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# Disgust and Behavioral Avoidance in Colorectal Cancer Screening and Treatment

## A Systematic Review and Research Agenda

### KEY WORDS

Avoidance  
Cancer screening  
Colorectal cancer  
Disgust  
Emotional barriers  
Systematic review

**Background:** The emotion of disgust appears to promote psychological and behavioral avoidance, a dynamic that has significant implications in physical and psychological outcomes in colorectal cancer (CRC). Patients, caregivers, and health professionals alike are all potentially susceptible to responding with disgust and the associated avoidance. **Objective:** This article aimed to review the early-stage literature related to disgust and CRC, consider the clinical implications, and suggest an appropriate research agenda. **Methods:** Given limited research in this area, a systematic review of the literature was broadened to include disgust and all cancers. MEDLINE, Web of Science, SCOPUS, and ProQuest Dissertations and Theses databases were searched, with additional works sourced by reviewing citation lists and/or by contacting the lead authors. **Results:** Nine studies were identified relating to disgust and cancer screening, and 6 related to disgust and cancer treatment. Two broad findings emerged: (1) disgust appears to be promoting aversion to (and avoidance of) CRC screening, and (2) several known elicitors of disgust are widely apparent in CRC contexts. **Conclusions:** Disgust likely represents a key emotional substrate for avoidance among CRC patients, caregivers, and health professionals. Further research is required to identify disgust's elicitors and effects in CRC contexts, informing interventions that target early identification of

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persons at risk of maladaptive outcomes. Exposure therapies and mindfulness training may be well suited to treating disgust-generated avoidance. **Implications for Practice:** Disgust has significant implications in CRC contexts. Oncology nurses are uniquely positioned to guide clinical interventions and ultimately improve outcomes in this area.

**C**olorectal cancer (CRC) is common among both men and women and is expected to have an increasing presence on the international health landscape, with numbers of new cases estimated to rise from 1.2 million in 2008 to 1.7 million in 2020.<sup>1</sup> Despite being the fourth most common cause of cancer-related death,<sup>1</sup> cancer of the colon or rectum is often curable when localized and diagnosed early.<sup>2</sup> Although the clinical picture is less optimistic if the cancer has spread, an early-stage diagnosis will often not signal a shortened life span, but rather heralds the beginning of a new array of physical and psychological challenges.

Individuals adapt to these challenges in a variety of ways, with greater and lesser degrees of success. Among the more common, but typically less successful, approaches to the threat, diagnosis and treatment of CRC are various forms of avoidance.<sup>3</sup> From screening to decision making, treatment, and adherence, avoidance is evident at most stages of the cancer trajectory. People fail to attend screening tests at recommended rates,<sup>4</sup> delay seeking medical consultation for symptoms,<sup>5</sup> avoid disclosure about their illness,<sup>6</sup> fail to make decisions about treatment within recommended timelines,<sup>7</sup> and do not adhere to cancer treatment regimens and medication.<sup>8</sup>

In an illness where timeliness is often imperative, avoidance has critical implications—both in terms of clinical prognosis and psychological outcomes. Persons who fail to screen for cancer are at greater risk of late-stage presentation and increased mortality.<sup>9</sup> Delay in seeking medical assistance for cancer-related symptoms reduces survival<sup>10</sup> as do delays in the commencement of cancer treatment.<sup>11</sup> The psychological impact of avoidance is also of consequence. Nonadherence to recommended treatments is linked to higher rates of depression and anxiety.<sup>12</sup> Along the cancer spectrum, avoidance is both prevalent and significant in terms of poorer physical and psychological outcomes.

## ■ The Affective Substrates of Avoidance

Although avoidance has many causes, the role that emotions play has received little attention. There are, however, compelling reasons to believe that emotions may serve as a motivational substrate for avoidant behavior in the CRC context. Studies examining avoidance of cancer screening and treatment note the likely roles of fear and embarrassment.<sup>13,14</sup> Despite its clear, face-valid relevance, however, disgust has been essentially overlooked in this area. This omission is surprising given the particular relevance of disgust to health<sup>15</sup> and the fact that it evolved specifically to facilitate avoidance of particular stimuli<sup>16</sup>—many of which are found in CRC con-

texts. The current work reviews the small literature linking disgust to outcomes in CRC. We begin by characterizing disgust, concentrating on describing its function and elicitors, and discussing matters of disgust sensitivity and anticipated versus experienced disgust. Following this review, we examine some of the clinical and research implications that arise when considering the relevance of disgust to avoidance in CRC contexts.

## ■ A Characterization of Disgust

In theory, the core purpose of disgust is to promote the avoidance of actual and potential contaminants, that is, people or stimuli that might pose a threat to health.<sup>17</sup> Disgust responses occur when stimuli are appraised as potentially contaminating. The reaction that follows is broadly characterized as a withdrawal and rejection response, manifest in typical action tendencies, experiential and cognitive states, and functional expressive changes in which the nostrils narrow (a defense against penetration), the mouth closes (to prevent incorporation or promote ejecting contaminants), salivation is increased (to dilute pollutants), and the throat constricts (to prevent swallowing).<sup>18</sup> Cross-cultural work suggests that disgust is universally displayed and readily recognized across geopolitical and cultural groups.<sup>19</sup>

Certain stimuli, many of which are found in CRC contexts, reliably elicit disgust. Theory distinguishes between core and sociomoral disgust, with elicitors of core disgust reliably identified as stimuli that carry a risk of pathogen transmission typically via oral ingestion.<sup>20</sup> It is reported in response to poor hygiene, body products (eg, feces, urine, blood, saliva), violations of the body envelope (eg, insertions, wounds, gore, surgery, deformity), and death.<sup>21</sup> In contrast, sociomoral disgust is typically experienced as an aversion and avoidance of individuals outside one's social group.<sup>22</sup> Both core disgust and sociomoral disgust are potentially important in CRC contexts, given that both promote avoidance of the eliciting stimuli. Understanding the specific elicitor of the emotion is a prerequisite to understanding how the emotion will impact behavior<sup>15</sup> and, as such, is critical for health professionals and researchers interested in disgust responses along the CRC trajectory.

However, the disgust response is a somewhat imprecise "tool," and perceptions of a contamination threat can occur (or persist) in the absence of objective threat.<sup>23</sup> Identifying pathogens is inherently difficult, and the evolved disgust mechanism appears to err on the side of conservatism, perhaps to avoid missing unfamiliar signals of pathogen presence.<sup>24</sup> Such imprecision can promote avoidance of potentially disgust-evoking stimuli and/or persons with varying degrees of accuracy—from people who exhibit real cues of illness<sup>25</sup> to persons or stimuli

who posit no actual threat but who may be perceived to potentially carry exotic pathogens—such as strangers,<sup>26</sup> those outside one's ethnic group,<sup>27</sup> or people who exhibit physical abnormalities.<sup>28</sup> Interestingly, the avoidant dynamic characterizing disgust appears to motivate cognitive as well as behavioral avoidance. Although yet to be studied in CRC contexts, the notion that disgust alters cognitive processing is consistent with studies showing that induced disgust influences social judgments,<sup>29</sup> and similarly, the dispositional tendency to experience disgust predicts rejection and bias against disgust-inducing groups.<sup>30</sup>

Importantly from a clinical perspective, it is also well established that there are reliable individual differences in the tendency to feel disgust—known as disgust sensitivity.<sup>31</sup> Disgust sensitivity is a dynamic adaptive system, able to recalibrate and adapt according to variations in the system's vulnerability.<sup>25</sup> When vulnerability to pathogens increases (eg, during demanding medical regimens), so too does disgust sensitivity.<sup>24</sup> Prejudice against the elderly and obese, for example, is highest in those who feel most vulnerable to infectious disease.<sup>27</sup>

Finally, it is worth noting that it is not only the actual experience of disgust that is relevant in CRC contexts, but also the anticipation of disgust in either the self or in others that may be important. Anticipation of other aversive emotions has been found to be a key driver of avoidant behavior. The anticipation of negative emotional reactions predicts avoidance in women with elevated risk of breast cancer,<sup>32</sup> and anticipated worry and regret are stronger predictors of vaccination than the individual's perceived risk of illness.<sup>33</sup> Additionally, anticipated emotion is often much worse than experienced emotion, as highlighted by persons undergoing colorectal procedures reporting that the actual event was much better than anticipated.<sup>34</sup>

## ■ Disgust and CRC Contexts

Given that disgust is fundamentally designed to promote the avoidance of potential contaminants and that feces, violations of the body envelope, and death have all been well established as elicitors of disgust,<sup>21</sup> it seems almost certain that disgust has a role to play in CRC. The anatomical site of CRC involves exposure to several normative elicitors for the emotion—from screening tests that require patients to collect their own stool and rectal examinations involving penetration of an instrument into the rectum, to symptoms including constipation or diarrhea, adverse effects of treatment such as nausea and vomiting, and the potential need for a stoma. Such stimuli almost certainly generate an actual or anticipated disgust response in a portion of patients, caregivers, nursing staff, and other health professionals. As is evidenced below, although the literature remains in its infancy, disgust responses appear likely to promote behavioral avoidance, a dynamic that has significant implications in terms of both physical and psychological outcomes.

## ■ Methods

In providing a rationale for the study of disgust in CRC, we conducted a systematic review of studies reporting on disgust and cancer. Because of the lack of relevant literature, we broadened our search beyond CRC to all cancers. In developing this review, we conducted a computer-based search using MEDLINE, Web of Science, SCOPUS, ProQuest Dissertations and Theses databases and limited the searches to the English language. We began our search by combining (a) cancer-related key words (eg, "cancer," "carcinoma," "tumor," "malignant," "malignancy," "chemotherapy") and (b) words pertaining to or synonymous with disgust (eg, "disgust," "disgusting," "unpleasant," "revolting"). Given the small number of studies located, additional works were sourced by reviewing citation lists in identified articles and/or by contacting the lead authors. Review articles and those that did not relate to cancer screening or treatment were excluded.

## ■ Results

Our review identified 8 studies meeting the initial search criteria. Inspection of the abstracts together with secondary sources resulted in a further 7 studies reporting on disgust and cancer. For ease of presentation, results are split into 2 tables—studies pertaining to cancer screening (Table 1) and studies relating to cancer treatment (Table 2).

## ■ Studies Examining Disgust and Cancer Screening

Of the 9 studies relating to disgust and cancer screening, most posited a similar theme—that anticipated disgust was a key barrier to participation in CRC screening tests including fecal occult blood testing (FOBT), which requires individuals to collect a sample of their own feces, place in a sealed container, and then deliver to a health agency for analysis. One study contrasted participants and nonparticipants of an FOBT screening program and found that "disgust at the idea of handling stools" was a commonly cited reason for nonparticipation; some participants disliked the idea of things "rectal" or "fecal," others refused because "it's just not nice," and others rejected the test because it was "pretty disgusting."<sup>36</sup> Other focus group studies similarly suggest that FOBT collection processes are seen as "disgusting" or "messy,"<sup>38,42</sup> although there are exceptions.<sup>41</sup> One study examining disgust and breast screening found that reluctance for breast self-examination was greater when participants were reminded of the physical nature of their bodies.<sup>39</sup>

Quantitative studies offered a similar theme. One study utilized a questionnaire based on health beliefs and focus group responses from nonparticipants of FOBT screening and found that 24.7% of people who had not taken part in a

**Table 1 • Summary of Studies Reporting on Disgust and Cancer Screening Behaviors**

Article	Sample/Research Method	Primary Finding(s) on Disgust
1 Brouse et al <sup>35</sup>	Randomized controlled trial testing CRC screening telephone intervention with 226 people who had not recently received CRC screening	5% of the sample cited “beliefs” including perceptions that tests were “repugnant” or “gross” as a barrier to participation
2 Chapple et al <sup>36</sup>	Qualitative, semistructured individual interviews with 44 invitees to a CRC screening program	Disgust at the idea of handling stools cited as reason for reluctance to take part in screening test
3 Deutekom et al <sup>37</sup>	Cross-sectional design investigated 20 623 people invited to the first Dutch CRC screening trial; compared CRC screening tests g-FOBT and i-FOBT	Significantly more participants ( $P < .01$ ) reported g-FOBT was more shameful and disgusting to use than i-FOBT
4 Friedemann-Sanchez et al <sup>38</sup>	Qualitative, focus-group interviews with 27 women and 43 men assessed preferences and barriers to current CRC screening	Both female and male participants expressed similar attitudes toward FOBT screening, including the collection process being disgusting
5 Goldenberg et al <sup>39</sup>	Three experimental studies with 93 female students investigated reluctance for breast self-examinations	Participants reported lower intentions and conducted shorter examinations on a breast model when “creatureliness” was primed
6 Hillyer <sup>40</sup> (dissertation)	Prospective cohort design with 197 Hispanic participants who were not up to date with CRC screening	90% complete CRC screening using FIT at home; screeners had lower levels of disgust compared with nonscreeners
7 O’Sullivan and Orbell <sup>41</sup>	Qualitative, focus groups with 36 participants aged 35–75 y explored beliefs that might have impact on CRC screening	Minority of participants found the idea of FOBT disgusting
8 Weitzman et al <sup>42</sup>	Qualitative, focus groups with 39 adult men and women aged 50–65+ y explored CRC screening	Some respondents reported the screening procedure was too “messy” and was a barrier to completing the test
9 Worthley et al <sup>43</sup>	Cross-sectional design investigated 481 nonparticipants from a CRC screening program	24.7% reported that the test was “too unpleasant”; the type of FOBT influenced perceived unpleasantness with “brush-based FIT” least unpleasant, and spatula-based FIT most unpleasant

Abbreviation: CRC, colorectal cancer; FIT, fecal immunochemical testing; g-FOBT, guaiac fecal occult blood test; i-FOBT, immunological fecal occult blood test.

CRC screening program suggested that the test was “too unpleasant.”<sup>43</sup> Another prospective study of 197 Hispanics found that those who engaged in CRC screening had lower disgust than those who did not participate as measured by a scale of perceived barriers to CRC screening, which included 5 disgust-specific items.<sup>40</sup> Similarly, a randomized controlled trial examining whether a tailored telephone intervention would increase CRC screening found that 5% of people cited “beliefs” when asked open-ended questions about barriers to screening; beliefs included comments such as the tests “were gross” and “repugnant.”<sup>35</sup>

Taken together, 2 final studies provide some evidence that the specific stimuli encountered during screenings may be germane. A Dutch CRC screening trial of 20 623 participants found that those who received the guaiac FOBT were more likely to respond yes to “I found the test shameful” and “I found the test disgusting” and were less likely to take part in screening than those who received the immunological FOBT.<sup>37</sup> These 2 tests primarily differ in terms of collection manner, with the guaiac FOBT requiring more handling of feces and potentially more opportunity for fecal contact. Similarly, Worthley et al<sup>43</sup>

found that the “degree of involvement” in the screening test made a difference to how unpleasant the process was rated, but noted that half of nonparticipants decided not to participate before they had considered collection methods.

## ■ Studies Examining Disgust and Cancer Treatment

Unlike studies investigating disgust and screening, the 6 studies relating to cancer treatment had no obvious themes (Table 2). Earliest was a retrospective analysis of Nigerian case notes of CRC patients between the years of 1971 and 1990.<sup>44</sup> Most patients presented late with bowel symptoms, and 13% declined surgery to remove rectal tumors because of the required permanent colostomy; findings were taken as evidence that patients found the idea of colostomy “repugnant.” In contrast, another study identified disgust as a possible early indicator of pancreatic cancer, with a small proportion of patients reporting sudden-onset disgust for coffee, smoking, and/or wine.<sup>48</sup>

 **Table 2 • Summary of Studies Reporting on Disgust and Cancer Treatment**

Article	Sample	Primary Finding(s) on Disgust
1 Akute <sup>44</sup>	Retrospective analysis of 141 case notes of Nigerian patients with adenocarcinoma of the large bowel	Patients presented late and some found the idea of colostomy “sufficiently repugnant” to refuse surgery
2 Carey and Harris <sup>45</sup>	Cross-sectional design with 197 cancer patients receiving chemotherapy at outpatient clinics	36 participants (18.9%) reported strong feelings of fear, disgust, or discomfort toward the sight of blood, receiving injections, or both; of these people, 19.4% said they first noticed concerns while receiving chemotherapy
3 Hardy <sup>46</sup>	Qualitative interviews with 27 stakeholders in anal health issues including healthcare professionals, counselors, and patients	Anal taboo and stigma influence every aspect of anal healthcare delivery; both medical practitioners and patients are affected by shame, disgust, fear, and anguish
4 Harris et al <sup>47</sup>	Cross-sectional design with 124 outpatients receiving first-time chemotherapy	Those with high BII concern reported elevated disgust sensitivity compared with groups with low BII concerns; few people attributed their BII concerns to chemotherapy
5 Gullo et al <sup>48</sup>	Case-control design comparing 305 pancreatic cancer patients with 305 controls who had acute nonmalignant disorders	Of pancreatic cancer patients who had disturbances >6 mo before diagnosis, 3.6% had sudden onset of disgust for coffee and/or smoking and/or wine
6 Rosman <sup>49</sup>	Qualitative interviews with 35 lung and breast cancer patients; 80% had gone through chemotherapy, and the majority of these had lost their hair	Losing hair can elicit sense of disgust due to the physical evidence of consequences of their illness, which provides direct confrontation with the seriousness of cancer

Abbreviation: BII, blood-injection-injury.

Three studies examined potential elicitors of disgust and cancer treatment including hair loss<sup>49</sup> and investigation of blood-injection-injury (BII) concerns.<sup>45,47</sup> In-depth qualitative interviews with lung and breast cancer patients found that “losing hair” through chemotherapy had the potential to elicit disgust because the treatment provided a physical reminder of the nature and consequences of being a cancer patient.<sup>49</sup> In another work, Carey and Harris<sup>45</sup> confirmed a link between disgust using a 16-item version of the Disgust Scale<sup>50</sup> and BII in the cancer context and found that a “large minority” of chemotherapy patients (18.9%) experienced “strong feelings of fear, disgust, or discomfort” toward the sight of blood, receiving injections, or both. However, the link between elevated BII concern and disgust was attributed by the majority (52.8%) as a response to prior experiences rather than receiving chemotherapy per se. This finding is consistent with later research also identifying a relationship between BII and disgust (as measured by the Disgust Scale) in cancer patients.<sup>47</sup> A final qualitative investigation conducted comparative analysis of interviews with anal healthcare workers and patients, finding that anal taboos and stigma permeated every aspect of anal healthcare delivery, with participants reporting shame, embarrassment, disgust, and fear.<sup>46</sup>

texts, empirical demonstrations of such a relationship are comparatively scant. Despite a lack of development, however, 2 broad findings emerged. First, disgust or disgust sensitivities appear likely to be promoting an aversion to (and avoidance of) CRC screening. Second, evidence suggests that several of the known elicitors of disgust are widely apparent in CRC contexts. In the following sections, we revisit these considerations in greater detail, structuring our discussion around key time points in the CRC trajectory; CRC screening, CRC decision making and treatment, and CRC posttreatment adaptation.

## Disgust and Avoidance in CRC Screening

Although studies remain methodologically primitive (below), our review suggests that anticipated disgust contributes to the avoidance of CRC screening. Several considerations should, however, constrain our confidence at this point. First, it is worth noting that our understanding of the specific elicitors of disgust remains underdeveloped, with these early studies generally assessing impressions of screening as nasty, repulsive, or disgusting; standardized disgust and/or disgust sensitivity instrumentation is urgently needed in this context. Studies of emotion are increasingly demonstrating that specific stimuli are being avoided in screening contexts<sup>13,51</sup>; however, further research identifying the most salient disgust elicitors of distinct CRC screening methods is needed. In CRC screening, disgust generated by the idea of either fecal collection or regarding something being inserted into the anus may have distinct behavioral and psychological implications relative to disgust at the idea of a tumor growing inside the body. The former appears likely to generate behavioral avoidance, whereas the latter may

## ■ Discussion and Clinical Implications

Preliminary indications from this systematic review of disgust and CRC confirmed our impression that despite an intuitive link between disgust and avoidance dynamics in CRC con-

well activate participation in screening. Research that identifies the specific elicitors of disgust has potential to inform communication and processes of CRC screening and potentially improve screening rates. Further to this goal is the need to develop tools specifically designed to measure disgust in CRC contexts. General measures of disgust propensity and sensitivity have been developed<sup>50,52,53</sup>; however, to our knowledge, apart from a recently developed CRC screening embarrassment measure,<sup>13</sup> which assesses embarrassment regarding feces and the rectum as barriers to screening, there are no specific tools that measure disgust in the CRC screening context.

Second, whereas the majority of the studies reviewed here were qualitative and reference the “idea” of screenings being disgusting,<sup>36,41,42</sup> quantitative and/or prospective data are few. Third, it is currently unclear whether it is dispositional disgust sensitivity, experienced or state disgust, or anticipated disgust that is most relevant at this juncture. Research investigating other emotions shows that anticipated emotion is often much worse than predicted,<sup>33</sup> suggesting that nurse-led discussions of anticipated disgust may reassure potential screeners that experiences are often better than expected. Similarly, some cultural/ethnic groups have relatively low CRC screening rates,<sup>54</sup> and it may be that differential sensitivity to disgust or culturally mediated sensitivities to disgust’s elicitors are playing a role. Research that identifies how communications and screening messages might be targeted to address anticipated disgust has potential to increase screening among these at-risk groups.

## Disgust and Avoidance in CRC Treatment Decision Making

Although the majority of studies identified in this review focused on CRC screening, the cancer trajectory extends well beyond the decision to screen. Treatment delay and late presentation have significant implications for CRC prognosis, and disgust-generated avoidance appears likely to play a role in such delays. Despite noting this, our review identified no studies specifically addressing the possible impact of disgust on CRC decision-making processes. Clearly, blood sampling procedures can elicit disgust,<sup>45,47</sup> and many CRC surgical treatments also require potentially disgust-generating invasions of the body envelope. Surgical access via the vagina, abdominal wall, or anus, which may involve the removal of tissue or entire organs, is likely to induce disgust and may sufficiently deter some people such that surgery is delayed, or even rejected, as a treatment option altogether. Again, we suggest that disgust is likely to form a core part of the affective substrate for these forms of avoidance and aversion.

Similarly, the adverse effect profiles that many treatments potentially create may also induce anticipated disgust in the CRC patient. One well-known downside to informed consent processes is that patients can develop a distorted picture of the likelihood of possible adverse effects. Upward of 15% of patients in other types of cancer fail to initiate chemotherapy,<sup>55</sup> suggesting that there are clear barriers to certain types of treatment. Treatments for CRC can engender possible adverse effects including, but not limited to, vomiting, nausea, diarrhea, skin

rashes, and gastrointestinal distress.<sup>56</sup> To the extent that patients (*a*) are aware of these adverse effects and (*b*) anticipate being disgusted by them, we might expect anticipated disgust and/or a disgust sensitivity to predict delays in decision making and/or the uptake of recommended CRC treatment regimens. Both behavioral avoidance (eg, nonadherence, delay) and cognitive avoidance (eg, trying not to think about it) may play a role and potentially promote the search for alternative and perhaps clinically less efficacious options.

Provocatively, given the impact of many treatments on immune processes, disgust responses may become more common when immune functioning is impaired<sup>57</sup>—a protective mechanism in immunocompromised groups.<sup>24</sup> Lowered immune function is well established in patients going through chemotherapy treatment and can lead to serious complications.<sup>58</sup> Patients are routinely informed of their elevated risk of illness and infection and given guidelines on limiting exposure to pathogens.<sup>59</sup> Such findings suggest that disgust sensitivity and/or anticipated disgust may increase among CRC patients being treated with immune-compromising agents. In this context, disgust-generated avoidance is potentially helpful if it promotes avoidance of potential contaminants or infectious agents. However, if disgust leads to restrictive dietary sensitivities or avoidance of the treatment itself, then it may ultimately lead to poorer outcomes. Clearly, such issues require further investigation.

Finally, many cancer treatments require that an individual engage repeatedly and/or over time in certain processes or behaviors. Given the issues with long-term treatment adherence noted above, the repeated nature of peoples’ experiences with treatment effects and adverse effects suggests that examinations of how people adapt or habituate to disgust-eliciting stimuli over time will be important. That such habituation occurs is evident anecdotally as well as in consideration of the fact that people are not normally troubled by the act of cleaning themselves after defecation, despite the necessary proximity to fecal matter. The rapidity with which people adapt to disgust-inducing stimuli may vary as a function of dispositional sensitivities<sup>60</sup>; thus, it may be clinically useful to target persons who have high disgust sensitivity with acknowledgement of the likelihood of disgust as a potential response to CRC treatment, but then to also reassure that generally people learn to live with, and adjust to, exposure to bodily function. Other than obsessive-compulsive and phobic clinical samples (see below), little is known about whether or how disgust sensitivities may habituate as a function of exposure to eliciting stimuli, and further work is needed.

## Disgust and Avoidance in Posttreatment Adaptation

Beyond treatment, CRC can require considerable posttreatment adaptation to permanent changes to bodily function and other longer-term adverse effects. Although there is little evidence thus far, such processes also appear likely to be influenced by disgust. Enduring food aversions occur in up to 80% of cancer patients following treatment,<sup>61</sup> and disgust may be an important factor in the development and maintenance of

dietary restrictions. Animal work, in particular, suggests that conditioned food aversions endure well after the initial, conditioned disgust response has been extinguished.<sup>62</sup> Future research is required to evaluate whether the food avoidance evident among CRC patients is similarly related to disgust and whether interventions designed to decouple disgust responses from specific foods will be of benefit.

Posttreatment adaptation to CRC will also often include a temporary or permanent stoma. Although physical functioning is generally unimpaired following stoma surgery, unpleasant noises, odors, and gas may occur, and stoma bags occasionally leak. Day-to-day management of stomas necessitates ongoing contact with fecal matter and is likely to elicit degrees of disgust in both patients and others. Patients with CRC often consider dealing with permanent stomas "their greatest challenge."<sup>63</sup> One recent study has shown that general disgust predicted poorer adjustment to colostomy, and colostomy-specific disgust predicted poorer adjustment to surgery.<sup>60</sup> To date, however, there have been no studies of longer-term adjustment to disgust-eliciting stimuli in CRC. Although it is possible that habituation to fecal exposure occurs over time (with avoidant behavior and adjustment issues naturally resolving), this may not be the case for all patients.

To this point, we have focused on disgust in the cancer patient. However, patients are diagnosed and treated and return to life in social contexts, creating the possibility that the real (or perceived) disgust responses of intimate partners, caregivers, nursing staff, other health professionals, and broader support networks may be important. Disgust responses play a key role in the stigmatization (and avoidance) of "out-group" persons, particularly among those with a detectable disease or disability,<sup>28,64</sup> and another work suggests that both patients and health professionals alike are affected by the stigma of anal disgust.<sup>46</sup> It may be that, in these broader networks, the (imagined) threat of contagion creates disgust-generated stigmatization of patients, particularly when overt disease cues (eg, odors, hair loss, disfigurement, wounds) are exhibited. Within closer relationships, these same disease cues may trigger a disgust response in both patients and their loved ones, potentially impacting on the quality of intimacy and relationship connections.

Colostomy patients report high stigmatization, feelings that promote greater utilization of medical services, poorer health, more emotional difficulty, and social withdrawal,<sup>65</sup> and those patients with higher disgust sensitivity report greater stigmatization, assuming others will also be disgusted by their colostomy.<sup>60</sup> In terms of posttreatment adaptation then, the anticipation of disgust-driven stigmatization may promote social avoidance because patients anticipate disgust reactions and stigmatization from others. The quality-of-life implications of social isolation, withdrawal from existing relationships, and a reluctance to form new bonds are enormous for both CRC patients and those around them.

The clinical implications of disgust in the CRC context are extensive, with preliminary evidence suggesting that disgust may promote avoidance behaviors across the spectrum of the CRC trajectory. Evidence in other populations suggests that

disgust promotes avoidance in nonclinical samples<sup>66</sup> and has been shown to feature anxiety disorders,<sup>21,67</sup> depression,<sup>68</sup> and sexual dysfunction<sup>69</sup>; however, the role that disgust takes in shaping maladaptive outcomes in physical health outcomes is yet to be determined. Early identification of those at risk of struggling with disgust in CRC contexts has the potential to lessen the negative impact of diagnosis and treatment through the informed channeling of individuals to appropriate interventions. Specific recommendations on the form that these interventions might take are difficult at this stage, given the very limited research in the area. However, therapeutic work conducted with other populations suggests that 2 classes of approach might be appropriate: exposure-based therapy and mindfulness training. Exposure therapy using gradual or abrupt exposure to problematic stimuli has good empirical support in the treatment of anxiety disorders<sup>70</sup> and has been used specifically where disgust is a factor in sexual problems.<sup>69</sup> Such an approach may well translate to the habituation and desensitization of stimuli perceived as disgusting in CRC contexts. Therapeutic work utilizing a mindfulness approach also shows promise, with its inherent focus on present-moment acceptance that is fundamentally in contrast to avoidance. Training in mindfulness aims to counter avoidant mental and behavioral processes by encouraging the acceptance of a wide range of experiences including bodily sensations, thoughts, and emotions without trying to avoid or suppress them, even when they are unpleasant.<sup>71</sup> A mindfulness approach may be suited to CRC treatment and adaptation contexts when acceptance of current physical status and disgust-eliciting stimuli is more feasible than change.

## ■ Summary

Our systematic review of research examining disgust and cancer has confirmed that research investigating disgust and avoidance in cancer contexts remains in its infancy, with few data suited to the provision of guidance for nursing staff and other health professionals working in this context. Above, we have suggested that disgust may represent one of the primary emotional substrates of avoidance behaviors among both CRC patients and those around them. Delay and nonadherence have significant implications in the CRC context; understanding the mechanisms that might be driving avoidance has potential to inform potential interventions, with oncology nurses uniquely positioned to guide and facilitate these interventions. However, there is still much we do not know. Of the available studies, designs are almost exclusively cross-sectional, small-scale, and convenience based. Instrumentation has typically been weak in early work, and more robust measurement is also called for. These limits noted, preliminary data indicate that the careful study of disgust may extend our understanding of avoidance in the CRC trajectory. However, future research is required that both investigates the specific mechanisms driving disgust-generated avoidance in CRC screening and treatment and develops tools specifically designed to identify triggers of disgust and barriers to appropriate behaviors in CRC contexts.

Research and development in these areas will enable guidance into communication, medical practice, and clinical interventions in the CRC context.

## References

1. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. GLOBOCAN 2008 v1.2, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 10 2010. <http://globocan.iarc.fr>. Accessed December 20, 2011.
2. Dollinger M, Rosenbaum EH, Tempero M, Mulvihull SJ. *Everyone's Guide to Cancer Therapy: How Cancer is Diagnosed, Treated and Managed Day to Day*. 4th ed. Kansas City, KS: Andrew McMeel Publishing; 2002.
3. Zabalegui A. Coping strategies and psychological distress in patients with advanced cancer. *Oncol Nurs Forum*. 1999;26(9):1511–1518.
4. Khankari K, Eder M, Osborn CY, et al. Improving colorectal cancer screening among the medically underserved: a pilot study within a federally qualified health center. *J Gen Intern Med*. 2007;22(10):1410–1414.
5. Ristvedt SL, Trinkaus KM. Psychological factors related to delay in consultation for cancer symptoms. *Psychooncology*. 2005;14(5):339–350.
6. Manne S, Badr H, Zaider T, Nelson C, Kissane D. Cancer-related communication, relationship intimacy, and psychological distress among couples coping with localized prostate cancer. *J Cancer Surviv*. 2010;4(1):74–85.
7. Ferrante JM, Chen P-H, Kim S. The effect of patient navigation on time to diagnosis, anxiety, and satisfaction in urban minority women with abnormal mammograms: a randomized controlled trial. *J Urban Health*. 2008;85(1):114–124.
8. Hohneker J, Shah-Mehta S, Brandt PS. Perspectives on adherence and persistence with oral medications for cancer treatment. *J Oncol Pract*. 2011;7(1):65–67.
9. Kronborg O, Fenger C, Olsen J, Jorgensen OD, Sondergaard O. Randomised study of screening for colorectal cancer with faecal-occult-blood test. *Lancet*. 1996;348(9040):1467–1471.
10. Richards MA, Smith P, Ramirez AJ, Fentiman IS, Rubens RD. The influence on survival of delay in the presentation and treatment of symptomatic breast cancer. *Br J Cancer*. 1999;79(5/6):858–864.
11. Lohrisch C, Paltiel C, Gelmon K, et al. Impact on survival of time from definitive surgery to initiation of adjuvant chemotherapy for early-stage breast cancer. *J Clin Oncol*. 2006;24(30):4888–4894.
12. Kondry HJ, Edmondson CL, Hill J, Eden TOB. Treatment non-adherence in teenage and young adult patients with cancer. *Lancet Oncol*. 2011;12(1):100–108.
13. Consedine NS, Ladwig I, Reddig MK, Broadbent EA. The many faeces of colorectal cancer screening embarrassment: preliminary psychometric development and links to screening outcome. *Br J Health Psychol*. 2011;16(3):559–579.
14. Consedine NS, Magai C, Krivoshekova YS, Ryzewicz L, Neugut AI. Fear, anxiety, worry, and breast cancer screening behavior: a critical review. *Cancer Epidemiol Biomarkers Prev*. 2004;13(4):501–510.
15. Consedine NS, Moscowitz JT. The role of discrete emotions in health outcomes: a critical review. *Appl Prev Psychol*. 2007;12(2):59–75.
16. Curtis V, Auger R, Rabie T. Evidence that disgust evolved to protect from risk of disease. *Proc R Soc Lond B Biol Sci*. 2004;271(suppl 4):S131–S133.
17. Davey GCL, Bond N. Using controlled comparisons in disgust psychopathology research: the case of disgust, hypochondriasis and health anxiety. *J Behav Ther Exp Psychiatry*. 2006;37(1):4–15.
18. Angyal A. Disgust and related aversions. *J Abnorm Soc Psychol*. 1941; 36(3):393–412.
19. Elfenbein HA, Ambady N. On the universality and cultural specificity of emotion recognition: a meta-analysis. *Psychol Bull*. 2002;128(2):203–235.
20. Rozin P, Haidt J, McCauley CR. Disgust. In: Lewis M, Haviland-Jones J, eds. *Handbook of Emotions*. 2nd ed. New York: Guilford; 2000:637–653.
21. Berle D, Phillips ES. Disgust and obsessive-compulsive disorder: an update. *Psychiatry*. 2006;69(3):228–238.
22. Olatunji BO, Sawchuk CN. Disgust: characteristic features, social manifestations, and clinical implications. *J Soc Clin Psychol*. 2005;24(7):932–962.
23. Nemerooff CB, Rozin P. The contagion concept in adult thinking in the United States: transmission of germs and of interpersonal influence. *Ethos*. 1994;22(2):158–186.
24. Neuberg SL, Kenrick DT, Schaller M. Human threat management systems: self-protection and disease avoidance. *Neurosci Biobehav Rev*. 2011;35(4):1042–1051.
25. Curtis V, de Barra M, Auger R. Disgust as an adaptive system for disease avoidance behaviour. *Philos Trans R Soc B*. 2011;366(1563):389–401.
26. Raman L, Gelman SA. Do children endorse psychosocial factors in the transmission of illness and disgust? *Dev Psychol*. 2008;44(3):801–813.
27. Navarrete CD, Fessler DMT. Disease avoidance and ethnocentrism: the effects of disease vulnerability and disgust sensitivity on intergroup attitudes. *Evol Hum Behav*. 2006;27(4):270–282.
28. Park JH, Faulkner J, Schaller M. Evolved disease-avoidance processes and contemporary anti-social behavior: prejudicial attitudes and avoidance of people with physical disabilities. *J Nonverbal Behav*. 2003;27(2):65.
29. Schnall S, Haidt J, Clore GL, Jordan AH. Disgust as embodied moral judgment. *Pers Soc Psychol B*. 2008;34(8):1096.
30. Inbar Y, Pizarro DA, Knobe J, Bloom P. Disgust sensitivity predicts intuitive disapproval of gays. *Emotion*. 2009;9(3):435–439.
31. Rozin P, Haidt J, McCauley CR, Dunlop L, Ashmore M. Individual differences in disgust sensitivity: comparisons and evaluations of paper-and-pencil versus behavioral measures. *J Res Pers*. 1999;33(3):330–351.
32. Sussner KM, Thompson HS, Jandorf L, et al. The influence of acculturation and breast cancer-specific distress on perceived barriers to genetic testing for breast cancer among women of African descent. *Psychooncology*. 2009;18(9):945–955.
33. Chapman GB, Coups EJ. Emotions and preventive behavior: worry, regret, and influenza vaccination. *Health Psychol*. 2006;25(1):82–90.
34. Von Wagner C, Knight K, Halligan S, et al. Patient experiences of colonoscopy, barium enema and CT colonography: a qualitative study. *Br J Radiol*. 2009;82(973):13–19.
35. Brouse CH, Basch CE, Wolf RL, Shmukler C. Barriers to colorectal cancer screening: an educational diagnosis. *J Cancer Educ*. 2004;19(3):170–173.
36. Chapple A, Ziebland S, Hewitson P, McPherson A. What affects the uptake of screening for bowel cancer using a faecal occult blood test (FOBT): a qualitative study. *Soc Sci Med*. 2008;66(12):2425–2435.
37. Deutekom M, Van Rossum LGM, Van Rijn AF, et al. Comparison of guaiac and immunological fecal occult blood tests in colorectal cancer screening: the patient perspective. *Scand J Gastroenterol*. 2010;45(11):1345–1349.
38. Friedemann-Sanchez G, Griffin JM, Partin MR. Gender differences in colorectal cancer screening barriers and information needs. *Health Expect*. 2007;10(2):148–160.
39. Goldenberg JL, Arndt J, Hart J, Routledge C. Uncovering an existential barrier to breast self-exam behavior. *J Exp Soc Psychol*. 2008;44(2):260–274.
40. Hillyer GC. *Factors Related to Colorectal Cancer Screening With the Fecal Immunochemical Test among Uninsured Hispanic Women in Upper Manhattan* [dissertation]. New York: Teachers College, Columbia University; 2011.
41. O'Sullivan I, Orbell S. Self-sampling in screening to reduce mortality from colorectal cancer: a qualitative exploration of the decision to complete a faecal occult blood test (FOBT). *J Med Screen*. 2004;11(1):16–22.
42. Weitzman ER, Zapka J, Estabrook B, Goins KV. Risk and reluctance: understanding impediments to colorectal cancer screening. *Prev Med*. 2001;32(6):502–513.
43. Worthley DL, Cole SR, Esterman A, et al. Screening for colorectal cancer by faecal occult blood test: why people choose to refuse. *Intern Med J*. 2006;36(9):607–610.
44. Akute OO. Colorectal carcinoma in Ibadan, Nigeria: a 20-year survey—1971 to 1990. *Hepatogastroenterology*. 2000;47(33):709–713.

45. Carey CL, Harris LM. The origins of blood-injection fear/phobia in cancer patients undergoing intravenous chemotherapy. *Behav Change*. 2005;22(4):212–219.
46. Hardy D. *When We Dare Not Speak Its Name: Anal Taboo, Anal Health, and Affect Theory* [dissertation]. Pennsylvania, PA: Widener University; 2010.
47. Harris LM, Jones MK, Carey CL. Characteristics of blood-injection-injury fears in people receiving intravenous chemotherapy. *Curr Psychol*. 2009;28(2):124–132.
48. Gullo L, Tomasetti P, Migliori M, Casadei R, Marrano D. Do early symptoms of pancreatic cancer exist that can allow an earlier diagnosis? *Pancreas*. 2001;22(2):210–213.
49. Rosman S. Cancer and stigma: experience of patients with chemotherapy-induced alopecia. *Patient Educ Couns*. 2004;52(3):333–339.
50. Haidt J, McCauley C, Rozin P. Individual differences in sensitivity to disgust: a scale sampling seven domains of disgust elicitors. *Pers Indiv Differ*. 1994;16:701–713.
51. Consedine NS, Adjei BA, Ramirez PM, McKiernan J. An object lesson: differences in source determine the relations that trait anxiety, prostate cancer worry, and fear of screening hold with prostate screening frequency. *Cancer Epidemiol Biomarkers*. 2008;17(7):1631–1639.
52. van Overveld M, de Jong PJ, Peters ML, Schouten E. The Disgust Scale-R: a valid and reliable index to investigate separate disgust domains? *Pers Indiv Differ*. 2011;51(3):325–330.
53. Olatunji BO, Williams NL, Tolin DF, et al. The Disgust Scale: item analysis, factor structure, and suggestions for refinement. *Psychol Assess*. 2007;19(3):281–297.
54. O’Malley AS, Kerner J, Johnson AE, Mandelblatt JS. Acculturation and breast cancer screening among Hispanic women in New York city. *Am J Public Health*. 1999;89(2):219–227.
55. Lyman GH, Dale DC, Crawford J. Incidence and predictors of low dose-intensity in adjuvant breast cancer chemotherapy: a nationwide study of community practices. *J Clin Oncol*. 2003;21(24):4524–4531.
56. Tsunoda A, Yasuda N, Nakao K, et al. Health-related quality of life in patients with advanced colorectal cancer: results from a phase II study of S-1 combined with irinotecan (CPT-11). *Int J Clin Oncol*. 2010;15(3):280–286.
57. Fessler DMT, Eng SJ, Navarrete CD. Elevated disgust sensitivity in the first trimester of pregnancy: evidence supporting prophylaxis the compensatory hypothesis. *Evol Hum Behav*. 2005;26(4):344–351.
58. Biron P, Fuhrmann C, Escande MC, et al. Standards, options and recommendations (SOR) for the management of neutropenic cancer patients (excluding prolonged neutropenia). *Bull Cancer (Paris)*. 1998;85(8):695–711.
59. Rubenstein EB, Rolston K. Outpatient management of febrile episodes in neutropenic cancer-patients. *Support Care Cancer*. 1994;2(6):369–373.
60. Smith DM, Loewenstein G, Rozin P, Sherriff RL, Ubel PA. Sensitivity to disgust, stigma, and adjustment to life with a colostomy. *J Res Pers*. 2007;41(4):787–803.
61. Holmes S. Food avoidance in patients undergoing cancer chemotherapy. *Support Care Cancer*. 1993;1(6):326–330.
62. Cantora R, López M, Aguado L, Rana S, Parker LA. Extinction of a saccharin-lithium association: assessment by consumption and taste reactivity. *Learn Behav*. 2006;34(1):37–43.
63. McMullen CK, Hornbrook MC, Grant M, et al. The greatest challenges reported by long-term colorectal cancer survivors with stomas. *J Support Oncol*. 2008;6(4):175–182.
64. Faulkner J, Schaller M, Park JH, Duncan LA. Evolved disease-avoidance mechanisms and contemporary xenophobic attitudes. *Group Proc Intergroup Relat*. 2004;7(4):333–353.
65. MacDonald LD, Anderson HR. Stigma in patients with rectal cancer: a community study. *J Epidemiol Community Health*. 1984;38(4):284.
66. Olatunji BO, Haidt J, McKay D, David B. Core, animal reminder, and contamination disgust: three kinds of disgust with distinct personality, behavioral, physiological, and clinical correlates. *J Res Pers*. 2008;42(5):1243–1259.
67. Sawchuk CN, Lohr JM, Westendorf DH, Meunier SA, Tolin DF. Emotional responding to fearful and disgusting stimuli in specific phobias. *Behav Res Ther*. 2002;40(9):1031–1046.
68. Overton PG, Markland FE, Taggart HS, Bagshaw GL, Simpson J. Self-disgust mediates the relationship between dysfunctional cognitions and depressive symptomatology. *Emotion*. 2008;8(3):379–385.
69. de Jong PJ, van Lankveld J, Elgersma HJ, Borg C. Disgust and sexual problems—theoretical conceptualization and case illustrations. *Int J Cogn Ther*. 2010;3(1):23–39.
70. Franklin ME, Fox EB. Treatment of obsessive compulsive disorder. *Annu Rev Clin Psycho*. 2011;7:229–243.
71. Baer RA, Walsh E, Lykins ELB. Assessment of mindfulness. In: Didonna F, ed. *Clinical Handbook of Mindfulness*. New York: Springer; 2009:153–168.