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Care Starts at Home: Emotional State and Appeals to Altruism may Reduce Demand for Overused Health Services in the UK

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Compliance with Ethical Standards

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Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Abstract

Background: Overuse of unnecessary services, screening tests, and treatments is an ongoing problem for national healthcare systems. Overuse is at least partly driven by patient demand.

Purpose: This study examined whether altering patients' emotional state and appealing to patient altruism would reduce demand for three commonly overused UK health services.

Methods: In an online experiment, 1,267 UK volunteers were randomized to anxiety, compassion, or neutral conditions before viewing three overuse vignettes. In each vignette, use of the health service was recommended against by the doctor and participants were further randomized to one of three altruism frames, emphasizing the impact of overuse on the self, the self and others locally, or the self and others nationally. Participants rated the likelihood that they would pursue the health service and, assuming that they did not, how long they would be willing-to-wait for it.

Results: Altruism frame had a small effect on intentions to use the health service. Those in the local or national (vs. self) frame were 4.7 and 6.1 percentage points, respectively, less likely to ask for the service. Emotion induction had no direct effect on outcomes. However, self-reporting higher levels of anxiety or compassion post-induction was associated with a small, greater likelihood in intentions to ask for the health service or willingness-to-wait, respectively. No interactions between frame and emotion were observed.

Conclusions: As a low-cost initiative, emphasizing the benefits to the self and local or national communities could be embedded in appeals designed to appropriately reduce healthcare overuse in the UK.

Keywords: Altruism, anxiety, compassion, medical overuse, patient demand, primary health care.

Introduction

In the UK, the overuse of NHS services that are not in line with best practice is associated with, at best, suboptimal utilization of resources and, at worst, the development and acceleration of global health problems, such as antimicrobial resistance [1]. Overuse can occur when patients present to health services unnecessarily, such as attending primary and emergency care services with minor ailments [2]. Equally, overuse occurs when patients are prescribed diagnostic tests or treatments where evidence suggests limited effectiveness for the health condition [3-5].

While physician behavior is also important [6], patients' demands and expectations about their healthcare and the outcomes of a consultation with their General Practitioner (GP) are central to overuse [7, 8]. Patients' expectations and demands are known to contribute to a differential likelihood of acquiring health services for the same condition, including the prescription of antibiotics for respiratory tract infections [9] and referrals to secondary care [10]. Potentially exacerbating such effects, patient expectations are "played out" in a culture that aims to deliver on patient satisfaction [11]. Accordingly, while several initiatives have sought to reduce overuse by intervening with physicians [12], addressing patient expectations and demands in a scalable manner remains important.

Amongst the factors that influence patient demand is the patient's underlying emotional state [13, 14]. For example, anticipated worry and regret have been shown to be a stronger predictor of flu vaccination behavior than perceived risk [15]. Equally, in the context of healthcare overuse, emotional distress at an initial consultation for acute low back pain has been shown to prospectively predict subsequent primary healthcare use over 3- to 12-months [16]. While emotional responses have complex origins, patients' emotional states can be impacted *within* consultations, with anxiety being lower, for example, among patients with more empathic GPs [17]. Understandably, most prior work has focused on negative

emotions, many of which tend to direct attention "inward" and increase symptom reports or the extent to which symptoms are interpreted as concerning [18]. However, positive emotions, many of which are associated with a greater focus on others, such as patient compassion [19] and its effects on overuse, have not been investigated. Testing whether compassion reduces the tendency to overuse health services was one aim of this report.

In addition to considering how emotions may impact overuse, this study sought to evaluate how patients' perceptions of how healthcare use impacted themselves and others affected their decisions [20, 21]. Recent work has begun to investigate the possibility that appeals to altruism (via the advertised cost/benefit to others) may reduce overuse [22]. In online experimental work in the US, Riggs and colleagues found limited effectiveness for altruistic appeals on several overused health services [22]. However, such work is likely limited by both measurement issues and the peculiarities of the US healthcare system and culture [23]. European work suggests a different picture. Altruistic frames have been shown to be effective for health problems with a collective cost (e.g., vaccination decisions in Germany [24]) and highlighting the cost of antimicrobial resistance beyond the immediate self, for example on family members, has been incorporated into materials used in European trials designed to reduce antibiotic over-prescribing [25]. Such findings suggest altruistic motivations are worthy of further exploration in a UK context. A second aim of the current work was thus to evaluate whether altruistic frames highlighting the costs to others would alter intended healthcare overuse. Extending prior work, the current report evaluated the extent to which appeals to altruism for proximal (i.e., local others) versus distal (i.e., national others) others might differentially effect intentions to use healthcare services. Research has shown that helping behavior is often greater for others perceived to be more similar to the self [26]. A perceived greater closeness to the self, and thus a greater willingness to help others, could be differentially predicted by factors such as geographical proximity (i.e., local versus

distal others; [27]) and/or a common categorical identity (i.e., being in the same local or national ingroup; [28, 29]). Accordingly, in this study we chose to test for the differential effectiveness of using local versus national altruistic frames.

Finally, this study examined whether patients' receptiveness to altruistic appeals might vary as a function of their emotional state. Prior studies have shown that compassion facilitates greater pro-social behavior [30, 31], perhaps implying that those randomized to a compassionate state will be more receptive to other-oriented altruism frames. Conversely, we might expect those randomized to an anxiety condition to be less receptive to other-oriented frames [18]. Considering these possibilities was a supplementary aim of the current report.

The Current Report

To recap, the overall objective of the present study was to explore whether a reduction in patient demand for overused UK health services could be achieved by systematically altering patients' emotional state and/or appealing to patients' altruism. Participants were randomized to feel a self-focused emotional state (anxiety), an other-focused emotional state (compassion), or neither of the two. They were then provided with three health vignettes featuring scenarios of healthcare overuse, where patients' expectations/demands play a role, including: imaging for back pain [3, 5]; antibiotics for a lower respiratory tract infection [4, 9]; and visiting the doctor rather than a pharmacist for minor ailments [32]. In all scenarios, the treatment was inexpedient and against the practitioner's guidance. The scenarios either communicated the benefit of not using the healthcare service to the self, the self and local community of healthcare users, or the self and the national population of healthcare users.

The following hypotheses were tested:

H1) Emotional state will affect demand for overused health services. In particular: (H1a) people will exhibit less demand when in a more *compassionate* state; and (H1b) exhibit more demand when in a more *anxious* state.

H2) Receiving information describing the impact of potential overuse on others will reduce demand for overused health services. In particular: (H2a) people will exhibit less demand when effects on others *locally* and/or *nationally* are made salient; and (H2b) there will be a difference in the effectiveness of *local* and *national* primes.

H3) Emotional state and information received will interact to predict patients' reported demand. Specifically: (H3a) information on the effects of overuse on others will have a larger effect on patient demand among those in a *compassionate* state; and (H3b) information on the effects of overuse on others will have a smaller effect on patient demand in those in an *anxious* state.

Methods

Participants

One thousand two hundred and sixty-seven volunteers (639 women) were recruited from the Prolific Academic platform (www.prolific.co). The mean age of participants was 40.0 years (SD = 12.7). All participants were current UK residents and had at least a 90% approval rate from any prior studies completed on Prolific. Recruitment was stratified by age (18-39 years, 40 years or over) and gender. Full participant characteristics are in Table 1.

Design

This study featured a 3 (emotion induction) x 3 (self and other frames) x 3 (health vignettes) mixed experimental design. Participants were randomized to either a neutral, compassion, or anxiety emotion induction (between-subjects). They were further randomized to either a self, local, or national frame (between-subjects), which determined the content of the health vignettes they received. All participants completed three health vignettes (antibiotics, scan, and pharmacy) in a randomized order (within-subjects).

Procedure

The host institution granted ethical approval for the study. Prior to launch, the study was piloted internally. The study was designed and administered using the Qualtrics survey platform (www.qualtrics.com). Participants gave their informed consent at the beginning. To help mask the true objectives, the study was described as testing how "memory and other characteristics affect health decision-making". As the video stimuli in the emotion inductions required sound, participants first had to pass a sound validation check, where an audio file was presented, and participants had to correctly write the word that was spoken ("example") in order to proceed. Following the sound validation check, participants completed a measure of state emotion, before being randomly assigned to one of the three emotion induction conditions (neural, compassion, or anxiety), which was framed as a "memory test" (with questions after exposure to the stimuli).

Following a picture and video based emotion induction, participants completed the memory questions and a second measure of state emotion. Next, participants were given the health vignette instructions and were randomized to one of the three vignette content frames (self, local, or national), before completing the three health vignettes (antibiotics, scan, and pharmacy) with the frame content embedded within them, in a randomized order. For each of the health scenarios, participants then indicated how much they agreed with a statement that said following medical advice would help more vulnerable others, before completing demographic and health use questions (fixed order), and a series of questionnaires (randomized order). Finally, participants were debriefed and offered a counter-active elevation emotion induction. On average the survey took 16.5 (SD = 7.9) minutes, and participants were paid £2.00 for taking part.

Experimental Materials

Copies of, or links to, all experimental materials (including slide numbers from the International Affective Picture System [IAPS]; [33]) are in the Electronic Supplementary Material (ESM 1).

Emotion inductions. *Compassion* and *neutral* emotional states were induced using validated materials from a previous study [34]. This study employed a combination of 15 picture slides (largely from the IAPS) and a short video clip. The compassion video clip was 70 seconds long and featured images of child malnutrition and starvation. The neutral video clip was 47 seconds long and was a scene from *All the President's Men* showing two people talking in a courtroom. *Anxiety* was induced using 15 pictures from the IAPS previously employed [35], together with a video clip (82 seconds long) previously used to induce fear (featuring a clip from *The Shining*) [36]. Four of the images used by Lincoln and colleagues [35] were filtered for extreme content and their potential to elicit high levels of disgust as well as anxiety. They were replaced by alternative pictures from the IAPS. In each condition, the pictures were displayed for 8 seconds each (2 minutes in total). Finally, the *elevation* counter emotion induction at the end of the study was a previously validated video (56 seconds long; featuring a free hugs campaign) [37].

Four affective state measures were included to confirm the emotion inductions. Two 100-point visual analogue scales (VASs) were used to assess the target emotions of compassion and anxiety (0 = *do not feel this way at all*, 100 = *feel this way very intensely*). Three adjectives, incorporated as a single item, were used to describe each emotional state: "How compassionate/sympathetic/moved do you feel right now?" (taken from [34]), and "How anxious/nervous/apprehensive do you feel right now?" (taken from [38]). In addition to the target emotions, overall core affect (see [34]) was assessed using the pictorial Self-Assessment Manikins (SAM) [35], with one 9-point scale measuring pleasantness/valence (1

= *unpleasant*, 9 = *pleasant*), and another measuring alertness/arousal (e.g., 1 = *relaxed*, 9 = *alert*). These two scales have been used widely in other studies [40].

Memory test. To help ensure sufficient attention was paid to the induction materials, participants were informed that their memory for the materials would be tested following exposure. To maintain this cover story, participants were asked five content-specific multiple choice memory questions after the induction.

Health vignettes. Three health scenarios were developed with the help of an academic and practicing GP, and adapted from Riggs and colleagues [22], to describe situations where overuse was a known problem: antibiotics for a respiratory tract infection, a scan for back pain, and visiting the GP rather than the pharmacy for a headache. In each scenario, the symptoms were described, followed by the decision to seek medical advice. Participants were then given the GP's recommendation not to use the service and provided with an additional piece of information commensurate with one of three informational frames. In the *self* frame, the negative implications of using the (unnecessary) health service were described in terms of impact on the participant. In the *local* altruistic frame, impacts were described on the self and people in the local community who have more significant health problems or were more susceptible to illness. In the *national* altruistic frame, the same impacts were described but as applied to people throughout the UK. Each participant was randomized to one frame and completed the three scenarios in a randomized order.

Outcome measures. Immediately after reading each vignette, participants were asked two questions. The first asked about *likelihood* of pursuing (asking for) the health service on a 100-point VAS (0 = *would not ask*, 100 = *would definitely ask*). The second asked, if the participant was not given the service, what would be the maximum number of days they would be *willing to wait* with exactly the same symptoms before returning to the GP, on a scale of 1 to 14 days. Finally, following the vignettes, participants rated the degree

to which they agreed with statements that said following the medical advice would *help others* more vulnerable than themselves on a 100-point VAS (0 = *do not agree at all*, 100 = *agree completely*). All outcome measures were aggregated across the three health scenarios. Likelihood reliability statistics were: $\alpha = 0.59$, $\omega = 0.64$, GLB = 0.60. Willingness-to-wait reliability statistics were: $\alpha = 0.58$, $\omega = 0.62$, GLB = 0.61. Agreement with the help vulnerable others statements reliability statistics were: $\alpha = 0.63$, $\omega = 0.68$, GLB = 0.65.

Background Measures

Demographics. Participants were asked about their: gender (0 = *male*, 1 = *female*); age (years); ethnicity (using UK Census categories, recoded as 0 = *not White British*, 1 = *White British*); marital status (recoded as 0 = *not married*, 1 = *married*); custodial responsibility for children (0 = *no*, 1 = *yes*); highest educational qualification (0 = *none*, 6 = *PhD or equivalent doctoral level qualification*); country (region) of residence (based on the Nomenclature of Territorial Units for Statistics [NUTS] 1 statistical regions of the UK); and gross household income (1 = *< £20,000*, 6 = *> £100,000*), in a fixed order.

Health use. To control for access and past healthcare behavior, participants were asked: if they had private health insurance or had received private health treatment in the last 12 months (0 = *no*, 1 = *yes*); to rate their overall health (1 = *poor*, 5 = *excellent*); how many times they had visited their GP over the past month (recoded as 0 = *not visited GP*, 1 = *visited GP*); whether they have received antibiotics, had a medical scan, or seen a pharmacist for a medical consultation and advice over the past month (grouped into one variable 0 = *no*, 1 = *yes*); and, if no, the same three questions regarding the past year (0 = *no*, 1 = *yes*).

Risk taking. To assess attitudes to risk, participants completed a single 10-point Likert scale (0 = *not at all willing to take risks*, 10 = *very willing to take risks*) adapted from a previous study [41].

Beliefs about medicines. Participants' beliefs about medicines were assessed using the 8-item general subscale of the Beliefs about Medicines Questionnaire (BMQ) [42]. These items are responded to on a 5-point Likert scale (1 = *strongly agree*, 5 = *strongly disagree*). A higher score represents a more positive view of medicines. Reliability statistics for this questionnaire were $\alpha = 0.81$, $\omega = 0.85$, GLB = 0.86.

Perceived vulnerability to disease. Participants' perceived vulnerability to disease was measured using the 7-item perceived infectability subscale of the 15-item Perceived Vulnerability to Disease (PVD) questionnaire [43]. Participants responded to this measure on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). Reliability statistics for this scale were $\alpha = 0.90$, $\omega = 0.94$, GLB = 0.93.

Dispositional anxiety. Participants' dispositional anxiety was measured using the 6-item trait short form of the State-Trait Anxiety Inventory (STAI) [44]. Participants responded on a 4-point Likert scale (1 = *almost never*, 4 = *almost always*). Reliability statistics for this measure were $\alpha = 0.84$, $\omega = 0.88$, GLB = 0.87.

Dispositional compassion. Participants' dispositional compassion was assessed using the 5-item compassion subscale of the Dispositional Positive Emotion Scales (DPES) [45]. Participants responded on a 7-point Likert scale (1 = *disagree strongly*, 7 = *agree strongly*). Reliability statistics for this scale were $\alpha = 0.89$, $\omega = 0.91$, GLB = 0.91.

Data Analysis

An a priori power analysis on G*Power 3.1.7 for a 3*3 factorial ANCOVA design (with interactions) was conducted to determine the required sample size. In this analysis, we assumed a small effect size of $f = .10$ and $\alpha = .05$. A minimum sample of $N = 1{,}199$ was required for 80% power, and a sample size of $N = 1{,}204$ was required for 9 balanced groups. We intended to recruit an additional 5% for possible bad data, giving a target sample size of $N = 1{,}267$. This number was applicable for both the baseline and covariate models.

Following randomization and manipulation checks, descriptives, planned ANOVAs, and ANCOVAs, for each of the three outcomes, were conducted on R 3.6.1 [46], using packages car [47], lsmeans [48], psych [49], and sjstats [50]. Following these results, an exploratory path analysis was conducted on AMOS v 24 (IBM Corp., Armonk, NY, US), using bias-corrected and accelerated bootstrapping to test the significance of direct and indirect effects [51], with 10,000 resamples [52].

Results

Randomization and Manipulation Checks

Randomization checks (chi-squared tests for frequencies and ANOVAs for continuous variables) confirmed that there were no significant differences in any of the background characteristics or initial emotional states across any of the three emotion conditions or vignette frame groups.

Mean emotion ratings are provided in Figure 1. Manipulation checks showed that being randomized to the compassion induction produced greater compassion (M = 72.2, SD = 21.8) than the anxiety (M = 50.7, SD = 24.1) and neutral (M = 47.0, SD = 22.4) groups, F(2, 1264) = 150.28, $p < .001$, f = .49. Equally, the anxiety induction produced greater anxiety (M = 48.8, SD = 26.8) versus compassion (M = 43.0, SD = 27.6) and neutral (M = 33.5, SD = 25.5) groups, F(2, 1264) = 35.95, $p < .001$, f = .24. However, the compassion group also reported greater anxiety than the neutral group, $p < .001$, and the anxiety group had slightly higher compassion than the neutral group, p = .018.

Overall, the compassion induction produced a more negative valence (M = 3.9, SD = 1.9) than the anxiety (M = 5.0, SD = 1.9) or neutral (M = 6.0, SD = 1.7) groups, and the anxiety condition had a more negative valence than the neutral condition, F(2, 1264) = 131.84, $p < .001$, f = .46. Finally, both the compassion (M = 4.4, SD = 2.3) and anxiety (M = 4.5, SD = 2.2) inductions produced greater arousal than the neutral induction (M = 3.7, SD =

2.1), $F(2, 1264) = 17.19$, $p < .001$, $f = .17$, but did not significantly differ in arousal from one another.

To test for vignette order effects, ANOVAs were conducted on each of the three outcomes, with order as a predictor (with three levels: antibiotics, back pain, or pharmacy scenario first). The analyses revealed significant order effects for all outcomes (likelihood, $F(2, 1264) = 11.84$, $p < .001$, $f = .14$; willingness-to-wait, $F(2, 1264) = 13.51$, $p < .001$, $f = .15$; helping other statements, $F(2, 1264) = 9.52$, $p < .001$, $f = .12$). Overall, receiving the antibiotics scenario first appeared most effective and the pharmacy scenario least effective. Specifically, participants had a lower likelihood of asking for the health service if they received the antibiotics vignette before the back pain, $t(1264) = -4.66$, $p < .001$, $d = -0.32$, or pharmacy, $t(1264) = -3.59$, $p = .001$, $d = -0.25$, vignette, of 6.9 and 5.2 percentage points, respectively. Participants exhibited a greater willingness-to-wait if they received the antibiotics, $t(1264) = 3.04$, $p = .007$, $d = 0.21$, or back pain vignette, $t(1264) = 5.16$, $p < .001$, $d = 0.36$, before the pharmacy vignette, by 0.5 and 0.9 days, respectively. Finally, the participants who received the antibiotics versus back pain vignette first were more likely to agree with the helping other statements, $t(1264) = 3.77$, $p = .001$, $d = 0.26$, and those that received the back pain versus pharmacy vignette first were less likely to agree, $t(1264) = -3.79$, $p < .001$, $d = -0.26$, by 5.0 and 4.9 percentage points, respectively. As order effects were detected, order was included as a covariate in the ANCOVAs below.

ANOVA and ANCOVA models

Disaggregated means and SDs, by outcome, emotion condition, and frame are reported in Table 2. Effect sizes and *p* values for the AN(C)OVA models are presented in Table 3. This section contains results for the main hypotheses, further results regarding participants' background characteristics are provided in Table 3.

H1) Emotional state will affect demand for overused health services. Assignment to emotion condition did not have a significant effect on any outcome variables. In the covariate models, dispositional compassion was associated with a lower likelihood of pursuing the inexpedient health service, $F(1, 1238) = 13.63$, $p < .001$, $f = -.11$, and a greater agreement with the help vulnerable others statements, $F(1, 1238) = 17.91$, $p < .001$, $f = .12$. Furthermore, post-induction compassion reported prior to completing the outcome measures was associated with a greater willingness-to-wait, $F(1, 1238) = 4.05$, $p = .045$, $f = .06$, and a greater agreement with the help vulnerable others statements, $F(1, 1238) = 19.64$, $p < .001$, $f = .13$. The level of post-induction anxiety reported was associated with a greater likelihood of pursuing the health service, $F(1, 1238) = 6.17$, $p = .013$, $f = .07$. Positive valence was negatively associated with willingness-to-wait, $F(1, 1238) = 4.20$, $p = .041$, $f = -.06$.

H2) Receiving information describing the impact of potential overuse on others will reduce demand for overused health services. Frame had a small effect, $F(2, 1262) = 9.58$, $p < .001$, $f = .12$, on the average likelihood of pursuing the health service, and a non-significant effect, about half the size, on willingness-to-wait for it. However, frame did not significantly influence explicit agreement that forgoing the service would help more vulnerable others. While slightly larger for the national frame, the effects were statistically equivalent for the local and national variants, with participants on average reporting that they would be 4.7 and 6.1 percentage points, respectively, less likely to pursue the health services than those receiving the self-oriented frame.

H3) Emotional state and information received will interact to predict patients' reported demand. The hypothesized interaction between frame and emotion condition was not significant for any outcome variable and thus was omitted from the models.

Robustness check. As a robustness check, the primary analyses were repeated with participants scoring 60% or more on the memory test ($n = 1{,}161$). The pattern of findings

above remained unchanged, except from the effect of post-induction compassion on willingness-to-wait, which became marginal, $F(1, 1132) = 3.44$, $p = .064$, $f = .06$.

Exploratory Path Model

Following the results of the planned analyses above, an exploratory path analysis was conducted to estimate the indirect effect of emotion condition on likelihood and willingness-to-wait via reported compassion, anxiety, and agreement with the help vulnerable others statements, and the effect of frame via the help vulnerable others statements. The path model is illustrated in Figure 2. In the model, the effects of the two respective emotion inductions are compared against the neutral induction condition, and the effects of the local or national frame manipulations are compared against the self only frame, when controlling for each other's influence. The model fit the data appropriately, $X^2(14) = 16.75$, $p = .270$, CFI = 1.00, RMSEA = .01, 90% CI [.00, .03], $p = 1.00$. The compassion induction had a significant indirect effect on likelihood to pursue the overused health service, $\beta = -.03$, 95% CI [−.05, −.02], $p < .001$, and willingness-to-wait, $\beta = .02$, 95% CI [.01, .03], $p < .001$, via increased felt compassion, which led to increased help vulnerable others agreement. The anxiety induction had a significant indirect effect on health use likelihood, $\beta = .01$, 95% CI [.00, .02], $p = .020$, and willingness-to-wait, $\beta = -.01$, 95% CI [−.01, −.00], $p = .020$, via increased felt anxiety, which led to reduced help vulnerable others agreement. The anxiety induction also had a significant indirect effect on likelihood via increased felt anxiety, independently of help vulnerable others agreement, $\beta = .02$, 95% CI [.01, .03], $p = .005$.

Discussion

Healthcare overuse remains an ongoing problem in the NHS [53]. This study evaluated experimentally the effects of emotional state and informational appeals to altruism on intentions to pursue healthcare that had been recommended against by the GP. Findings were mixed. While there was no overall effect of emotion condition on intention to utilize

healthcare services (H1), participant emotion mattered to a degree; post-induction state anxiety and compassion reported *immediately prior* to the assessment of outcome predicted the likelihood of pursuing the health service and willingness-to-wait for it, respectively. These findings are consistent with the general expectation that anxiety would increase demand (H1a), while compassion would reduce it (H1b), but do not reflect the original expectation that group assignment to emotion condition would predict outcomes. Informational frame did predict utilization intentions in the expected manner (H2), albeit with no significant differences between the local and national framings (H2b). Below, these core findings are revisited in light of prior studies in the area, alongside preliminary interpretations, study limitations, applications, and future directions.

Although the fact that emotion condition did not predict service utilization intention while post-induction state emotion did appears discrepant, these findings can be reconciled in at least two ways. First, it is worth noting that the effects of reported state emotion were small (a 10 percentage point increase in state anxiety or compassion predicted an approximate 0.6 percentage point increase in overuse likelihood or willingness-to-wait, respectively). Given that the emotion induction influenced the target emotion to a modest (but not 1:1) degree, changes associated with the manipulation may have been insufficient for us to observe an effect at the group (emotion condition) level.

Second, while previously validated [34, 35], the *specific* manipulation of complex emotional states, such as compassion and anxiety, is difficult and other, non-target emotions are often impacted. Of note, anxiety (as well as compassion) was greater in the compassion induction (vs. the neutral induction) and vice versa. The fact that these two emotions had hypothesized but "competing" effects on utilization intentions thus creates the possibility that the non-significant effect of emotion condition may represent some degree of suppression. That significant indirect effects of emotion condition on the outcome variables were observed

via the respective target emotion in the path analysis is consistent with this view. Emotion inductions that affect more than just the target emotion are common problems in empirical research when working with complex states like compassion [37, 54].

While the effects were small, the finding that participants' current feelings mattered is worthy of further comment. Broadly, this result is consistent with studies noting the role of emotion in patients' healthcare decision-making, such as patients' anxiety predicting greater service use [16]. To the authors' knowledge, the finding that dispositional and reported compassion were associated negatively with intended health service overuse is novel, supplementing work on the potential benefits of compassion in healthcare [55, 56]. Yet, the findings of dispositional and post-induction emotion measures did not always parallel one another, and this is worthy of further exploration. Most studies to date have focused on enhancing compassion in the healthcare provider rather than the patient (or the interactions between the two) [57]. Practically, if reduced anxiety and heightened compassion reduce inappropriate patient demand, then attempts should be made to promote these states (e.g., via empathic GPs reducing anxiety [17]).

More broadly, where health decisions have a salient *collective* cost, altruism appears to matter [20, 21]. While it is inconsistent with the data from Riggs and colleagues [22], where no effect of framing was observed, contradictory results may reflect key differences between this earlier study and the current work. Such differences include the use of a more disaggregated outcome variable in the present study, a different healthcare and cultural context (UK vs. US samples [23]), and differences in the specific frames used.

Testament to the complexity of these processes, the expected a priori mechanism for the frame effects – via increased agreement with statements suggesting that forgoing the health service would help more vulnerable others – was not supported. Indeed, the path analysis shows that the frame independently affected outcomes, even when agreement with

the aforementioned statements was adjusted for. Although the relatively undeveloped state of this literature can be borne in mind, a few explanatory possibilities are evident. First, this may represent a ceiling effect, as participants' ratings on these statements were high in the baseline condition (emphasizing costs to the self only; $M = 73.8$ out of 100). Second, the effect of frame independent of explicit agreement with the help vulnerable others statements may indicate a distinction between implicit and explicit responding. Studies have shown that implicit and explicit altruism do not always align or predict behavior in the same way, and that implicit processes are more likely to underlie altruistic behavior [58, 59]. For example, a prior study found that implicit altruistic attitudes towards organ donation differentiated registered organ donors from those simply intending to register, whereas explicit attitudes were the same across these two groups and a third group not intending to register [59].

As they were not of primary interest, the help vulnerable others statements were administered *after* the primary outcome variables and so may represent some degree of post hoc reasoning and/or a desire to increase desirability following the utilization decisions. Conversely, it is clearly possible for participants to agree that forgoing the health service would be beneficial to more vulnerable others but not enact that in the vignettes. Finally, it is possible that alternative mechanism(s) underpin the effect of the frames, such as the references to local *community*. These characteristics (i.e., sense of community) were not referred to in the help vulnerable others statements. Nonetheless, as both the local and national frames were about equally as effective, it seems likely that the causal mechanism is a characteristic common to the two. In sum, these data suggest appeals to altruism show promise in the context of service overuse, but may require further research to identify the precise causal mechanism or "active ingredient(s)" at work.

Finally, the hypothesis that there would be an interaction between emotional state and receptiveness to the informational appeals (H3) was not supported. This appears to contrast

work that suggests emotional states, like compassion, may alter subsequent information processing (e.g., greater attention to others' suffering [60]). Again, the failure to reject this null hypothesis may be due to the complexity of the emotion inductions used (although post-hoc interactions using reported emotion ratings instead of condition were not significant). Instead, the pattern of findings in this study suggest that reported emotional state and informational appeals to altruism operated on the outcome variables via independent cognitive and affective channels.

This was a novel experimental study with a large UK sample. Some limitations should be noted. First, the emotion inductions were complex and affected more than just the target emotion; this may have led to a greater difficulty in isolating the effects of the discrete emotions of interest. Second, the study involved hypothetical patient decision making and, while indicative, it is unclear to what extent the observed findings would translate to actual behavior, particularly when patients are experiencing ill health. Third, this was an online survey that enables greater reach outside of the laboratory, but may reduce representativeness and/or control over the contexts in which the experiment was completed. Nevertheless, weaker effects may be expected in online experimental paradigms [61], and safeguards were put in place to help ensure better quality data (including a cover-story memory test and sound validation check for the emotion inductions). Fourth, results from the covariates in the statistical models and the path analysis should be considered exploratory. No correction was applied to adjust for the familywise error rate in these models and further confirmatory studies are necessary. Finally, these data fall short of the evidence that could be derived from a large-scale RCT and accompanying cost-effectiveness analyses, which would be required to further assess the effectiveness of the proposed interventions. For example, this study does not consider the potential for false negatives; in the intention to reduce overuse, it is possible

that some people with genuine need or complications are put off seeking help when they should actually do so. Further work should take this into account.

In sum, the present investigation provides some evidence that emotional state and informational appeals to altruism can nudge hypothetical patient decision making in the context of overused health services. These effects operated via independent channels, rather than as an interactive model, with a larger effect from the informational appeals than induced emotions. Given the relatively low cost involved, it is recommended that information that emphasizes the cost to the self *and* more vulnerable others in either the local or national community could be embedded in any informational appeals that are generated to promote appropriate reductions in healthcare overuse in the UK (c.f., [25]).

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Tables

Table 1. Participant characteristics.

Variable	*M* (*SD*) or *N* (%)
Gender	
Male	628 (49.6)
Female	639 (50.4)
Age	40.0 (12.7) years
Ethnicity	
English/Welsh/Scottish/Northern Irish/British	1023 (80.7)
Irish	16 (1.3)
Gypsy or Irish Traveller	1 (0.1)
Any other White background	89 (7.0)
White and Black Caribbean	13 (1.0)
White and Black African	2 (0.2)
White and Asian	11 (0.9)
Any other Mixed/multiple ethnic background	13 (1.0)
Indian	19 (1.5)
Pakistani	15 (1.2)
Bangladeshi	3 (0.2)
Chinese	18 (1.4)
Any other Asian background	10 (0.8)
African	17 (1.3)
Caribbean	9 (0.7)
Any other Black/African/Caribbean background	1 (0.1)
Arab	3 (0.2)
Any other ethnic group	4 (0.3)
Highest qualification	
GCSE or equivalent secondary school qualification	212 (16.7)
A-level or equivalent post-secondary level qualification	348 (27.5)
Bachelors or equivalent first degree level qualification	490 (38.7)
Masters or equivalent higher degree level qualification	173 (13.7)
PhD or equivalent doctoral level qualification	32 (2.5)
None of the above	12 (0.9)
Employment status	
Student	102 (8.1)
Employed	880 (69.5)
Unemployed	199 (15.7)
Retired	86 (6.8)
Marital status	
Single	555 (43.8)
Married	603 (47.6)
Separated/Divorced/Widowed	109 (8.6)
Has responsibility for children	561 (44.3)
Household income before tax	
< £20,000	336 (26.5)
£20,000 - £39,999	470 (37.1)
£40,000 - £59,999	257 (20.3)
£60,000 - £79,999	118 (9.3)
£80,000 - £100,000	48 (3.8)
> £100,000	38 (3.0)
Overall health rating	
Excellent	132 (10.4)
Very good	473 (37.3)
Good	402 (31.7)
Fair	186 (14.7)
Poor	74 (5.8)
Private health insurance or treatment past 12 months	144 (11.4)
Approximate GP visits past 12 month	0.3 (0.9)
Antibiotic use	

Past month	65 (5.1)
Past 12 months	313 (24.7)
Medical scan	
Past month	71 (5.6)
Past 12 months	299 (23.6)
Pharmacist consultation	
Past month	126 (9.9)
Past 12 months	372 (29.4)
Geographical location	
England (North East)	70 (5.5)
England (North West)	146 (11.5)
England (Yorkshire and the Humber)	106 (8.4)
England (East Midlands)	114 (9.0)
England (West Midlands)	108 (8.5)
England (East)	97 (7.7)
England (Greater London)	142 (11.2)
England (South East)	171 (13.5)
England (South West)	118 (9.3)
Northern Ireland	30 (2.4)
Scotland	107 (8.4)
Wales	56 (4.4)
Risk taking score [0 – 10]	5.2 (2.3)
Beliefs about medicine score [8 – 40]	26.2 (5.4)
Perceived vulnerability to disease score [7 – 49]	24.3 (9.1)
Dispositional anxiety score [6 – 24]	13.7 (3.9)
Dispositional compassion score [5 – 35]	27.4 (4.9)

Note. N = 1,267.

Table 2. Disaggregated Means (and SDs) by Outcome, Emotion Condition, and Frame.

Emotion condition	Frame			
	Self	**Local**	**National**	**Total**
Outcome: Average likelihood of pursuing health service				
Neutral	32.3 (21.1)	24.7 (18.8)	24.3 (20.2)	27.2 (20.3)
Anxiety	31.0 (22.8)	24.7 (18.8)	24.4 (20.1)	26.7 (20.8)
Compassion	27.5 (23.9)	27.4 (24.5)	23.7 (20.5)	26.2 (23.0)
Total	30.3 (22.6)	25.6 (20.9)	24.2 (20.2)	26.7 (21.4)
Outcome: Willingness-to-wait for health service				
Neutral	7.1 (2.4)	7.4 (2.4)	7.5 (2.6)	7.3 (2.5)
Anxiety	7.0 (2.6)	7.5 (2.3)	7.4 (2.7)	7.3 (2.5)
Compassion	7.5 (2.6)	7.4 (2.6)	7.9 (2.6)	7.6 (2.6)
Total	7.2 (2.5)	7.4 (2.4)	7.6 (2.6)	7.4 (2.5)
Outcome: Agreement with help vulnerable others statements				
Neutral	73.8 (17.0)	75.3 (18.1)	75.2 (18.9)	74.7 (18.0)
Anxiety	72.6 (19.7)	76.7 (18.2)	75.6 (18.6)	75.0 (18.9)
Compassion	75.1 (19.7)	73.8 (20.6)	75.9 (20.5)	75.0 (20.3)
Total	73.8 (18.8)	75.3 (19.0)	75.6 (19.3)	74.9 (19.0)

Note. $N = 1{,}267$.

Table 3. Results of ANOVA and ANCOVA models in predicting average likelihood and willingness-to-wait for uptake of overused health services.

	Likelihood		Willingness-to-wait		Help others agreement	
	1. Baseline	**2. Covariate**	**3. Baseline**	**4. Covariate**	**5. Baseline**	**6. Covariate**
Predictor	**R^2 = .02, p < .001**	**R^2 = .12, p < .001**	**R^2 = .01, p = .089**	**R^2 = .06, p < .001**	**R^2 = .00, p = .717**	**R^2 = .08, p < .001**
Emotion condition	f = .02, p = .836	f = .03, p = .644	f = .05, p = .220	f = .01, p = .884	f = .00, p = .983	f = .06, p = .118
Frame	f = .12, p < .001	f = .12, p < .001	f = .06, p = .084	f = .05, p = .192	f = .04, p = .357	f = .04, p = .279
Order		f = .15, p < .001		f = .16, p < .001		f = .12, p < .001
Gender (1=female)		f = −.06, p = .023		f = .04, p = .152		f = −.01, p = .816
Age		f = .03, p = .304		f = −.02, p = .545		f = −.07, p = .012
White British (1=yes)		f = −.16, p < .001		f = .09, p = .002		f = .11, p < .001
Have children (1=yes)		f = .02, p = .526		f = −.03, p = .229		f = −.02, p = .460
Married (1=yes)		f = .04, p = .186		f = −.07, p = .011		f = −.03, p = .343
Employed (1=yes)		f = .06, p = .052		f = −.04, p = .150		f = −.05, p = .085
Education level		f = −.01, p = .805		f = −.02, p = .447		f = −.00, p = .926
Household income		f = −.05, p = .096		f = .03, p = .340		f = .02, p = .512
Private health (1=yes)		f = .04, p = .224		f = −.08, p = .003		f = −.03, p = .363
Overall health		f = .05, p = .074		f = −.07, p = .012		f = −.07, p = .021
GP visit past month (1=yes)		f = .08, p = .005		f = −.04, p = .148		f = −.05, p = .068
Health service past month (1=yes)		f = .07, p = .016		f = −.06, p = .042		f = −.04, p = .183
Health service past year (1=yes)		f = .00, p = .981		f = .00, p = .881		f = −.01, p = .653
Risk taking		f = .04, p = .120		f = .04, p = .159		f = −.04, p = .196
Beliefs about medicines		f = −.04, p = .195		f = −.02, p = .538		f = .06, p = .022
Perceived disease vulnerability		f = .10, p < .001		f = −.07, p = .018		f = −.10, p < .001
Dispositional anxiety		f = −.01, p = .757		f = .03, p = .325		f = .00, p = .949
Dispositional compassion		f = −.10, p < .001		f = −.02, p = .478		f = .12, p < .001
Post-induction state compassion		f = −.02, p = .435		f = .06, p = .045		f = .13, p < .001
Post-induction state anxiety		f = .07, p = .013		f = −.02, p = .452		f = −.04, p = .216
Post-induction state valence		f = .05, p = .061		f = −.06, p = .041		f = .00, p = .943
Post-induction state arousal		f = .05, p = .076		f = −.02, p = .400		f = −.02, p = .505
Contrasts (Bonferroni adjusted)						
Frame: Self vs Local	d = 0.22, p = .004	d = 0.23, p = .002	-	-	-	-
Frame: Self vs National	d = 0.29, p < .001	d = 0.28, p < .001	-	-	-	-
Frame: Local vs National	d = 0.07, p = .994	d = 0.04, p = 1.000	-	-	-	-

Note. N = 1,267. Type II Sum of squares. Effect sizes (Cohen's f or d) and p values shown. Contrasts for emotion condition or frame only conducted where omnibus test had a p value < .05.

Figures

Figure 1.

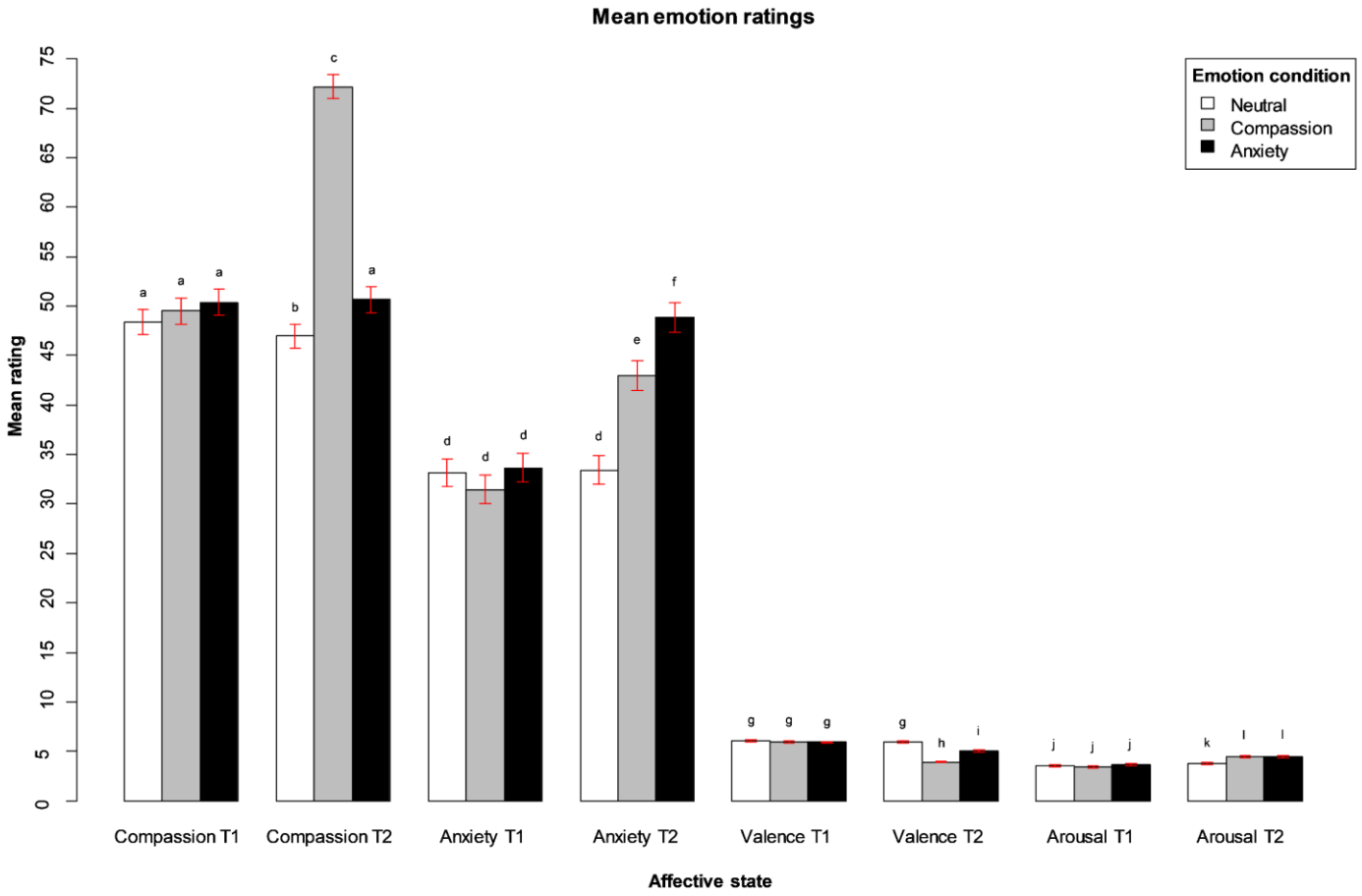


Figure 2.

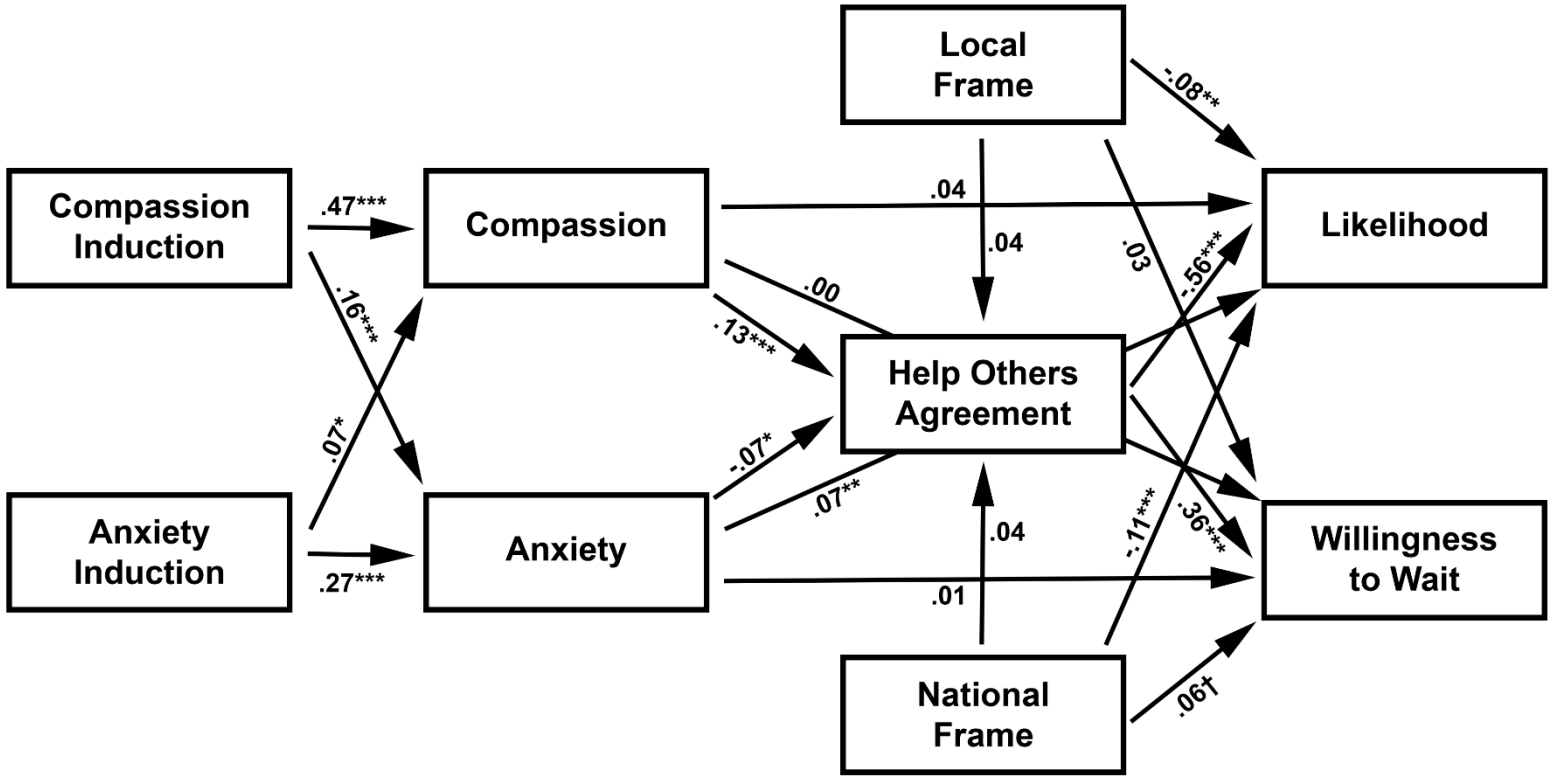

Local Frame
Compassion Induction
Compassion
Likelihood
Help Others Agreement
Anxiety Induction
Anxiety
Willingness to Wait
National Frame
.47***
.16***
.07*
.27***
.04
.04
.00
.13***
-.07*
.07**
.01
.04
.03
-.08**
-.56***
-.11***
.36***
.06†

Figure Captions

Figure 1. Mean emotion ratings before (T1) and after (T2) the emotion inductions, by condition. Bars with different superscript letters above them significantly differ (at $p < .05$, within the same affective state).

Figure 2. Exploratory path model. $X^2(14) = 16.75$, $p = .270$, CFI = 1.00, RMSEA = .01, 90% CI [.00, .03], $p = 1.00$. Estimates are standardized betas. The compassion and anxiety induction are being compared to the neutral induction (omitted category). The local and national frame are being compared to the self frame (omitted category). Significance estimates based on 10,000 bootstrap resamples. Anxiety $R^2 = .19$, 95% CI [.15, .23], p < .001; Compassion $R^2 = .05$, 95% CI [.03, .08], p < .001; Help others agreement $R^2 = .02$, 95% CI [.01, .03], p = .002; Likelihood $R^2 = .33$, 95% CI [.28, .38], p < .001; Willingness-to-wait $R^2 = .13$, 95% CI [.10, .16], p = .001. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Electronic Supplementary Material (ESM)

ESM 1. Experimental Materials

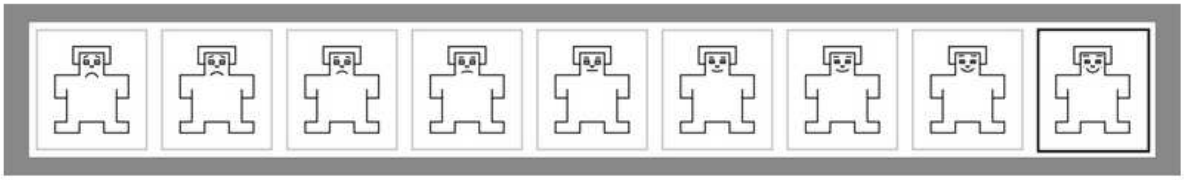
Emotion inductions. The pictures and videos used to induce compassion and neutral states are available here: http://supp.apa.org/psycarticles/supplemental/xge0000315/xge0000315_supp.html. The compassion induction used a pre-validated picture set, with one picture sourced from the IAPS (2070) and the rest from elsewhere (see the link above). The following IAPS picture numbers were used for the neutral induction: 7002, 7004, 7006, 7009, 7096, 7175, 7182, 7185, 7186, 7187, 7205, 7217, 7235, 7490. The following IAPS picture numbers were used to elicit anxiety: 1120, 1201, 1300, 1931, 3022, 3500, 3530, 5972, 6020, 6230, 6250, 6313, 6350, 9050, and 9910. The video clip used for anxiety ("fear") is available here: https://jenniferstellar.com/materials/ and https://www.youtube.com/watch?v=PZcbzRq1chk. Finally – the positive elevation video clip is (elevation/inspiration) is available here: https://jenniferstellar.com/materials/ and https://www.youtube.com/watch?v=vr3x_RRJdd4.

The questions used to assess state emotion were as follows:

How compassionate/sympathetic/moved do you feel right now?

How anxious/nervous/apprehensive do you feel right now?

Which image best characterises the way you feel right now?



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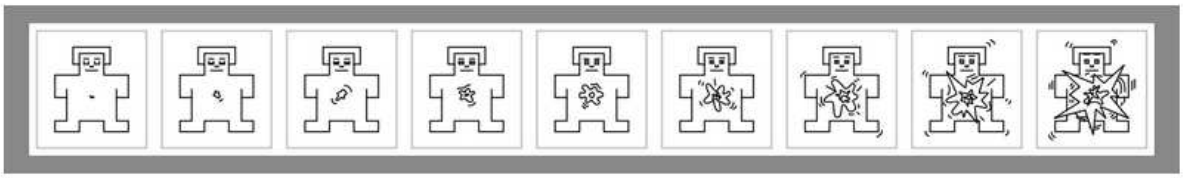


Memory test. The following memory questions were administered following the emotion induction materials.

Compassion.

One of the images showed a child offering something to a homeless man. What was it?

Toy | Book | Biscuit | Money

In the video there was a starving child clutching a spoon. What colour was the spoon?

White | Yellow | Red | Green

One of the images showed a fireman giving oxygen to an injured animal on the road. What was the animal?

Dog | Cat | Horse | Rabbit

How many African children under five die every year due to malnutrition and starvation?

1 million | 0.5 million | 2 million | 4.5 million

One of the images showed a homeless woman on the floor with her children while five men walked past. How many homeless children were there?

4 | 6 | 2 | 1

Anxiety.

One of the images showed a highly venomous and dangerous reptile. What was the animal?

Lizard | Frog | Snake | Chameleon

One of the images showed a woman with a knife up against her throat. What colour was the top she was wearing?

Yellow | White | Blue | Green

In the video an object is rolled down the corridor towards the boy, but when he looks up no one is there. What object was it?

Ball | Jack-in-the-box | Tricycle | Skateboard

One of the image showed a hand holding a gun pointed at you. How many bullets were visible in the chamber?

8 | 6 | 0 | 2

In the video the boy walks slowly towards an open room. What was the room number?

139 | 482 | 237 | 666

Neutral.

One of the images showed a piece of cutlery. What was the piece of cutlery?

Chopsticks | Knife | Spoon | Fork

One of the images showed a mug. What colour was the mug?

Yellow | Blue | Red | Green

In the video what did the man wearing the grey suit say his name was?

Markham | Smith | Roberts | Jones

How many men are in view throughout the majority of the video?

2 | 6 | 1 | 4

One of the images showed some coats hung up on a coat rack. How many were there?

7 | 5 | 3 | 1

Health vignettes and outcome measures. The following vignettes and outcome measures were used in this study.

"Self" frame vignettes.

Antibiotics scenario.

Imagine that you have had a sore throat, runny nose, and a chesty cough for a few days that is bad enough to have caused you to miss some work (or your usual daily activities). Your symptoms do not seem to be getting any better and you are feeling pretty rotten. From talking to friends and family, you think you need some antibiotics to treat your illness.

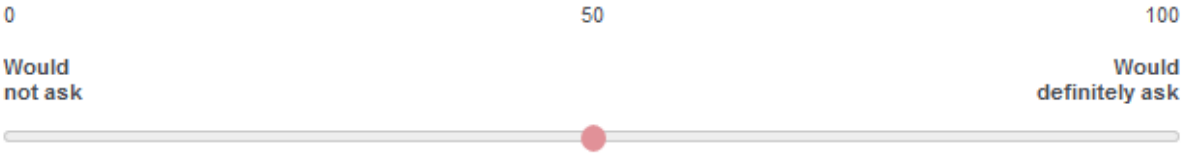
You go to see a doctor. She says that you have a respiratory tract infection, which she believes will most likely clear up on its own. She recommends that you rest, drink plenty of fluids, and use over-the-counter medicines, such as paracetamol, to ease your symptoms. The doctor says that you should book another appointment if you do not start feeling better in about a week's time.

You ask about antibiotics. The doctor says that because most respiratory tract infections are viral, antibiotics are more likely to cause harm through side effects than be effective. More rarely, respiratory tract infections are caused by bacteria. She says that immediate prescription is not recommended and she recommends that you wait and see if your symptoms get any better over the next week or so before trying antibiotics.

The doctor says that using antibiotics often causes side effects such as diarrhoea and stomach discomfort, and may also unnecessarily cause bacteria to become 'resistant' to antibiotics. This means that types of bacteria that cannot be easily treated become more common. She says this resistance may affect you personally in the future when you need a course of antibiotics.

However, the doctor is sensitive to your expectations and wants to provide a high standard of care, so she says the choice is yours of whether or not to take the antibiotic prescription now, or come back in a week if still unwell or getting worse.

Given this information, what is the likelihood that you would ask the doctor to prescribe you with the antibiotics now?



If you did not take the antibiotic prescription now, what would be the maximum number of additional days you would be willing to wait with exactly the same symptoms before returning to the doctor to ask for the antibiotics?

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Back pain scenario.

Imagine that you have developed sudden back pain that has lasted for about a week and is bad enough to have caused you to miss some work (or your usual daily activities). Your symptoms do not seem to be getting any better and you are in a lot of pain. From talking to friends and family, you think you need a scan of your back to work out what is wrong.

You go to see a doctor. She says that you have probably pulled a muscle in your back, or that your back muscles are in spasm, and this should get better on its own in a few weeks. She recommends that you keep gently active, and use over-the-counter medicines, such as paracetamol and/or ibuprofen, to ease your symptoms. The doctor says that you should book another appointment if you do not see any improvement in about ten days' time.

You ask about scans. The doctor says that the majority of cases of back pain are muscular, and that a scan may not be helpful. More rarely, the pain may be due to something more serious, but many people have slipped discs and no pain, others have pain and normal discs, so a scan won't be likely to offer helpful information. She explains that scans are normally only done on people with signs of nerve pressure or bladder problems who might need surgery, and you don't fit that category.

The doctor says a scan exposes you to radiation without providing any useful information to judge the best way to manage your problem. She says that having scans unnecessarily take up specialists' time and are a drain on NHS resources, and are not recommended. Such unnecessary use of resources may affect you personally in the future when you need to be referred for a scan.

However, the doctor is sensitive to your expectations and wants to provide a high standard of care, so she says the choice is yours of whether or not to be referred for the scan now.

Given this information, what is the likelihood that you would ask the doctor to refer you for a scan immediately?

0 50 100

Would not ask **Would definitely ask**

If you were not referred for the scan immediately, what would be the maximum number of additional days you would be willing to wait with exactly the same symptoms before returning to the doctor to ask for the scan?

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Pharmacy scenario.

Imagine that you have developed a headache that has lasted for a few days and is bad enough to have caused you to miss some work (or your usual daily activities). Your symptoms do not seem to be getting any better and you are feeling pretty rotten. From talking to friends and family, you think you need to go and see a doctor to see what is causing the headache.

You ring up your doctors to make an appointment. The receptionist on the phone says that they are currently experiencing a high demand to see a doctor. He asks whether you have tried your local pharmacist for advice and over-the-counter medicines. The receptionist explains the pharmacist can help with common ailments, such as headache, and this is what is currently recommended for patients with minor ailments like headaches.

He recommends you go to the pharmacy in the first instance and gives you the opening hours and location of your nearest branch. The receptionist says that you should follow the pharmacist's advice and call back to make an appointment at the doctors if they suggest you need to.

The receptionist says that if everybody went to a pharmacist with common health problems, more time would be freed up at doctors' surgeries. He says this may help you personally to get an appointment with the doctor in the future when you need one.

However, the receptionist is sensitive to your expectations and wants to provide a high standard of care, so he says if you really want to see the doctor they can squeeze you in later today.

What is the likelihood that you would ask the receptionist to make an appointment with the doctor for later today?

0 50 100

Would not ask **Would definitely ask**

If you did not see the doctor later today, and after seeing the pharmacist for advice, what would be the maximum number of additional days you would be willing to wait with exactly the same symptoms before making an appointment to see the doctor?

1 2 3 4 5 6 7 8 9 10 11 12 13 14

"Local" frame vignettes.

Antibiotics scenario.

Imagine that you have had a sore throat, runny nose, and a chesty cough for a few days that is bad enough to have caused you to miss some work (or your usual daily activities). Your symptoms do not seem to be getting any better and you are feeling pretty rotten. From talking to friends and family, you think you need some antibiotics to treat your illness.

You go to see a doctor. She says that you have a respiratory tract infection, which she believes will most likely clear up on its own. She recommends that you rest, drink plenty of fluids, and use over-the-counter medicines, such as paracetamol, to ease your symptoms. The doctor says that you should book another appointment if you do not start feeling better in about a week's time.

You ask about antibiotics. The doctor says that because most respiratory tract infections are viral, antibiotics are more likely to cause harm through side effects than be effective. More rarely, respiratory tract infections are caused by bacteria. She says that immediate prescription is not recommended and she recommends that you wait and see if your symptoms get any better over the next week or so before trying antibiotics.

The doctor says that using antibiotics often causes side effects such as diarrhoea and stomach discomfort, and may also unnecessarily cause bacteria to become 'resistant' to antibiotics. This means that types of bacteria that cannot be easily treated become more common. She says this resistance may affect you personally in the future when you need a course of antibiotics.

The doctor says that choosing to take antibiotics when you don't need them will impact people in your local community who are more susceptible to illnesses, such as children, the elderly, and those with compromised immune systems, who will suffer more from antibiotic resistance.

However, the doctor is sensitive to your expectations and wants to provide a high standard of care, so she says the choice is yours of whether or not to take the antibiotic prescription now, or come back in a week if still unwell or getting worse.

Given this information, what is the likelihood that you would ask the doctor to prescribe you with the antibiotics now?

0 50 100

Would not ask **Would definitely ask**

If you did not take the antibiotic prescription now, what would be the maximum number of additional days you would be willing to wait with exactly the same symptoms before returning to the doctor to ask for the antibiotics?

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Back pain scenario.

Imagine that you have developed sudden back pain that has lasted for about a week and is bad enough to have caused you to miss some work (or your usual daily activities). Your symptoms do not seem to be getting any better and you are in a lot of pain. From talking to friends and family, you think you need a scan of your back to work out what is wrong.

You go to see a doctor. She says that you have probably pulled a muscle in your back, or that your back muscles are in spasm, and this should get better on its own in a few weeks. She recommends that you keep gently active, and use over-the-counter medicines, such as paracetamol and/or ibuprofen, to ease your symptoms. The doctor says that you should book another appointment if you do not see any improvement in about ten days' time.

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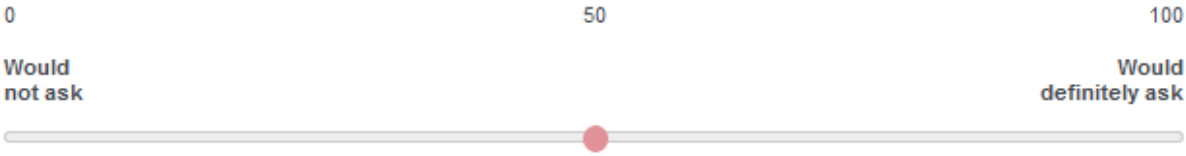
The doctor says a scan exposes you to radiation without providing any useful information to judge the best way to manage your problem. She says that having scans unnecessarily take up specialists' time and are a drain on NHS resources, and are not recommended. Such unnecessary use of resources may affect you personally in the future when you need to be referred for a scan.

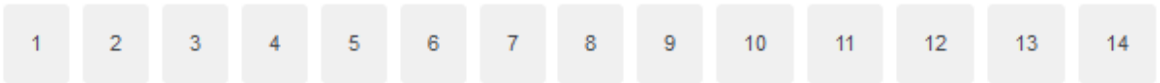
The doctor says that choosing to have a scan when you don't need one will impact upon people in your local community with symptom profiles pointing towards more significant health problems, such as cancer, liver disease, or injuries to internal organs, who will suffer more if their scans are delayed due to reduced availability.

However, the doctor is sensitive to your expectations and wants to provide a high standard of care, so she says the choice is yours of whether or not to be referred for the scan now.

Given this information, what is the likelihood that you would ask the doctor to refer you for a scan immediately?



If you were not referred for the scan immediately, what would be the maximum number of additional days you would be willing to wait with exactly the same symptoms before returning to the doctor to ask for the scan?



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What is the likelihood that you would ask the receptionist to make an appointment with the doctor for later today?

0 50 100

Would not ask **Would definitely ask**

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"National" frame vignettes.

Antibiotics scenario.

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The doctor says that choosing to take antibiotics when you don't need them will impact people throughout the UK who are more susceptible to illnesses, such as children, the elderly, and those with compromised immune systems, who will suffer more from antibiotic resistance.

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Given this information, what is the likelihood that you would ask the doctor to prescribe you with the antibiotics now?

0 50 100

Would not ask **Would definitely ask**

If you did not take the antibiotic prescription now, what would be the maximum number of additional days you would be willing to wait with exactly the same symptoms before returning to the doctor to ask for the antibiotics?

1	2	3	4	5	6	7	8	9	10	11	12	13	14

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1 2 3 4 5 6 7 8 9 10 11 12 13 14

Help vulnerable others statements.

To what extent do you agree with the following statements?

With a **respiratory tract infection**, following the doctor's advice to wait and see if my symptoms improved before asking for antibiotics would help people more susceptible to illnesses than me, who will suffer more from antibiotic resistance.

0 50 100

Do not agree at all **Agree completely**

With **back pain**, following the doctor's advice to wait and see if my symptoms improved before asking for a referral for a scan would help people with more significant health problems than me, who will suffer more if their scans are delayed due to reduced availability.

0 50 100

Do not agree at all **Agree completely**

With a **headache**, following the receptionist's advice to consult a pharmacist rather than a GP for advice would help people with more significant health problems than me, who will suffer more if they can't get in to see a doctor due to reduced availability.

0 50 100

Do not agree at all **Agree completely**