
Article:
Reynolds, L.M., Powell, P. orcid.org/0000-0003-1169-3431, Lin, Y.S. et al. (3 more authors) (2019) Fighting the flinch : experimentally induced compassion makes a difference in healthcare providers. British Journal of Health Psychology, 24 (4). pp. 982-998. ISSN 1359-107X

https://doi.org/10.1111/bjhp.12390

Fighting the flinch: Experimentally induced compassion makes a difference in healthcare providers

Short title: *Induced compassion in healthcare providers*

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Abstract:

Objectives: Although healthcare providers are required to sustain care in difficult circumstances, some patients challenge this principle. Evoking compassion seems likely to be helpful in such situations. This research aimed to evaluate whether inducing compassion in healthcare providers might mitigate disengagement with patients who have challenging presenting features such as those with disgusting symptoms and/or are to blame for their own health problems.

Design: An online experimental study with clinical healthcare providers.

Methods: Medical students (*n*=219) and qualified healthcare professionals (*n*=108) took part in an online experiment. Participants were randomised to view a slideshow of either neutral images (control) or compassion-inducing images (compassion condition) and were then presented with a series of patient vignettes where presenting problems systematically varied on patient responsibility and disgusting symptoms. Engagement was assessed by asking participants how caring they felt, how much they would want to help, how challenging it would be, and whether they would wear a mask.

Results: Participants reported less engagement with patients who were responsible for their illness and who presented with disgusting symptoms. Induced compassion offset disengagement and qualified health professionals were more caring and willing to help patients than medical students. The compassion induction eliminated some differences between experienced and trainee clinicians.

Conclusions: This research demonstrates that disgust and patient responsibility impacts clinical engagement and that medical students are more impacted by such scenarios than qualified health providers. Inducing compassion may help to mitigate

these differences and further investigation into strategies that foster engagement with difficult patients is warranted.

Keywords:

Compassion; health; emotion; disgust; medicine; engagement; healthcare providers;

Data availability statement:

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Background

Medical curricula emphasise that healthcare provision be based on principles of patient need rather than provider inclination (The Medical School Objectives Writing Group., 1999). In reality, healthcare providers are human and, in being so, will have emotional responses to patients and their situations. Disgust, an emotion that evolved to promote withdrawal and avoidance in response to contamination threats that are commonly found in medical settings (blood, vomit, faeces; Oaten et al., 2009) has been shown to predict career choice in health professionals (Consedine, Tzu-Chieh, & Windsor, 2013) and seems likely to be relevant to reduced clinical engagement. Similarly, patients who are perceived as responsible for their own health problems may exacerbate negative affective reactions in providers that limit their engagement (Van de Vathorst, 2000).

To care for people who pose a potential contamination threat requires abilities in over-riding signs of potential contamination (Oaten et al., 2009; Tybur, Lieberman, Kurzban, & DeScioli, 2013). Although medical programmes ostensibly train students to override the tendency to withdraw in the face of challenging situations (The Medical School Objectives Writing Group., 1999), withdrawal in response to such situations occurs nevertheless (Fernando & Consedine, 2017). The current work experimentally investigates whether healthcare providers might be less engaged with patients they perceive as responsible for their own health predicament or where symptoms are seen as ‘disgusting’ and assesses whether clinical experience and induced compassion might mitigate such disengagement.

While studies of the types of patient scenarios that impact clinical engagement have been well researched, the exact elements of patient presentation (and physician response) that make a patient difficult to engage with remain unclear. In the view taken in the current work, the elicitation of avoidance-promoting emotions is central to problematic clinical engagement. Fear and embarrassment are well established inhibitors of engagement with patients; embarrassment gets in the way of clinicians investigating sensitive topics (Tomlinson, 1998) or undertaking intimate examinations (Hine & Smith, 2014), while fear of

aggressive patients impedes the patient-provider relationship (Elston & Gabe, 2016). However, considerably less is known about how disgust might impact clinical interactions. Patients commonly present with aversive symptoms—unpleasant odours, open wounds, phlegmy coughs, faecal leakage, and the like (Smith & Kleinman, 1989). Symptoms of this kind map directly onto the stimuli that are known to elicit disgust responses (Curtis, Aunger, & Rabie, 2004). Given that disgust responses have been shown to amplify moral judgements (Schnall, Haidt, Clore, & Jordan, 2008) and the evolved purpose of the disgust system is to promote withdrawal and avoidance of potential health threats (Davey, 2011) it seems plausible that clinicians might be less engaged with patients who present with such symptoms. Thus, testing the possibility that symptoms seen as disgusting will reduce clinician engagement with patients is the first aim of this report.

Whilst it seems intuitive that clinicians might withdraw from patients who present with symptoms seen as disgusting, it is possible that disengagement from patients might be less where the patient is perceived as not to blame for their ailment. In other realms, helping behaviour has been shown to vary in accordance to perceptions of deservingness, with persons seen as victims of events beyond their control viewed as “deserving” of help while those whose difficulties are seen as self-inflicted are not (Weiner, 1995). Medical contexts are no exception to this phenomenon (Ekstrom, 2012); research shows that health professionals sometimes perceive patients who have exacerbated their condition (e.g., through substance abuse or treatment non-adherence) as less deserving of help and are less involved in the delivery of their healthcare (Fernando & Consedine, 2014; Van Boekel, Brouwers, Van Weeghel, & Garretsen, 2013). Conversely, it is possible that clinicians might be more engaged with patients perceived as not being responsible for their own health problems and, specifically, be less likely to withdraw when symptoms are seen as disgusting. The current report investigates whether clinician perceptions that a patient is responsible for their own health problems impacts on the patient-provider relationship.

Although the types of patients noted above are likely to challenge clinical engagement,

the equitable provision of healthcare relies on providers sustaining care despite such challenges. Developing the capacity to sustain care in such scenarios has ostensibly been an important feature of medical training (The Medical School Objectives Writing Group., 1999). Nevertheless, medical education has been criticized for producing graduates that understand the mechanism of disease but do not know how to effectively engage with patients (Peabody, 2015). Recent work suggests that clinical exposure might be important— medical students have been shown to habituate to established elicitors of disgust in medical settings (i.e., dead bodies, Rozin, 2008), and healthcare providers with more experience are better able to maintain their capacity to deliver care in the face of patient-related barriers (Dev, Fernando, Lim, & Consedine, 2018). Why clinical experience makes a difference is unclear but it is possible that professional training and personal development might equip clinicians with the skills or attitudes to offset the disengagement that can occur in the face of challenging patient presentations.

Although clinical training may equip healthcare providers with the ability to sustain care in difficult situations, the time required to develop such skills can be lengthy and more immediate interventions are needed. A less time intensive strategy might exist through deliberately activating compassion. Put simply, compassion is the motivation to help and care and is categorised by two primary components; engagement and action (Gilbert & Mascaro, 2017). Evolutionary theory suggests that caring behaviour evolved as a means to protect offspring, attract mates, and support affiliative bonds (Gilbert, 2019). Humans have a long history of compassionate caring for the sick and vulnerable, especially amongst kin and group members (Spikins, 2018). However, caring for others is a costly endeavour and tends to be constrained to those we know and like (Gilbert, 2019). Recent work has investigated the factors that may facilitate and inhibit compassionate care (Dev et al., 2018; Gilbert & Mascaro, 2017) including caring for strangers, as is the case for healthcare providers. Such outgroup members are more vulnerable to factors such as evaluations of being worthy (or unworthy) of care (Hein, Silani, Preuschoff, Batson, & Singer, 2010).

Over the past decade there has been an escalating interest in the potential benefits of compassion-based interventions in clinical practice with clients (Kirby, 2017; Sinclair et al., 2016). Recent research has demonstrated that compassion can be cultivated with training and, of relevance, in non-medical contexts experimentally-induced compassion has been shown to predict increased generosity (Saslow et al., 2013) and helping behaviour (Lim & DeSteno, 2016), and increase engagement of neural systems implicated in understanding the suffering of others (Weng, Lapate, Stodola, Rogers, & Davidson, 2018). Although the effects of experimentally induced compassion have not been widely examined in medical contexts, it seems plausible that inducing compassion might be helpful in offsetting the avoidance promoting effects of patients who are seen to be undeserving, or where symptoms are perceived as disgusting.

The current report

Healthcare providers are professionally required to sustain care in difficult situations. Although studies are lacking, it seems likely that providers might struggle to engage with patients who present with unpleasant symptoms and that perceptions of patient responsibility and/or clinical training might mitigate this disengagement. Research in other contexts suggests that inducing compassion might be one way of proactively maintaining professional engagement in such challenging circumstances. In considering these issues, our specific research questions were:

1) Are healthcare providers less engaged with patients who a) are perceived as being responsible for their own health condition, and b) present with symptoms seen as disgusting?
2) Is disengagement mitigated by a) clinical training, and b) induced compassion?

Methods

Study design and participants

Permission to conduct this study was obtained from the XXX Ethics Committee. Convenience sampling via social media and medical networks was used to recruit medical students and qualified heathcare professionals aged 18+ who were fluent in English. Interested participants were sent study information and a link to the online survey hosted by Qualtrics. Participants were entered into a prize draw for an iPad mini. Given the right to withdraw, only participants who fully completed the survey were included in analyses.

After informed consent was obtained, participants completed measures of demographic data, occupation, clinical experience, dispositional empathy, disgust, and social desirability. Only those measures used in the current analyses are described below. Participants were randomised to either control or compassion conditions and, in both conditions, viewed a 2-minute slideshow. The compassion condition slideshow had been previously validated to induce compassion (Oveis et al., 2010) and included images of either humans (13 images) or an animal (one image of a puppy) in various situations depicting helplessness, vulnerability, and physical and emotional pain. Previous piloting indicated that one image from the original slideshow had a higher score for disgust and, given our research focus, was removed from the induction utilised in the current study. The slideshow used in the control condition contained neutral images from the International Affective Picture System (Saslow et al., 2013). After viewing the slideshow, participants rated current emotions and were presented with four, gender-matched vignettes that depicted hypothetical patients (Figure 1). The vignettes were constructed in conjunction with clinical experts to ensure face validity and were systematically varied in terms of the degree the patient had a role in exacerbating their own health condition and the presence of symptoms that might be perceived as ‘disgusting’ (Table 1).

Measures

Marlowe Crowne Social Desirability Scale – short form (MC-C) (Reynolds, 1982). Given the probable demand to present as compassionate in healthcare settings, the MC-C was used to assess the tendency to self-report in socially desirable ways. This scale includes

13 true/false items and has previously been used to offset the possibility that healthcare providers might present themselves in ways that bely their true tendencies (Benson, Sammour, Neuhaus, Findlay, & Hill, 2009). In the current study, reliability was adequate (α = .77).

State compassion. Participants rated the degree to which they experienced fourteen emotions while viewing the slideshow pictures using a 1 (did not experience at all) to 7 (experienced very intensely) scale. A composite score for state compassion (α = .96) was calculated based on the total mean scores of ratings for "compassion", "sympathy", and "moved" (Oveis et al., 2010).

Patient vignette manipulation checks. To assess whether patient vignettes had been successfully varied on degree of responsibility and disgusting symptoms, participants were asked to rate each patient on 0 to 100 point scales for a) how much they would hold the patient responsible for their own condition (0 = "not responsible" to 100 = "very responsible"), and b) how disgusting they would find the patient's symptoms (0 = "not disgusting" to 100 = "very disgusting").

Self-reported measures of engagement. As a proxy measure of engagement participants were asked to use VAS scales from 0 to 100 to rate how caring they would feel toward the patient, how much they would want to help the patient, how challenging they would find it to give the patient a physical examination, and how likely they would be to wear a mask.

Statistical Analyses

First, manipulation checks were conducted to assess whether the experiment had successfully induced compassion and to determine whether patient vignettes had been perceived in the manner intended. There were some cases of missing data and these were excluded pairwise and only available case analyses conducted[1]. To assess differences in

[1] Missing data included one item (perception of disgusting symptoms) which was not included in the questionnaire of the first 36 participants due to an administrative error, one missing

state compassion between the two conditions, a 2 group (compassion vs. control) ANCOVA controlling for social desirability was conducted on state compassion scores. To assess whether the hypothetical patients varied in the manner intended, 2 patient ('disgusting' vs. not 'disgusting') x 2 patient (responsible vs. not responsible) ANCOVAs, controlling for social desirability, were conducted on perceptions of patient responsibility and disgusting symptoms. Finally, to assess the primary research questions, a series of 2 patient (responsible vs. not responsible) x 2 symptoms ('disgusting' vs. not 'disgusting') x 2 (students vs. qualified health professionals) x 2 (compassion vs. control) mixed model ANCOVAs, controlling for social desirability, were run on ratings of care, desire to help, extent to which a physical examination would be challenging, and the likelihood of wearing a mask.

For each significant effect observed in the main analyses, causal mediation analysis was carried out to assess if the effect of the predictor on the outcome operated via the hypothesised causal channel (i.e., disgust or responsibility ratings of the vignettes). Given that responses were clustered within participants, multilevel mediation analysis was conducted in R 3.6.1 (R Core Team, 2019) using packages lme4 (Bates, Maechler, Bolker, & Walker, 2015) and mediation (Tingley, Yamamoto, Hirose, Keele, & Iami, 2014). Random intercept models were estimated that take into account responses nested within participants, and were subsequently used to estimate the indirect (mediation) effect (Tingley et al., 2014). As there is a single observation at each treatment level for each participant, a random intercept structure was deemed sufficient (Barr, Levy, Scheepers, & Tily, 2013). Variables were grand mean centred prior to analysis. The predictor-to-mediator model estimates were conditioned on the other predictors in the analyses (i.e., responsibility or disgust vignette content; emotional condition; social desirability; student status, and mediator-to-outcome model estimates were conditioned on these predictors and the alternate mediator (i.e., disgust or responsibility

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response to perception of patient responsibility, two responses to items about how challenging it would be to conduct an exam and wear a mask, and two responses from students about their training profession.

ratings), but not any other higher-order interaction terms. For each estimate, quasi-bayesian confidence intervals and *p* values are provided, using 1000 simulations (Tingley et al., 2014).

Results

In total, 327 participants completed the online questionnaire (Table S1). Ages ranged from 18 to 66 years, however students were younger (median = 22 years) than health professionals (median = 41.5 years) (Table S2). The majority of participants were female (72.2%); however, again, there was a difference in the gender split between students (females 68.0%) and health professionals (females 80.6%). Most were medical students (67.0%), with the remainder being either medical doctors (14.4%), nurses (14.4%) or other health professionals (4.3%). Participants ranged in clinical experience; health professionals had between 0 and 46 years of clinical experience (median = 12 years) and medical students ranged from being in their 2nd to 6th year of study (median = 4). Students were studying medicine (86.3%), nursing (11.0%), and other (1.8%) clinically relevant specialities.

Manipulation checks

Compassion induction. Analyses showed a significant difference between conditions ($F(2, 324)=353.60$, $p=.000$, $\eta p^2 =.52$) for state compassion. The compassion group reported more state compassion ($M=5.11$, $SD=1.45$) than the control group ($M=2.02$, $SD=1.57$) which indicated that compassion had been successfully induced in the compassion condition.

Patient manipulations. There were main effects for the degree to which patients were perceived as being responsible for their health condition $F(1, 321)=166.43$, $p=.000$, $\eta p^2 =.34$ and as presenting with 'disgusting' symptoms $F(1, 288)=97.15$, $p=.000$, $\eta p^2 =.25$. As intended, patients B and D were seen as more responsible for their health condition than patients A and C, and patients C and D were perceived as having more 'disgusting' symptoms than patients A and B (Figure 2).

Healthcare provider responses to patients perceived as a) responsible for their own health condition and b) having 'disgusting' symptoms?

Patient responsibility. As expected, healthcare providers expressed less care ($F(1, 322)=105.04$, $p=.000$, $\eta p^2 =.25$) and a lower desire to help ($F(1, 322)=72.11$, $p=.000$, $\eta p^2 =.18$) patients perceived as being responsible versus not responsible for their own health problems (Table S3). These effects were partially mediated by reported responsibility ratings, with indirect effects of $b = -9.42$, 95% CI [−11.58, −7.48], $p < .001$ and $b = -7.85$, 95% CI [−9.86, −5.85], $p < .001$, respectively. However, patient responsibility did not impact ratings of how challenging it would be to conduct a physical examination ($F(1, 320)=2.75$, $p=.098$, $\eta p^2 =.01$) or the likelihood of wearing a mask ($F(1, 320)=0.37$, $p=.541$, $\eta p^2 =.00$).

'Disgusting' symptoms. In contrast to patient responsibility, the perception of disgusting symptoms did not impact the degree to which clinicians felt caring ($F(1, 322)=1.07$, $p=.302$, $\eta p^2 =.00$) or wanted to help ($F(1, 322)=.83$, $p=.364$, $\eta p^2 =.00$). However, participants reported that disgusting symptoms made patients more challenging to examine ($F(1, 320)=40.84$, $p=.000$, $\eta p^2 =.11$) and that they would be more likely to wear a mask in their presence ($F(1, 320)=41.81$, $p=.000$, $\eta p^2 =.12$). These significant effects were partially mediated by reported disgust ratings to the vignettes, with indirect effects of $b = 12.82$, 95% CI [11.01, 14.41], $p < .001$ and $b = 10.52$, 95% CI [8.85, 12.26], $p < .001$, respectively.

Is disengagement mitigated by a) clinical training and/or b) induced compassion?

Clinical training. There were systematic differences in the way that students and qualified health professionals responded to the different types of patients (Figure 3). In particular, an interaction between training and patient responsibility showed that, students reported feeling less caring ($F(1, 322)=6.47$, $p=.011$, $\eta p^2 =.02$), however, they were no less willing to help ($F(1, 322)=1.42$, $p=.235$, $\eta p^2 =.00$), the patients who were responsible for their own health condition than the fully trained health professionals. The effect of this interaction on caring ratings was partially mediated by vignette responsibility ratings, $b = 0.97$, 95% CI [0.19, 1.78], $p = .014$. Similarly, an interaction between training and disgusting symptoms showed that, compared to fully trained healthcare providers, students reported feeling less caring ($F(1, 322)=4.08$, $p=.044$,

ηp^2 =.01), being more likely to wear a mask (F(1, 320)=9.72, p=.002, ηp^2 =.03), and that it would be more challenging to conduct a physical examination (F(1, 320)=9.78, p=.002, ηp^2 =.03) of patients with disgusting symptoms. Thus, challenging aspects of the patient elicited a more distant and less engaged response in the students.[2] All of these effects were partially mediated by participants' ratings of how disgusting they found the vignettes, with indirect effects of: b = 0.72, 95% CI [0.19, 1.36], p = .006; b = −2.70, 95% [−4.68, −0.83], p = .004; and b = −3.21, 95% [−5.43, −1.03], p = .008, respectively.

Induced compassion. Whilst there were no main effects for condition on caring, wanting to help, or examination metrics, being randomised to the compassion condition did mitigate some of the effects associated with other variables. Specifically, those randomised to the compassion condition were less likely to report wearing a mask with patients who they perceived as having more disgusting symptoms (F(1, 320)=7.15, p=.008, ηp^2 =.02), than those in the control condition. However, this effect was not mediated by participants' disgust ratings, b = 0.11, 95% CI [−1.70, 1.86], p = .880. Similarly, while students reported greater difficulty examining more disgusting patients overall, this effect was only evident in the control condition and was not evident in the compassion condition (F(1, 320)=4.89 p=.028, ηp^2 =.02).[3] This interaction effect was not mediated by participants' disgust ratings, b = 2.96, 95% CI [−1.39, 7.59], p = .180.

[2] Given that students were significantly younger than health professionals and that age is also a proxy for clinical experience, we ran alternative models where training status was replaced with dichotomised age (younger vs. older). Replacing training status with age in these models revealed no interaction effects for age x disgust for caring or how challenging it would be to conduct a physical examination, however, age x responsibility was significant for caring. These results suggest that the effects of training status were not purely driven by age.

[3] Given the gender differences across groups and the possible gender differences in induced compassion, we ran alternative models where training status was replaced with gender (male vs. female). In these models, there were no main effects or interaction effects for gender across any of the measures, suggesting that the effects of training status were not purely driven by differences in gender.

Discussion

Consistent with prior work and theory, greater attributions of patient responsibility and the perception of 'disgusting' symptoms both reduced indices of patient engagement and care. Specifically, participants reported less engagement with patients who were responsible for their illness (i.e., less caring, less desire to help) and who presented with aversive symptoms (i.e., more challenging, more likely to wear a mask). Importantly, most of the observed effects operated through the hypothesised causal channels, as evidenced by significant meditation effects via disgust and/or responsibility ratings. As predicted, induced compassion offset dis-engagement although only in one of these aspects (likelihood of wearing a mask in the face of symptoms seen as disgusting); that this effect was *not* mediated by disgust ratings, suggests the compassion induction mitigated behavioural withdrawal even though the disgust response itself was unaffected. Also as predicted, compared to medical trainees, qualified health professionals were more caring and willing to help patients perceived as responsible for their condition, and less challenged/likely to wear a mask with patients they perceived as having disgusting symptoms. Of particular importance, differences between students and qualified health professionals in how challenging it would be to examine patients with disgusting symptoms were eliminated by the induction of compassion.

The current work extends our understanding into the specific patient characteristics that are likely to impede engagement and is the first to examine disgust as a key emotional substrate for withdrawal from patients. Disgust is understudied in medicine but almost certainly relevant. While wearing a mask in the face of contagion can be protective (Rockwood & O'Donoghue, 1960), there are many medical situations where the clinical imperative for their use is ambiguous (Da Zhou, Sivathondan, & Handa, 2015). Our design did not control for fear of contamination from an infectious disease, nevertheless, although wearing masks in clinical situations is widely perceived as protective for health providers, there is ambiguity about their benefit in some situations and it may be that mask wearing is sometimes symbolic (Leyland & McCloy, 1993). From a patient perspective, masks can create barriers to engagement and communication

(Mendel, Gardino, & Atcherson, 2008). Our findings suggest that in the face of symptoms perceived as disgusting, health providers are likely to err on the side of "protecting themselves" rather than prioritising patient engagement; this has important implications for the patient-provider relationship.

Further to this, analyses in this report tested whether the detrimental effect of disgust on indices of engagement might be mitigated in patients whose health problems were caused through no fault of their own. Consistent with work showing that attributions of patient responsibility negatively impact the patient-clinician relationship (Olsen, 1997), predict allocation of fewer healthcare resources (Skitka & Tetlock, 1992), and are associated with less sympathy and more anger towards patients (Feather & Johnstone, 2001), healthcare providers reported less care or willingness to help patients they considered responsible for their health problems regardless of whether patients had 'disgusting' symptoms. However, the lack of interaction effects between perceptions of responsibility and symptoms indicated no mitigation of disengagement in patients who were not at fault for their ailment, although neither was it compounded when the reverse was true. It is worth noting that in the current work, we investigated *anticipated* experience rather than specifically assessing whether disgust had been elicited in participants. Given that *feeling* disgusted has been shown to amplify moral judgements in other contexts (Schnall et al., 2008), future work could distinguish between the impact of anticipated and actual disgust on judgements about patients.

In the context of healthcare provision where withdrawal from difficult patients can have significant implications, our findings also show that training has the potential to mitigate such effects. Compared to students, qualified health professionals were more caring toward difficult patients and less likely to use a mask. Although our design precludes knowing *why* clinical training might matter in this context, recent related work offers some possible explanations. A greater range of prior clinical experiences may provide opportunities for learning such that more senior healthcare workers are better equipped to deal with challenging clinical encounters (Dev et al., 2018; Fernando & Consedine, 2017) and/or aging itself may also offer benefits in this

regard. Older persons show greater empathic concern for others (Sze, Gyurak, Goodkind, & Levenson, 2012), are better able to regulate their emotions (Magai, Consedine, Krivoshekova, Kudadjie-Gyamfi, & McPherson, 2006), and are more likely to have had exposure to difficult personalities and unpleasant symptoms in their lives (Consedine & Magai, 2002). Thus, it may be that older, more experienced, providers are less fazed by difficult patients in a "been there, done that" manner. This possibility aligns with research demonstrating how medical students adapt to clinical procedures that they initially find disgusting (Rozin, 2008). Although there is evidence to suggest that there are no differences in the disgust sensitivities of nurses and doctors (Consedine et al., 2013), it is possible that there are differences across various professions such that some clinicians may be better equipped to sustain compassion in the face of difficult situations. We ran alternative analyses where we compared professions and our results were essentially unchanged apart from the expected marginalization of some results due to lack of power. Our findings provide a clear rationale for the further study of the specific factors that change with experience and/or training such that deterrents to engagement and the provision of care become less problematic.

In line with this, a final contribution of this work lies in testing the proposition that activating compassion might mitigate inhibitors to engagement particularly, in less experienced, providers. Induced compassion moderated withdrawal in two instances where patients had 'disgusting' symptoms (wearing a mask, and how challenging it would be to examine a patient with disgusting symptoms). Despite the fact that inducing compassion in our study did not mitigate the (arguably) more resistant impact of patients seen as at fault for their health condition, these findings are consistent with studies showing that even brief inductions of compassion have the potential to promote feelings of connection and other-focused concern (Boellinghaus, Jones, & Hutton, 2014; Seppala, Hutcherson, Nguyen, Doty, & Gross, 2014). Although our design precludes knowing why there were no other condition effects, we hypothesize that the relative impact of a temporary elevation in general compassion is not sufficiently potent (or focused) to influence metrics of engagement that are fundamentally

important to healthcare (e.g., caring). Thus, we suspect that our compassion induction which included general images of suffering may not have directly elicited compassion specific to clinical healthcare situations. It is also possible that our induction induced empathy rather than compassion (Valk et al., 2017). Additionally, even though we controlled for individual differences in social desirability, it may be that the pull to respond in socially desirable ways had a larger impact than our compassion manipulation. This possibility seems supported by the fact that 'wearing a mask' has a clear rationale in medical settings. As such, it may be easier to rationalize whether a mask is worn (or not) compared to feeling caring towards a patient. Recent work suggests that alongside clinician factors, patient factors and context also have an influence (Fernando, Arroll, & Consedine, 2016). Nevertheless, given the importance of maintaining care across challenging situations in healthcare, seeking ways to quickly and effectively activate compassion in medical settings appears to be an avenue worthy of further investigation.

Strengths and limitations

Although our experimental design allows conclusions about the causal influence of perceptions regarding disgust and responsibility on self-reported measures of patient engagement, our hypothetical scenarios necessarily restrict insight into how these findings might translate to real-world situations. Trade-offs between experimentally controlled healthcare scenarios and the practicalities of real world experimentation are well known (Mercer, DeVinney, Fine, Green, & Dougherty, 2007). It is also possible that health providers might report one thing and do another; although anonymity reduces social desirability, the intentions of professionals may not always translate to action (Godin, Bélanger-Gravel, Eccles, & Grimshaw, 2008). Additionally, some of our participants were as young as 18 years which means their clinical exposure would have been limited. While we trust participants' responses and data checking was conducted to identify errors, we were not able to verify participants' credentials in this study. There were also differences in the ages and genders across students and health professionals and, as such, we are unable to rule out the effects of

these differing characteristics on the findings. Although age is inherent to the difference between professionals and students future research could incorporate a matched design on such demographics to help untangle the influence of their effects. Our design also precluded investigation of possible differences in responding across different types of health professionals.

Despite these limitations, the current work provides an example of a pragmatic, online experiment as a means to investigate a typically hard to reach and time-poor population (healthcare providers). We utilised a previously validated induction of general compassion (Oveis et al., 2010) and, although the induction was not specifically targeted at healthcare behaviours and we cannot exclude the possibility that the induction affected other affective states (e.g., empathy), given the escalating interest in the importance of compassion in healthcare (Fernando, Skinner, & Consedine, 2017; Sinclair et al., 2016) and ongoing examples of catastrophic suffering in its absence (Francis, 2013), the fact that a very brief online induction showed effects justifies further investigation in this area. Whilst our work did not attempt to investigate the *impact* of disengagement or how that might exacerbate suffering this is clearly an important direction for future work, and our findings reinforce emerging work demonstrating the buffering effects of clinical training on such disengagement. Previous work has noted the role of fear as an inhibitor of compassion and how this emotion differs from resistances (when a person simply does not want to be compassionate) and blocks (e.g., environmental factors such as staff shortages; Gilbert & Mascaro, 2017). The current work suggests the understudied emotion of disgust also has a role in inhibiting compassionate care. Whilst examinations of disgust in heathcare might seem intuitively obvious, scant research has been conducted in the area. Thus, our findings provide early evidence justifying further investigation into how disgust might impact the pivotal provider-patient relationship on which equitable healthcare relies.

Figure captions

Table 1. Hypothetical patients depicted in clinical vignettes

Figure 1. Clinical vignettes

Figure 2. Patient manipulation checks

Figure 3. Students versus health professionals' responses to patient vignettes

Table 1. Hypothetical patients depicted in clinical vignettes

Patient	Not responsible for own health condition	Responsible for own health condition
Not 'disgusting' symptoms	Patient A (Tom/Tanya)	Patient B (Mike/Maria)
'Disgusting' symptoms	Patient C (Chris/Christine)	Patient D (Eric/Erin)

Figure 1

Clinical vignettes (female version)

Patient A: Tania*.* After a lifetime of good health and with no prior warning, Tania had a seizure while at her work as an accountant. Given she had no history of epilepsy, a full battery of investigative tests were carried out and an MRI revealed a tumour in her brain. She has since had surgery which has successfully removed the tumour and has commenced radiotherapy. She dutifully turns up for her appointments, takes her medications, and does everything else her doctors recommend. She is doing everything she can to get well and get back to work so that she can look after her family financially and support her husband is doing the majority of caring for their two young children. However, she continues to experience very intense headaches. These headaches have stopped her from returning to work and are getting in the way of her spending quality time with her children. Her sleep is being badly disrupted and she is very anxious about what lies ahead for her.
Patient B: Maria*.* Five years ago, the first signs of damage were found on Maria's liver after she went through a period of losing weight and feeling nauseous. At the time, her doctor warned her that unless she dramatically changed her lifestyle and curtailed her alcohol consumption she was at risk of more severe cirrhosis, or worse, the development of liver cancer. Fully aware of the risk, she continued to drink heavily – consuming several drinks most weeknights and considerably more at the weekend. She finds it difficult to keep a job, as she regularly fails to turn up in the morning after a big night's drinking. Luckily for her, there is plenty of work around at the moment for casual labourers, so she has been able to work when she wants. The assault to her liver by alcohol has not been helped by a diet consisting of mostly high fat, high salt, fast foods. Six weeks ago, after months of fatigue and nausea, she finally went again to the doctor. After a series of tests, a tumour was found in her liver. The oncology team has been considering different treatment options but without Maria's assurance that she will stop drinking it is difficult to know how to proceed. Unfortunately, Maria has said that she enjoys alcohol too much, and has no intention of changing her lifestyle. She keeps missing her appointments and you are surprised to see that she has actually turned up today.

Patient C: Christine. Christine is 45 and has anal cancer. Her diagnosis two weeks ago came completely out of the blue. Until that time, she had been fit, active and had a very healthy diet. When she noticed blood oozing from her rectum she sought immediate medical help. She was shocked to find out that despite having no family history of cancer and a very healthy lifestyle, she had a fist-sized tumour growing on the wall of her rectum. A few days ago she had surgery to remove the mass, however, the extent of cancer invasion has meant that her entire anus, rectum and part of her bowel were completely removed. She now has a stoma, which is a hole in the side of her abdomen that drains faeces into a bag stuck to the outside of her body. Christine is very motivated to recover from this procedure and is carefully following all of her doctor's instructions. However, adjusting to the stoma is going to take some time. The stoma bag is clearly not fitting well. It is leaking odour and faeces, such that the surrounding skin is already red, raw, and flaking. The smell makes your stomach turn and your eyes water.

Patient D: Erin. You hear Erin before you see her. Twelve months ago, Erin was diagnosed with lung cancer. Despite strong medical recommendation against continuing to smoke, she continues to smoke over twenty cigarettes a day and has not been taking her medication. She rarely attends her follow-up appointments, but today she is here, and as she approaches, you hear that familiar thick, hacking cough of hers. When she arrives, as usual, you see that she is dishevelled, her hair is greasy, her clothes ingrained with dirt and she has not washed or showered for a very long time. Her breath is rancid and she smells of old sweat and stale smoke. She is doubled-over with her cough, which catches at the back of her throat and makes her retch. You hold a disposable cup for her while she attempts to dislodge the build-up of phlegm. She finally expels some of the thick, green, slimy, blood-tinged product that has been choking her.

Figure 2

Patient manipulation checks

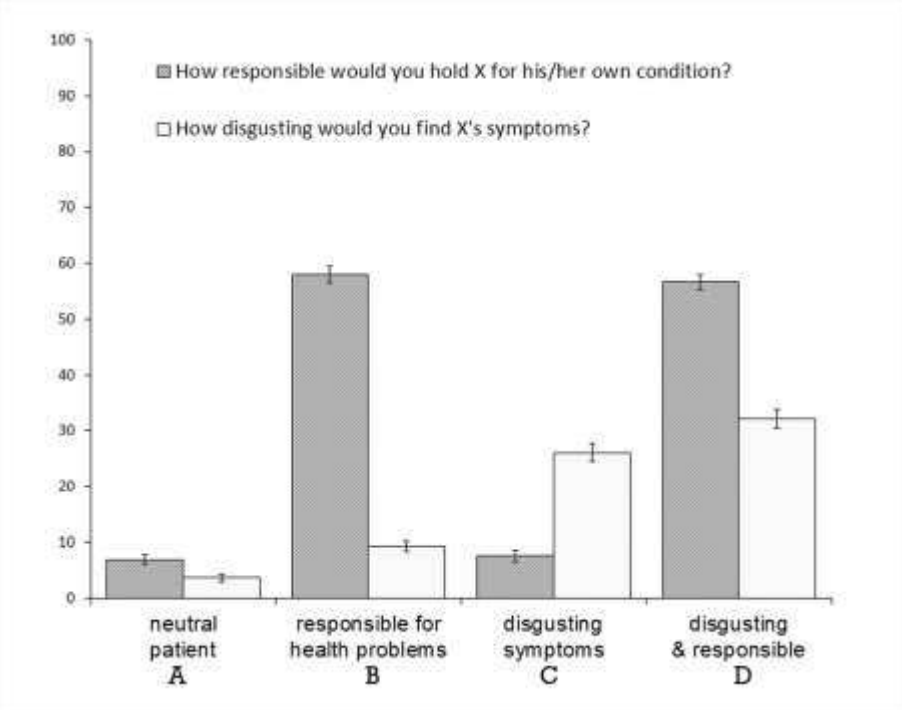
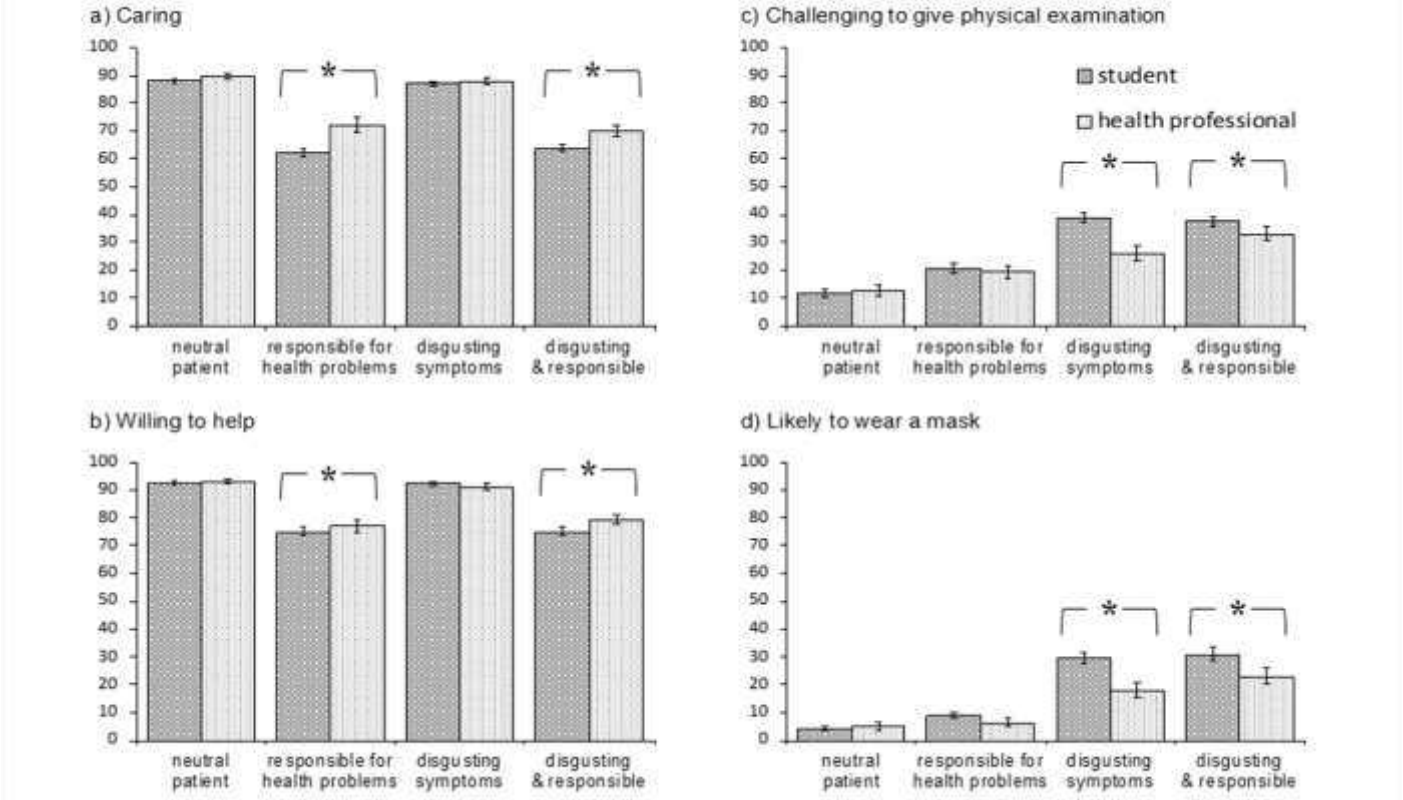


Figure 3

Students versus health professionals' responses to patient vignettes



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Supplementary Tables

Table S1. Demographic characteristics and study measures for participants per condition

Table S2. Participants age and gender per training status

Table S3. Summary of effect sizes for self-reported measures of engagement as a function of training status and condition

Table S1. Demographic characteristics and study measures for participants per condition

Measure	All Participants (N = 327)	Control Condition (n = 167)	Compassion Condition (n = 160)	Statistical results
Age: mean (SD)	29.13 (12.30)	29.41 (12.55)	28.83 (12.07)	t = 0.43
Gender:				
Male	91 (27.8%)	47 (28.1%)	44 (27.5%)	χ^2 = 0.17
Female	236 (72.2%)	120 (71.9%)	116 (72.5%)	
Occupation:				
Doctor	47 (14.4%)	24 (14.4%)	23 (14.4%)	
Nurse	47 (14.4%)	24 (14.4%)	23 (14.4%)	χ^2 = 0.01
Student	219 (67.0%)	112 (67.1%)	107 (66.9%)	
Other	14 (4.3%)	7 (4.2%)	7 (4.4%)	
Years of clinical experience[1]				
Mean (SD)	16.32 (13.56)	16.98 (13.03%)	15.62 (14.18%)	t = 0.52
Years of training[2]				
Mean (SD)	4.02 (1.38)	4.03 (1.34)	4.01 (1.42)	*t = 0.94*
State compassion	3.53 (2.16)	2.02 (1.57)	5.11 (1.45)	t = -18.50*
Compassion	3.66 (2.29)	2.07 (1.67)	5.32 (1.56)	t = -18.15*
Sympathy	3.58 (2.26)	2.02 (1.64)	5.21 (1.55)	t = -18.04*
Moved	3.35 (2.19)	1.96 (1.67)	4.79 (1.68)	t = -15.31*
Social Desirability	7.17 (2.74)	7.26 (2.65)	7.08 (2.82)	t = .60
Responsibility ratings:				
Patient A	6.93 (16.03)	6.39 (15.11)	7.50 (16.97)	t = -.63
Patient B	57.99 (25.82)	60.08 (25.69)	55.81 (25.86)	t = 1.50
Patient C	7.89 (17.08)	7.95 (17.61)	7.82 (16.57)	t = .07
Patient D	56.58 (25.54)	57.58 (25.55)	55.54 (25.57)	t = .72
Disgust ratings:				
Patient A	3.66 (11.26)	2.71 (8.84)	4.67 (13.33)	t = -1.48
Patient B	9.24 (15.04)	8.49 (14.29)	10.02 (15.80)	t = -.87
Patient C	26.07 (26.14)	25.49 (24.88)	26.68 (27.48)	t = -.39
Patient D	32.13 (27.69)	30.62 (26.80)	33.73 (28.61)	t = -.96

[1]health professionals only; [2]medical students only; *p < .01

Table S2. Participants age and gender per training status

Measure	All Participants (N = 327)	Students (n = 219)	Health Professionals (n = 108)	Statistical results
Age: mean (SD)	29.13 (12.30)	22.91 (4.08)	41.72 (13.71)	t = -18.71**
Gender:				
Male	108 (33.0%)	70 (32.0%)	21 (19.4%)	χ^2 = 5.64*
Female	219 (67.0%)	149 (68.0%)	87 (80.6%)	

Table S3. Summary of effect sizes for self-reported measures of engagement as a function of training status and condition

Measure	Control Mean (SD)	Compassion Mean (SD)	Resp.	Disgust	Cond. x resp.	Cond. disgu
How caring?						
Patient A						
Students	88.02 (11.43)	88.05 (14.21)				
Health professionals	90.04 (11.49)	90.36 (11.04)				
Patient B						
Students	61.23 (21.65)	62.95 (21.41)				
Health professionals	74.60 (17.80)	70.32 (21.10)				
Patient C			.25**	.00	.00	.00
Students	86.87 (12.31)	86.84 (14.86)				
Health professionals	89.13 (13.11)	87.53 (11.69)				
Patient D						
Students	64.19 (20.38)	63.73 (22.71)				
Health professionals	72.76 (20.69)	67.85 (23.37)				
Want to help?						
Patient A						
Students	99.01 (10.24)	91.90 (13.02)				
Health professionals	93.78 (8.62)	93.00 (10.23)				
Patient B						
Students	75.22 (21.31)	74.88 (21.34)				
Health professionals	78.55 (23.00)	76.42 (21.73)				
Patient C			.18**	.00	.00	.00
Students	93.01 (9.71)	91.44 (13.54)				
Health professionals	90.49 (17.27)	91.81 (12.62)				
Patient D						
Students	75.35 (19.54)	74.68 (21.12)				
Health professionals	82.18 (17.87)	76.75 (20.75)				
How challenging?						
Patient A						
Students	9.99 (18.66)	13.64 (22.36)				
Health professionals	14.82 (25.40)	9.63 (17.60)				
Patient B						
Students	18.89 (20.93)	22.71 (26.26)				
Health professionals	18.35 (24.25)	18.42 (25.00)				
Patient C			.01	.11**	.00	.00
Students	40.72 (26.58)	36.88 (26.74)				
Health professionals	24.64 (24.93)	26.87 (27.73)				
Patient D						
Students	37.49 (28.05)	37.67 (28.13)				
Health professionals	31.27 (27.79)	33.56 (26.67)				
Wear a mask?						
Patient A						
Students	3.17 (6.47)	5.88 (15.77)	.00	.12**	.00	.02*
Health professionals	4.73 (16.96)	4.71 (15.47)				

Patient B		
Students	8.25 (13.42)	10.06 (16.08)
Health professionals	5.07 (14.60)	7.06 (15.94)
Patient C		
Students	32.95 (31.60)	26.80 (30.50)
Health professionals	20.98 (29.32)	12.81 (20.41)
Patient D		
Students	32.49 (32.46)	29.78 (32.45)
Health professionals	24.69 (33.93)	18.69 (27.97)

*p<.05, **p<.01