the Likert scale outcome, $F(4, 756) = 0.45$, $p = .76$; Table 2. As in Study 1, we conducted exploratory analyses to determine whether any of the demographic or health-relevant variables interacted with decision strategy to predict choice, and there were no significant interactions (see online supplement for zero-order correlations between these variables and choice).[2]

Next, we turned to participants' evaluations of their decisions. We conducted the following analyses both with and without controlling for age, gender, and all of the measured health-relevant variables. These controls did not change the results, and so we report the more straightforward ANOVAs rather than ANCOVAs. Results showed a significant effect of decision strategy on evaluations of the decision process, $F(4, 755) = 49.09$, $p < .001$, $\eta_p^2 = .20$, and post hoc Tukey's HSD tests indicated that all of the deliberation conditions were liked better than control (all $p < .001$, $\eta_p^2 = .24–.27$) and no deliberation task was preferred more than the others (all $p > .90$; Table 2). There was also a significant effect of condition on decision confidence, $F(4, 755) = 3.88$, $p = .004$, $\eta_p^2 = .02$, and post hoc Tukey's tests revealed that the free-write conditions were more confident than control (both $p = .01$, both $\eta_p^2 = .03$), whereas the listing conditions were not (*p*s = .72 and .07). A further 2 (Effort: High vs. Low) × 2 (Confirmation Bias Possible: Yes vs. No) ANOVA involving the four deliberation conditions revealed a significant effect of confirmation bias, $F(1, 494) = 3.64$, $p = .05$, and no effect of effort ($p = .27$) and no interaction ($p = .30$), indicating that increased confidence was influenced by confirmation bias rather than effort.

We coded the free-write responses as in Study 1. Replicating Study 1, a majority (71%) of participants engaged in one-sided reasoning in the longer free-write condition, and even more (84%) engaged in one-sided reasoning in the shorter free-write condition. Also replicating Study 1, participants who wrote one-sided arguments were more confident ($M = 4.98$, $SD = 0.86$) than participants who wrote two-sided arguments ($M = 4.42$, $SD = 1.11$), even when controlling for predeliberation conflict, $F(1, 312) = 13.41$, $p < .001$, $\eta_p^2 = .04$ (argument style was unrelated to choice and evaluations of decision process, all $p > .50$). This indicates that the high confidence observed for participants who made one-sided arguments cannot be attributed to these participants having a stronger feeling about what to choose from the outset.

A final set of analyses indicated that evaluations of the deliberative strategies cannot be explained by a subset of participants who have a preexisting preference for such strategies. Two linear regressions were conducted to determine whether decision strategy and pre-existing preference for deliberation (PID Scale) interacted to predict confidence and evaluations of the decision process (control vs. deliberation dummy coded). The only significant ef-

[2] To be as thorough as possible, we conducted these analyses using the binary choice and Likert scale "leaning toward" outcomes, and in neither case did we find any significant interactions. We conducted these analyses by dummy coding the conditions (0 = control and 1 = all deliberation groups), as well as by comparing control to the long free-write condition.

Table 2
Study 2 Manipulation Checks and Primary Outcome Measure Means (Standard Deviations)

		Free-writing conditions		Listing conditions		
	Control	Low effort (no time limit)	High effort (2 min)	Low effort (2 reasons)	High effort (5 reasons)	*F* statistic
Manipulation checks						
Engaged in careful thought	4.92 (1.43)	5.22 (.97)	5.26 (.98)	5.32 (1.04)	5.32 (1.06)	3.52**
Time taken to decide	6 s (5)	162 s (128)	230 s (183)	133 s (94)	347 s (290)	84.95***
Decisions and decision evaluations						
Percent choosing surgery	48%	50%	49%	49%	53%	0.22
Likert scale treatment preference	4.06 (2.16)	3.96 (2.52)	3.99 (2.56)	4.13 (2.02)	3.79 (2.03)	0.45
Evaluations of the decision process	2.41 (1.16)	3.69 (0.88)	3.65 (1.02)	3.61 (0.89)	3.68 (0.97)	49.09***
Decision confidence	4.45 (1.22)	4.84 (.98)	4.86 (.93)	4.61 (1.24)	4.79 (1.11)	3.88**

* $p < .05$. ** $p < .01$. *** $p < .001$.

fect to emerge was that participants who had a strong preference for deliberation liked the deliberative strategies more than those who did not prefer deliberation (preference for Deliberation × Strategy interaction: $\beta = 1.29$, $SE = .14$, $t = 5.93$, $p < .001$). However, even participants in the lowest quartile of the PID Scale ($M = 3.55$ or less) showed more positive evaluations of the deliberation tasks compared to control, $F(4, 148) = 2.85$, $p = .02$, $\eta_p^2 = .07$.

Discussion

Participants liked the deliberative strategies and reported greater confidence following deliberation, even when those strategies didn't change their decisions and even when participants didn't have a strong preexisting preference for making decisions deliberatively. Participants liked all of the deliberative strategies equally, but only the free-write conditions produced higher confidence than control. Moreover, participants who provided one-sided arguments—an indication of confirmation bias—felt more confident about their choice than those who engaged in two-sided reasoning, even when controlling for predeliberation decisional conflict. Together, these findings all suggest that decision confidence was driven by confirmation bias (Nickerson, 1998), whereas evaluations of the decision process were driven by the presence versus absence of an effortful process. This latter effect could be the result of cognitive dissonance specifically (Aronson & Mills, 1959) or a general heuristic that deliberative decisions are best (cf. Kruger, Wirtz, Van Boven, & Altermatt, 2004).

Although participants in the high effort conditions engaged in more objective effort (i.e., spent more time writing), one potential issue is that only three out of the four deliberation conditions reported more subjective thoughtfulness than control, and those three conditions did not differ from each other. Thus, one might argue that this experiment did not provide an adequate test of effort justification. Nonetheless, an effort-based explanation of the present effects would predict that the conditions that induced the most subjective thoughtfulness would also be the most confident. In contrast to this prediction, the conditions that produced the most subjective thoughtfulness elicited confidence levels that were not different from control, and the deliberation condition that was not more thoughtful than control was actually significantly more confident.

To our knowledge, this is the first study that has attempted to demonstrate *why* deliberative exercises, of the type that appear in decision aids, often make people feel better about their decisions. The present data suggest that many types of deliberative tasks are likely to make people feel more confident in their decisions, provided that the task allows them to build an argument in favor of a particular choice.

Study 3

If deliberation can cause people to feel better about their intuitive choice, then it follows that deliberation could cause people to feel better about decisions that are suboptimal, or even objectively bad. This has been a concern in the decision aid literature (e.g., Aldag & Power, 1986), but to our knowledge no study has examined the issue directly, primarily because it is often difficult to define "bad" decisions. For the present purposes, this issue is quite important, as deliberative values clarification exercises are typically meant to improve decisions, not improve confidence in bad decisions. Given the implications for patient decision support, we further tested these effects using a scenario in which we could identify individuals who make poor decisions. Hence, the purpose of this study was to examine which factor has a bigger impact on people's confidence: decision quality, or decision process.

Method

Participants. A total of 424 undergraduate students participated in return for partial course credit, and 417 completed the entire survey. We switched to an undergraduate sample in Study 3 because the prior results did not depend on age or education level and we thought it would be beneficial to diversify our samples. One participant was removed for leaving the computer on the deliberation task for over 18 hr (by comparison, the next longest time spent on that screen was 23 min), leaving a total of 416 participants.

Design and procedure. Participants were told to imagine that they had colon cancer, and had to choose between two surgeries (Amsterlaw et al., 2006). One surgery had an 80% chance of survival with no complications, and a 20% chance of death. The other treatment option had an 80% chance of survival with no complications, a 15% chance of death, and a 5% chance of survival

but with a colostomy bag (colostomy was defined for all participants). Prior research has shown that a surprising number of people choose the option with a higher chance of death, in order to avoid the colostomy (Amsterlaw et al., 2006). Moreover, they do this in spite of the fact that, when asked later whether they would rather be dead or have a colostomy at 100% certainty, most people say that they would rather have a colostomy. This fact is critical for the present study. Here, we define poor decision making as a lack of agreement between treatment choice and preference for certain death versus certain colostomy. That is, a good decision is one in which the treatment decision is congruent with participants' stated preferences for death versus colostomy. Study 3 was exactly the same as Study 1, save for 3 details: (a) participants responded to the new scenario, (b) participants completed the PID questionnaire (Betsch, 2008) as they did in Study 2, and (c) at the end of the survey participants chose between certain death or certain colostomy.

Results

Manipulation check means and standard deviations appear in Table 3, and show similar results as Study 1. Decision strategy did not impact surgery choice, $\chi^2(2) = 3.43$, $p = .17$ (see Table 3), nor did it impact preferences between death and colostomy, $\chi^2(2) = 0.08$, $p = .95$. Most importantly, deliberation did not improve congruence between surgery decision and preference for death versus colostomy, $\chi^2(2) = 1.86$, $p = .39$.

Next, tests of our primary hypotheses revealed that participants in the deliberation group liked their decision strategy more than participants in the intuition and control groups, even when controlling for decision congruence, $F(2, 412) = 25.24$, $p < .001$, $\eta_p^2 = .10$ (see Table 3). Tukey's HSD post hoc tests indicated that the deliberation group was different from both intuition and control ($ps < .001$, $\eta_p^2 = .02$–$.16$). The decision strategies also significantly influenced confidence, controlling for decision congruence, $F(2, 412) = 4.34$, $p = .014$, $\eta_p^2 = .02$. Tukey's tests indicated that deliberation was different from intuition ($p = .005$, $\eta_p^2 = .03$), but neither of these conditions was different from control, ($ps > .24$, $\eta_p^2 = .01$–$.008$). Together, these results indicate that participants valued deliberating and felt more confident following deliberation, regardless of the actual quality of their decisions.

A further question concerns the role of decision quality. Do participants who make good decisions feel better about their decisions than participants who make bad decisions? These data indicate that the answer is yes. Participants who made values-congruent decisions liked their decision strategy ($M = 3.53$, $SD = 1.03$) more than those who made incongruent decisions ($M = 3.13$, $SD = 1.18$), controlling for decision strategy, $F(1, 413) = 10.46$, $p = .001$, $\eta_p^2 = .025$. Moreover, congruent decision makers were also more confident ($M = 3.93$, $SD = .69$) than incongruent decision makers ($M = 3.73$, $SD = .66$), controlling for decision strategy, $F(1, 413) = 6.89$, $p = .009$, $\eta_p^2 = .016$. This means that participants who made good decisions were more confident and liked their decision strategy more, regardless of which decision strategy they used.

Finally, we tested whether participants' evaluations of the deliberative strategy was dictated by their preexisting preference for deliberative decision making (PID Scale; Betsch, 2008). We conducted the same analyses that were conducted in Study 2, however in this study there were no significant effects involving the PID Scale, all $p > .30$.

Discussion

In Study 3, participants felt better about deliberative decisions even when the resultant decision was actually bad. Clearly this is not an ideal situation. One assumption that is commonly made in the decision aid literature is that getting people to think about their decisions will result in better decisions made with higher confidence. The model displayed in Figure 1a represents this idealization. However, the present data show support for the model presented in Figure 1b. In particular, deliberation may sometimes result in better decisions but often it does not, whereas it does often result in *feeling* better about our decisions. Moreover, good decisions are made with greater decision confidence (cf. Mata et al., 2013), but this association occurs even in the absence of deliberation.

General Discussion

The present research examined some of the consequences of encouraging deliberative decision strategies in the context of hypothetical medical treatment decisions. Across all studies, results

Table 3
Study 3 Manipulation Checks and Primary Outcome Measure Means (Standard Deviations)

	Control	Intuition	Deliberation	*F* statistic
Manipulation checks				
Use of gut feelings	3.30 (1.20)	3.64 (1.09)	3.23 (1.16)	5.03**
Engaged in careful thought	3.60 (1.06)	3.23 (1.10)	3.93 (.84)	16.36***
Time taken to decide	8 s (8)	16 s (26)	276 s (131)	547.08***
Decisions and decision evaluations				
Percent choosing surgery with less death	53%	59%	64%	1.72, $p = .17$
Percent choosing colostomy over death at certainty	75%	74%	76%	0.04
Percent making concordant decisions	67%	68%	74%	0.93
Evaluations of decision process	2.94 (1.05)	3.20 (.89)	3.75 (.84)	26.23*** Controlling for concordance: 25.24***
Decision confidence	3.86 (.62)	3.75 (.76)	3.98 (.69)	4.97** Controlling for concordance: 4.34*

* $p < .05$. ** $p < .01$. *** $p < .001$.

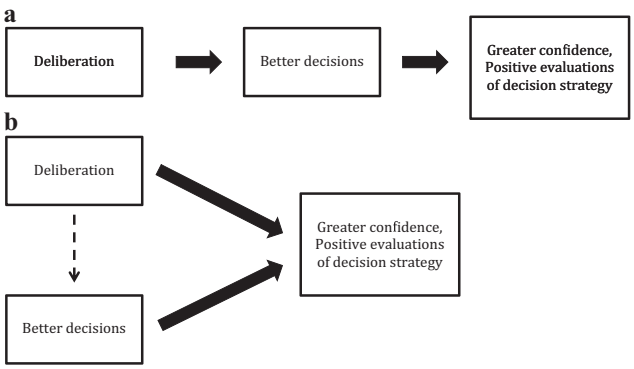

Figure 1. (a) Ideal (and often assumed) relationship between deliberation, decision quality, and confidence. (b) Relationship between deliberation, decision quality, and confidence as indicated by Study 3. The dashed arrow is included to allow for the possibility that deliberation may sometimes improve decisions, while also emphasizing that decision process and decision quality each have independent effects on confidence.

indicated that participants had unwarranted trust in deliberative strategies. In particular, deliberative decision strategies had null effects on decisions, in spite of large samples and heavy-handed instructions that might reasonably have been expected to change or improve choice. Nonetheless, participants who were asked to deliberate felt better about their decisions and decision strategy than participants who did not deliberate. Thus, participants' views about the value of deliberative decisions were consistent with views of experts in the patient DA literature; namely, that deliberative decisions are better. The problem is that deliberative decisions were not better. Moreover, people trusted the deliberative strategy even when they made poor decisions. The present research also made strides in our understanding of why these kinds of deliberative activities are liked: Decision confidence was driven by confirmation bias whereas evaluations of the decision strategy were driven by the presence versus absence of effort.

Because deliberative processing did not change decisions, one question is what factors *do* influence these decisions. In Studies 1 and 2, the individual differences that were associated with choice included gender, subjective numeracy, and fear of cancer (see online supplement for Study 2 data report). None of these individual differences interacted with decision strategy to predict choice. Thus, intuitive versus deliberative decision strategies did not reliably change the extent to which individuals used numerical information versus affective feelings in their decisions. Although it is possible that participants were unable to override their affective feelings, another possibility is that they believed that these feelings were a valid source of information for the decision at hand, and so did not feel the need to override them (Schwarz, 2011).

On the Implications of the Present Findings for Patient Decision Aids

Values clarification exercises are a recommended component of patient DAs (O'Connor, Rostom, et al., 1999), and yet they are only now being rigorously tested in isolation from the informational component of DAs (Fagerlin et al., 2013). One of the advantages of the present studies is that we tested not just the effectiveness of one method of values clarification, but instead examined one of the underlying assumptions of these exercises, which is that asking people to think more about the treatment options will create some kind of a decision benefit. Instead we found that asking people to think more about the treatment options may affect people's *feelings* about a decision or a decision process, rather than affecting the decision itself. Although it is certainly possible that there is a particular deliberative strategy that improves a particular type of medical decision, the present research suggests that deliberative reasoning may frequently affect subjective feelings rather than decisions themselves.

Although the goals of values clarification are often framed as improving decisions, and not simply improving how people feel about their decisions, it could be the case that improving decision evaluations has important and constructive implications. For example, decision justification theory proposes that regret is partly a function of whether one feels that the process leading up to the decision was justified (Connolly & Zeelenberg, 2002; Connolly & Reb, 2005). The present data clearly show that deliberation is the more highly valued decision process in medical contexts, suggesting that deliberative values clarification exercises may result in less regret later on. Indeed, there is some evidence to suggest that values clarification can result in reduced regret a year after a decision is made (Feldman-Stewart et al., 2012). Hence, even if values clarification does not change decisions, there may be benefits to helping patients to feel better about their decisions.

One advantage of the present research is that these studies can inform both the goals of values clarification (e.g., changing decisions vs. improving decision confidence), and also provide a framework for when these sorts of effects might follow from deliberation (i.e., when the task allows people to justify a particular choice). However, one limitation is that all of the studies involved simple hypothetical decisions. Clearly, future research will need to determine the effects of these decision strategies on patients who are making real medical decisions using decision aids. Our reason for using these scenarios was that (a) hypothetical scenarios were the most ethical starting place considering that deliberation might (and by some measure, *did*) have a negative impact on decisions, and (b) these scenarios reveal surprising medical treatment biases that can predict real treatment choices (Scherer et al., in preparation). With regard to the direct relevance of the present scenarios

to real medical decisions, these scenarios are likely predictive of medical decisions that are similar in structure, like decisions between active treatment versus passive "watch and wait" options, and decisions that involve options that have emotionally aversive outcomes.

One might further argue that these hypothetical scenarios were too simplistic, and deliberation might change or improve decisions that are more complex. However, the opposite argument is just as compelling: That is, *in spite* of the simplicity of the scenarios, additional thinking did not improve decisions. For example, in Study 3 participants who deliberated ideally would have realized that the decision concerned a tradeoff between death and colostomy, and made more consistent decisions as a result. And yet, deliberative reasoning had no such effect.

Given the limitations of using hypothetical scenarios, we do not believe that these data represent the final word on the topic of values clarification. Instead, our hope is that that these findings will be used by decision aid researchers to develop theoretically driven predictions about the potential influence of values clarification interventions. Research involving real medical decisions cannot easily do the kind of iterative exploration of outcomes and mechanisms that we have provided here. As a result of this fact, the literature on values clarification methods threatens to remain piecemeal, lacking in theory, specific predictions, and agreement on the most important outcome measures. The present paper provides some theoretical clarity and a framework for future research. We hope that these insights will be used to produce better patient decision aids, reorient the objectives of values clarification, and provide more general insight with regard to what kinds of interventions do and do not successfully improve decisions.

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