

**UCSF**

**UC San Francisco Previously Published Works**

**Title**

Emotion, health decision making, and health behaviour

**Permalink**

<https://escholarship.org/uc/item/9jz55553>

**Journal**

Psychology & Health, 33(1)

**ISSN**

0887-0446

**Authors**

Ferrer, Rebecca A

Mendes, Wendy Berry

**Publication Date**

2018-01-02

**DOI**

10.1080/08870446.2017.1385787

Peer reviewed



## Emotion, health decision making, and health behaviour

Rebecca A. Ferrer & Wendy Berry Mendes

To cite this article: Rebecca A. Ferrer & Wendy Berry Mendes (2018) Emotion, health decision making, and health behaviour, *Psychology & Health*, 33:1, 1-16, DOI: [10.1080/08870446.2017.1385787](https://doi.org/10.1080/08870446.2017.1385787)

To link to this article: <https://doi.org/10.1080/08870446.2017.1385787>



Published online: 20 Dec 2017.



Submit your article to this journal [↗](#)



Article views: 199



View related articles [↗](#)



View Crossmark data [↗](#)

## EDITORIAL

### Emotion, health decision making, and health behaviour

Rebecca A. Ferrer<sup>a\*</sup> and Wendy Berry Mendes<sup>b</sup>

<sup>a</sup>*Basic Biobehavioral and Psychological Sciences Branch, National Cancer Institute, Bethesda, USA;* <sup>b</sup>*UCSF School of Medicine, University of California, San Francisco, CA, USA*

(Received 3 July 2017; accepted 20 September 2017)

Efforts aimed at understanding and changing health decisions and behaviour have relied on theoretical frameworks or models comprised of social-cognitive determinants, such as knowledge, risk perception, attitudes, social norms, and self-efficacy (Conner & Norman, 1996, 2017; Noar & Zimmerman, 2005). These frameworks, and the interventions based upon them, largely do not take affective states into account. However, converging evidence suggests that emotion, stress, motivation and other affective states are essential to decision making and behaviour (e.g. Damasio, 1994; Lerner & Keltner, 2000, 2001; Loewenstein & Lerner, 2003).

Moreover, health decisions and behaviour often take place in emotionally-laden contexts. For example, decisions about cancer treatment involve managing fears of cancer, treatment side effects, and the burden and fears of close others who must manage the emotional consequences of the diagnosis (Ellis & Ferrer, 2017; Ferrer, Green, & Barrett, 2015). Decisions about sexual risk and prevention take place in the context of arousal and lust (Ariely & Loewenstein, 2006; George et al., 2009). Health-promoting behaviour, like healthy eating and exercise, are compromised when stress is high, uncontrollable, and chronic, or when emotion regulation is poor (e.g. Ferrer, Green, Oh, Hennessy, & Dwyer, 2017; Schnohr, Kristensen, Prescott, & Scharling, 2005; Tomiyama, Dallman, & Epel, 2011). Thus, the relative dearth of research focused on how affective states contribute to and influence health decision making and behaviour is an important gap in the literature. It is critical to cultivate research to fill this gap to inform effective intervention development and implementation efforts.

To date, the affective state most likely to be examined in a health context is stress. Stress research largely focuses on associations among stressors (i.e. social or environmental demands for which an individuals' coping resources are absent or exceeded) and biobehavioural responses to stressors, including health biomarkers and outcomes. Responses include, but are broader than, negative affect and behaviour, also encompassing cognitive responses, physical symptoms, and physiological changes (e.g. Kemeny, 2009; Lazarus & Folkman, 1984). Stress research often links to biological health outcomes, although some research examines stress as a predictor of decision making (e.g. Jamieson, Koslov, Nock, & Mendes, 2013; Kassam, Koslov, & Mendes, 2009; Light-hall, Mather, & Gorlick, 2009), including health behaviour (e.g. Adam & Epel, 2007).

---

\*Corresponding author. Email: [ferrerra@mail.nih.gov](mailto:ferrerra@mail.nih.gov)

Stress as a general concept, however, suffers from imprecision in definition and measurement, and often the heterogeneity of ‘stress’ prevents systematic and theoretical integration of varied research programmes (Kagan, 2016). Biological approaches to chronic and acute stress reactivity have benefited from methodological advances. However, there have been fewer advances on theoretical models that attempt to present a coherent understanding of how psychological and environmental factors contribute to (and interact with) the experience of stress and its consequences for decision making and behaviour.

Research on discrete emotions (i.e. specific states like anger, fear, sadness or happiness) and mood (e.g. general positive and negative affective states) and decision making is accumulating (Lerner, Li, Valdesolo, & Kassam, 2015). However, this research largely takes place outside a health decision making context, and focuses less on the biological mechanisms linking the psychological states to the behavioural outcomes. Emotion research is theoretically rich, with complex frameworks that build upon empirical knowledge from previous theoretically informed work. Traditionally, research on emotion and health behaviour has not fully capitalised on the theoretical perspectives offered by affective science. Instead, it targets a narrow and colloquial conceptualisation of an emotion like fear based on assumptions that this will uniformly facilitate preventive actions (Witte & Allen, 2000), drawing on more sophisticated frameworks that underscore the various outcome tendencies that can manifest from what seems to be a specific emotion category (e.g. Barrett, 2013, 2014). Such research has demonstrated that translating affective science to health research is not straightforward, and can result in unintended negative effects on health judgements and decisions. Thus, more recent efforts have been made to stimulate affective science and health work that capitalises on theoretical frameworks and rigorous methodology employed elsewhere (DeSteno, Gross, & Kubzansky, 2013; Ferrer, Klein, Lerner, Reyna, & Keltner, 2016; Ferrer et al., 2015; Williams & Evans, 2014; Williams, Rhodes, & Conner, *in press*).

Both within and outside a health context, stress, and emotion often examine the same types of problems from different disciplinary lenses – indeed, a commonly held view is that stress is studied in medical schools whereas emotion is studied in psychology departments. Indeed, both stress and emotion involve cognitive appraisals of predictability and controllability, social components, and elements of physical discomfort or pleasure, and both incorporate subjective experience and physiological response (e.g. Barrett, 2014; Blascovich, Mendes, Hunter, & Salomon, 1999; Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001; Dickerson, Gruenewald, & Kemeny, 2009; Ekkekakis & Petruzzello, 1999; Lazarus, 1991; Lerner & Keltner, 2001; Mendes, Major, McCoy, & Blascovich, 2008; Smith & Ellsworth, 1985). Similarly, emotion regulation and coping with stress involve attempts to downregulate the subjective experience, physiological responses, or expressive communications of negative affect, or attempts to attenuate the influence of these on subsequent behaviour (Gross, 2015; Jamieson, Mendes, & Nock, 2013; Lazarus & Folkman, 1984; Mendes, Reis, Seery, & Blascovich, 2003).

Given conceptual overlap, there have been theoretical attempts to integrate the two fields (e.g. Feldman, Cohen, Hamrick, & Lepore, 2004; Ganzel, Morris, & Wethington, 2010; Lazarus, 1994, 1999; Lerner, Dahl, Hariri, & Taylor, 2007; Taylor, Lerner, Sage, Lehman, & Seeman, 2004), but health research has not leveraged these integrations widely. As such, research is framed, and problems are examined differently depending on the disciplinary lens through which it is viewed, resulting in different theoretical

frameworks and methodological traditions, each with decided strengths and weaknesses. Stress research has a strong emphasis on biological outcomes (e.g. Baum, Lorduy, & Jenkins, 2011; Dhabhar, 2011; Greenberg, Carr, & Summers, 2002; Hash-Converse & Kusnecov, 2011; McCaffery, 2011; McEwen, 1995), whereas emotion has less developed models of biological responding. Emotion has developed elaborate theories about how emotion is constructed and its function (Barrett, 2006; Gross & Thompson, 2007; Keltner & Gross, 1999; Panksepp, 2007). In contrast, stress research has not developed nearly as sophisticated theories regarding the psychological antecedents, experiential aspects, or varieties of stress, and has focused instead on environmental stressors and physiological responses (Cohen, Janicki-Deverts, & Miller, 2007; Miller, Chen, & Cole, 2009). Perhaps, as a result, emotion researchers have considered the temporal dynamics of emotional responding (i.e. the generation and regulation of experience and physiology) more so than have stress researchers (Gross & Barrett, 2011). Importantly, these differences reflect the focus of each field, rather than a meaningful phenomenological difference.

Because the existing bodies of research examining stress and emotion have proceeded largely in parallel, with little crosstalk, progress on affective determinants of health decision making that has a strong theoretical basis and a sophisticated biologic approach has been stifled. The goal of this special issue is to bring together these diverse disciplinary perspectives, to demonstrate how these perspectives can be unified to facilitate the development of theory-informed interventions as well as the generation of basic knowledge from applied work. Thus, papers are organised along the research continuum, from theory generation to use-inspired, encompassing basic to applied. This basic-to-applied-to-basic translational model for health research is increasing in popularity (Czajkowski et al., 2016; Glasgow, 2008; Sussman, Valente, Rohrbach, Skara, & Ann Pentz, 2006; see also: <https://obssr.od.nih.gov/about-us/strategic-plan/>).

The theoretically rich perspectives of emotion research, married with stress research's intense focus on health applications, biological factors, and measurement, can facilitate important use-inspired programmes of research. These projects can be leveraged by health researchers to develop more theory-informed interventions that can replace a more colloquial understanding of affective determinants with a theoretically and empirically informed approach. Applied intervention work, in turn, can leverage measurement and methodological rigour from stress research and theoretically informed perspectives from emotion research to develop mechanistic hypotheses. This intervention-as-experiment or mechanistic inquiry approach can be back-translated to inform basic-inspired work by emotion and stress researchers. This cycle will ensure that the basic discoveries of emotion and stress are situated within ecologically valid decision making and behavioural contexts and that interventions intended to improve health decision making and behaviour are informed by empirically supported theories designed to explain behaviour in applied settings.

The papers in this special issue are ordered to reflect the translational process. These papers are summarised in Table 1, and classified as theory, basic and applied (although note empirical papers fall along a continuum, and as such a discrete classification of basic vs. applied is a heuristic categorisation rather than reflecting a meaningful dichotomous divide). The issue begins with a series of theory papers, which propose ways in which affective responses associated with neural, physiologic, or subjective states contribute to health behaviour and decision making. These theory papers set the

Table 1. Summary of articles in special issue.

| Article                         | Classification <sup>a</sup> | Design                          | Affective processes                                              | Behavioural context                                    |
|---------------------------------|-----------------------------|---------------------------------|------------------------------------------------------------------|--------------------------------------------------------|
| O’Leary et al. (2017)           | Theory                      | –                               | Stress, negative emotion, coping, emotion regulation             | Health risk behaviours                                 |
| Berkman (2017)                  | Theory                      | –                               | Motivation, Neuro-affective processes                            | Health decision making and behaviours                  |
| Carpenter and Niedenthal (2017) | Theory                      | –                               | Discrete emotion, physiological processes, affective forecasting | Health risk behaviours                                 |
| Van Cappellen et al. (2017)     | Theory                      | –                               | Positive affect and emotions                                     | Health promotion behaviours                            |
| Kiviniemi et al. (2017)         | Theory                      | –                               | Affective mediators and moderators                               | Health decision making and behaviours                  |
| Vrinten et al. (2017)           | Basic                       | Cross-sectional                 | Stress, fear                                                     | Health information seeking and avoidance               |
| Emerson et al. (2017)           | Basic                       | Ecological momentary assessment | Positive and negative affect                                     | Physical activity                                      |
| Felder et al. (2017)            | Basic                       | Longitudinal survey             | Stress and coping, rumination                                    | Sleep                                                  |
| Kiviniemi (2017)                | Basic                       | Cross-sectional                 | Positive and negative affect                                     | Fruit and vegetable consumption, physical activity     |
| Ellis et al. (2017)             | Basic                       | Cross-sectional                 | Positive and negative affect                                     | Sexual risk behaviour                                  |
| Gerrard et al. (2017)           | Applied                     | Longitudinal survey             | Anxiety, depression, hostility, anger                            | Health decision making and behaviours, health problems |
| Evans et al. (2017)             | Applied                     | Experimental                    | Affective/emotional reactions to risk                            | Smoking                                                |
| Mahler (2017)                   | Applied                     | Experimental                    | Negative emotions, worry, embarrassment                          | Sun safety                                             |
| Cameron et al. (2017)           | Applied                     | Cross-sectional; Experimental   | Positive affect                                                  | Physical activity                                      |
| Reynolds et al. (2017)          | Applied                     | Cross-sectional; Experimental   | Negative affect                                                  | Healthy eating, physical activity, alcohol consumption |
| Scherer et al. (2017)           | Applied                     | Experimental                    | Negative affect, anxiety                                         | Medical tests                                          |

<sup>a</sup>Because empirical papers fall along a continuum, discrete classification of basic vs. applied is a heuristic categorisation rather than reflecting a meaningful dichotomous divide.

stage for a series of use-inspired research papers, in which theory-based hypotheses are interrogated. The articles become progressively more applied and include research involving translating theories examined in use-inspired basic work to inform health behaviour change interventions. These applied studies also offer a window into processes, where the interventions also serve as experiments that can provide further information about the phenomena that inform them. Although this special issue ends with applied papers, the translational research process is circular. Ideally, in future theory papers and use-inspired research, the insight gained from examining psychological processes in interventions will be used to refine knowledge, which will then again be translated into interventions.

### Theory papers

All five theory papers incorporate components of different types of affective influences on health decisions and behaviour, and often married emotion and stress perspectives or examined important linkages between the two. The papers shed light on less traditionally examined affective factors that facilitate health behaviour, as well as how these affective factors may interface with more traditionally examined social and cognitive factors. In doing so, the papers develop important basic research questions and point to directions for use-inspired research. For example, the papers develop hypotheses about how health behaviour can be improved, either by leveraging affective concepts to target health behaviour directly or by targeting affective processes themselves in service of improving health behaviour through indirect routes. They also underscore measures and methodologies that should be incorporated into both basic and applied research. Finally, they provide guidelines for analyses that may produce mechanistic knowledge that is important for improving emotion and stress theories, as well as their translation to health behaviour change. These papers also highlight ways that future research can use these theories to understand health disparities better, or develop tests of these theories that better address health disparity problems.

The theoretical frameworks described in these papers are interconnected in ways, but also distinct, and may be useful for different purposes. For example, some are most useful when understanding healthy behaviour like physical activity (Van Cappellen, Rice, Catalino, & Fredrickson, 2017), while others focus on risky behaviour (O'Leary, Suri, & Gross, 2017). Some focus on physiological processes (Berkman, 2017; Carpenter & Niedenthal, 2017; Van Cappellen et al., 2017), whereas others have a more behavioural or psychological focus (Kiviniemi et al., 2017; O'Leary et al., 2017). Some articles are more explanatory (Berkman, 2017; Carpenter & Niedenthal, 2017; O'Leary et al., 2017); other articles are more focused on translation (Kiviniemi et al., 2017; Van Cappellen et al., 2017) – although all have some utility for both explanatory and translational functions. These papers are illustrative for informing basic and applied work, and for contextualising the papers in the remainder of this issue.

O'Leary et al. (2017) develop a comprehensive model of the joint roles of emotion regulation and coping with stress in contributing to risky health behaviour. Because behaviour such as smoking, overeating, and drinking alcohol can be used to regulate emotion or reduce stress (see also Adam & Epel, 2007; DeSteno et al., 2013; de Ridder, Kroese, Evers, Adriaanse, & Gillebaart, 2017; Ferrer et al., 2015; Kuntsche, Kuntsche, Thrul, & Gmel, 2017), poorly managed negative affect can have deleterious

consequences for health. For example, maladaptive emotion regulatory strategies have been linked to unhealthy eating behaviour (Evers, Marijn Stok, & de Ridder, 2010; Ferrer et al., 2017; Vandewalle, Moens, Beyers, & Braet, 2016; although see Adriaanse, de Ridder, & Evers, 2011). Similarly, many report that smoking helps them to cope with stress, despite that research suggests quitting smoking actually reduces stress (West, 2017; West & Shiffman, 2016). Thus, understanding emotion regulatory and coping processes together provides a novel window into the dynamics of health behaviour as well as unconventional or indirect methods of intervention. Synthesising knowledge about related emotion regulatory and coping can lead to a more comprehensive understanding of how emotions are generated and regulated (see also Gross & Barrett, 2011). This is particularly important given that coping includes broader attempts to address causes of stress (Lazarus & Folkman, 1984), allowing for a broader conceptualisation than emotion-focused strategies examined in emotion regulation (Gross & Thompson, 2007). This framework can be used to promote both effective and healthy forms of regulation to improve health behaviours without needing to intervene on health behaviours themselves. For example, promoting effective regulation via cognitive reappraisal or some types of problem-focused coping may lessen the need to engage in forms of emotion-focused coping that rely on risky health behaviours to downregulate negative affect.

Berkman (2017) examines health behaviours through a different lens: social and affective neuroscience. He calls for a process-focused account of health behaviours, which can generate novel predictions about why choices are made, and provide insight into how to intervene upon choices. Social neuroscience models of health decision making, behaviour, and communication can account for a great deal of variance in choices, well above and beyond self-report or other traditional measures (see also Berkman, Hutcherson, Livingston, Kahn, & Inzlicht, in press; Falk, Berkman, Mann, Harrison, & Lieberman, 2010). These models are not necessarily a replacement for traditional health behaviour choice models, but rather can complement and connect to social-cognitive frameworks and other frameworks based largely on self-report data, as outlined in this paper.

Carpenter and Niedenthal (2017) also extend traditional models of affect and health decision making by highlighting the role of biological inputs: here, physiological processes that signal decision making. Connecting traditional frameworks of emotion and decision making and affective forecasting to health (see also Ferrer et al., 2016; Loewenstein, 2005) with work on stress and physiological processes, this framework examines how affect can influence multi-attribute decisions in ways that are both beneficial and deleterious. The framework also extends to shared decision making in medical settings, connecting to work on social functions and dynamics of emotion and stress. By positing that flexible use and management of emotions across different physiological inputs influence the way that health decisions are made and are important for influencing the process itself, the framework highlights important basic questions about how interpretation of physiological signals affects health decisions, as well as useful applications for intervention.

Van Cappellen et al. (2017) turn to oft-overlooked affective processes in a health context: positive affect and emotions, experienced both as consciously linked to a stimulus, and as unconscious reinforcers of enjoyable behaviours. This 'Upward Spiral' framework posits that positive affect can contribute to recursive processes that support

positive health behaviours. Positive affect or responses to behaviour (such as enjoyment) make behaviour more likely, and behaviours reinforced by positive affect are more likely to be maintained. Frameworks that propose mechanisms for understanding and improving behavioural maintenance are particularly useful in health behaviour change, given difficulties in promoting maintenance of health behaviours over time (Rothman, 2000). Here, like in Carpenter and Niedenthal's (2017) framework, physiological processes play a role, where they are triggered by positive affect and health behaviours, leading to sustained changes in all three. Moreover, physiological or biological advantage such as greater cardiac vagal tone leads to more positive affective responses to activity (similar to other research where biological advantage, such as genetic predisposition, predicts affective response to exercise; Hooper, Bryan, & Hagger, 2014). Although distinct from evaluative conditioning paradigms, this framework points to ways in which evaluative conditioning-like processes can be leveraged in real-world settings to promote activity.

Finally, Kiviniemi et al. (2017) develop a comprehensive framework for understanding the complex associations among different types of affective processes and more traditional social-cognitive predictors of behaviour. Much previous work on emotion (and stress) and health decision making and behaviour has taken a main effects approach, examining how affect directly contributes to health decisions. Indeed, many of the theory papers in this issue take this approach, which can be useful but also may miss important nuances in the interplay among affective and cognitive predictors of behaviour. This framework proposes that examining how affect mediates associations of traditional social-cognitive factors and health behaviours is critical to more precise intervention development. Moreover, moderation is important, in that health behaviour decisions are often made in affectively laden contexts (see DeSteno et al., 2013; Ferrer et al., 2015, 2016; Ferrer, Padgett, & Ellis, 2016; Williams & Evans, 2014; Williams et al., *in press*), and affective factors can change the way that other decision making determinants influence health behaviours. This paper offers a particularly useful guide for translation, and points to the types of variables that should be included in interventions to test basic hypotheses for back-translation (and the types of statistical designs and tests that facilitate basic knowledge in applied contexts).

### **Basic empirical papers**

Following these theory papers, this special issue transitions to papers reporting use-inspired basic research. These empirical papers, in line with the goals of this special issue, often marry emotion and stress perspectives, capitalising on synergies and divergent methodological traditions by connecting strong theoretical and methodological traditions from each discipline. Vrinten et al. (2017) examine how fear of cancer and general stress has independent positive associations with avoidance of cancer information. By examining discrete emotion and stress concurrently but independently, the study suggests the possibility that fear may trigger defensive processing, while general stress may be linked to avoidance due to attenuated resources for coping with negative information. Examining emotion and stress separately allows for the possibility to address differential determinants of cancer information avoidance with models examining how worry or fear serves as a mechanism (Kiviniemi et al., 2017) and with those examining the consequences of poorly managed stress (O'Leary et al., 2017).

Emerson, Dunsiger, and Williams (2017) examine the complex temporal associations among exercise and positive affect using an ecological momentary assessment design and cross-lagged analyses. They find that exercise is more likely on days when positive affect is high early in the day, and likewise, positive affect is more likely to be experienced later in the day after exercising. This provides direct evidence in support of a recursive model of positive affect and healthy behaviours (Van Cappellen et al., 2017; see also Hogan, Catalino, Mata, & Fredrickson, 2015). It also suggests the potential that a more comprehensive understanding of emotion regulation and coping (O’Leary et al., 2017) may point to ways to upregulate positive affect in service of stimulating the recursive processes uncovered in this study.

Felder, Epel, Coccia, Puterman, and Prather (2017) examine stress and emotion in an important and relatively understudied context: sleep behaviour. They examined the associations among rumination, emotion suppression, and sleep among chronically stressed mothers of children with autism, and age-matched mothers of neurotypical children. Interestingly, they found that among the lower stress sample (mothers of neurotypical children), rumination was associated with poorer sleep outcomes, particularly among those with above average depressive symptoms. Rumination was unassociated with sleep outcomes among the higher stress sample (mothers of children with autism). Suppression was unassociated with any sleep outcome, contrary to some previous work linking suppression to sleep (Vantieghem, Marcoen, Mairesse, & Vandekerckhove, 2016), but consistent with findings that rumination emerges as a more maladaptive strategy for health outcomes (Zawadzki, 2015). These findings are notable given theory that stress may influence how emotion (and presumably emotion regulation) contributes to health behaviours (Carpenter & Niedenthal, 2017), and maladaptive regulatory strategies are presumed to lead to negative outcomes (O’Leary et al., 2017). This study is a striking example of where future work would benefit from well-conceptualised mediation and moderation analyses promoted by Kiviniemi et al. (2017).

Two studies (Ellis, Rajagopal, & Kiviniemi, 2017; Kiviniemi, 2017) examine the complexity of positive and negative affect and health decisions, providing further tests of positive affect frameworks (Van Cappellen et al., 2017) and taking a nuanced approach that examines basic questions about types of affective influences and their associations with social-cognitive determinants (Carpenter & Niedenthal, 2017). Kiviniemi (2017) disentangled positive and negative affective associations with health behaviours, as well as associations involving specific emotions vs. generalised affect. He found that affective associations were bidimensional, in that positive and negative affect’s associations with health behaviours were not bipolar, but rather were separate and distinct. He also found that when examining associations of affect and health behaviours, general positive and negative affect were more important in predicting intentions than were specific emotions. Ellis et al. (2017) demonstrated that both affective associations and cognitive beliefs were associated with intentions, cognitive beliefs were associated with behavioural stimuli and intentions only via affective associations. Both studies are examples of the importance of taking a nuanced approach to understanding how different types of affect predict health behaviours and how these relate to cognitive predictors (Kiviniemi et al., 2017).

### Applied empirical papers

Gerrard, Gibbons, Fleischli, Cutrona, and Stock (2017) also demonstrate the importance of moving beyond main effects by examining mediation and moderation models to better understand the role of affect in health behaviours (Kiviniemi et al., 2017). They examined affect, including anxiety and depression as well as hostility and anger, as mediators of the effects of discrimination on health and health behaviours, as well as how coping styles moderate these pathways. By allowing for the possibility that affect may serve as a mechanism only among individuals for which specific coping styles are used, the authors shed light on important ways to leverage theory (O'Leary et al., 2017) to attenuate negative health consequences of discrimination.

Evans et al. (2017) offer an example of leveraging applied work to inform basic questions using mediation models to probe mechanisms (Kiviniemi et al., 2017). Graphic warning labels on cigarette packages were designed (in part) to facilitate better understanding of smoking, consistent with theory suggesting that emotion influences health risk perceptions (Carpenter & Niedenthal, 2017; Ferrer et al., 2016; Peters, Lipkus, & Diefenbach, 2006; Slovic et al., 2015). However, mounting evidence shows a null effect of graphic warning labels on risk perceptions (Brewer et al., 2016; Noar et al., 2016). Evans et al. (2017) deconstruct affective mechanisms that may explain this null main effect, identifying an indirect path from graphic warning labels to risk perceptions via affective responses. Indirect effects in the absence of direct effects can point to opposing forces in the model (e.g. Hayes, 2009; Shrout & Bolger, 2002) (although it is worth noting that there is some disagreement regarding the value of interpreting indirect effects; e.g. Heathers et al., 2013; Kok et al., 2013; Kok & Fredrickson, 2015). Models in Evans et al. (2017) suggest the possibility that a complex combination of forces from labels via emotional reactions, warning consideration and smoking myth endorsement may counteract the indirect path from warning labels to risk perceptions via emotional reactions. This knowledge can inform basic research to identify stimuli that would increase emotional reactions (and therefore risk perceptions) without targeting warning consideration and smoking myths.

Mahler (2017) also demonstrates the importance of examining mediation in health behaviour interventions to shed light on mechanisms of effectiveness and develop process-focused knowledge regarding the role of affective processes in health behaviour change (Kiviniemi et al., 2017). She found that negative emotional reactions such as worry and embarrassment mediated the effectiveness of social norm-based sun safety interventions. This work unpacks the role of emotion in social-cognitive processes such as social norms, where theory has argued that these constructs incorporate affect (Ajzen & Driver, 1991), but affective processes are rarely explicitly examined. This paper also examines how social processes may contribute to health decision making, in accordance with theory (Carpenter & Niedenthal, 2017).

Finally, Cameron, Bertenshaw, and Sheeran (2017), Reynolds, Webb, Benn, Chang, and Sheeran (2017) and Scherer et al., (2017) all demonstrate how affective theories can be leveraged to develop efficacious interventions for health behaviours. In accordance with Van Cappelien et al. (2017), Cameron and colleagues show that inducing positive affect leads to greater engagement in physical activity. Also consistent with Van Cappelien and colleagues, Reynolds et al. (2017) demonstrate that while failing to make progress towards health goals leads to predictable negative affective responses, positive

affective responses about making progress towards health goals is more motivational for facilitating health behaviour intentions. And, consistent with recommendations for examining the role of emotions in relation to risk perceptions (Carpenter & Niedenthal, 2017; Kiviniemi et al., 2017), Scherer et al. (2017) demonstrate that affective evaluations, anxiety, risks and benefits all uniquely predict medical test preference in the context of an experiment to interrogate how different types of information and recommendations influence evaluations of medical tests.

Unfortunately, none of the studies in this special issue empirically examines emotion and decision making from a social neuroscience perspective (Berkman, 2017). Future work would benefit from integrating social neuroscience into work disentangling affective influences on health decisions and behaviour. For example, social neuroscience theory and approaches may shed light on why rumination does not interfere with sleep in high-stress populations (Felder et al., 2017), why specific emotions are less important than general feelings in predicting health behaviour (Kiviniemi, 2017), or what mechanisms underlie the effect of feeling good about progress on intentions to change health behaviours (Reynolds et al., 2017).

## **Conclusion**

This set of papers illustrates how health decision making and behaviour change research can benefit from uniting perspectives from emotion and stress along the translational continuum. The theory papers propose frameworks for understanding the role of emotion and stress in health decisions and behaviours. These theory papers are followed by use-inspired basic papers that interrogate some of the propositions in these frameworks. The special issue close with applied and intervention papers that translate basic knowledge to improve health outcomes and use interventions as experiments for understanding causal, mechanistic processes. Although these papers fall along the applied end of the spectrum, most fall short of full translation of theory and basic research to intervention; consistent with related compilations and recommendations, future work should integrate affective science into full-scale interventions (Rhodes, Williams, & Conner, 2017). Moreover, although these papers are organised along the continuum as though it were linear, it is important for future work to circle back to the beginning of the translational continuum, back-translating mechanistic knowledge derived from intervention studies (e.g. Cameron et al., 2017; Evans et al., 2017; Mahler, 2017; Reynolds et al., 2017) to improve theories and use-inspired basic work on goal pursuit, risk perceptions, positive affect and social norms. This recommendation for basic-to-applied-to-basic translation is consistent with parallel recommendations for affective science and health behaviour change (Rhodes et al., 2017), as well as emerging recommendations for behavioural science and health research (Czajkowski et al., 2016; Glasgow, 2008; Sussman et al., 2006; see also: <https://obssr.od.nih.gov/about-us/strategic-plan/>).

## **Disclosure statement**

No potential conflict of interest was reported by the authors.

## References

- Adam, T. C. & Epel, E. S. (2007). Stress, eating and the reward system. *Physiology & Behavior*, 91(4), 449–458.
- Adriaanse, M. A., de Ridder, D. T., & Evers, C. (2011). Emotional eating: Eating when emotional or emotional about eating? *Psychology and Health*, 26(1), 23–39.
- Ajzen, I., & Driver, B. L. (1991). Prediction of leisure participation from behavioural, normative, and control beliefs: An application of the theory of planned behaviour. *Leisure Sciences*, 13(3), 185–204.
- Ariely, D., & Loewenstein, G. (2006). The heat of the moment: The effect of sexual arousal on sexual decision making. *Journal of Behavioral Decision Making*, 19(2), 87–98.
- Barrett, L. F. (2006). Are emotions natural kinds? *Perspectives on Psychological Science*, 1, 28–58.
- Barrett, L. F. (2013). Psychological construction: The Darwinian approach to the science of emotion. *Emotion Review*, 5(4), 379–389.
- Barrett, L. F. (2014). The conceptual act theory: A précis. *Emotion Review*, 6(4), 292–297.
- Baum, A., Lorduy, K., & Jenkins, F. J. (2011). The molecular biology of stress: Cellular defense, immune response. In A. Baum & R. Contrada (Eds.), *The handbook of stress science: Biology, psychology, and health* (pp. 87–100). New York, NY: Springer.
- Berkman, E. T. (2017). Value-based choice: An integrative, neuroscience-informed model of health goals. *Psychology & Health*, 33, 1–8.
- Berkman, E., Hutcherson, C., Livingston, J. L., Kahn, L. E., & Inzlicht, M. (in press). Self-control as value-based choice. *Current Directions in Psychological Science*.
- Blascovich, J., Mendes, W. B., Hunter, S. B., Lickel, B., & Kowai-Bell, N. (2001). Perceiver threat in social interactions with stigmatized others. *Journal of Personality and Social Psychology*, 80(2), 253–267.
- Blascovich, J., Mendes, W. B., Hunter, S. B., & Salomon, K. (1999). Social ‘facilitation’ as challenge and threat. *Journal of Personality and Social Psychology*, 77, 68–77.
- Brewer, N. T., Hall, M. G., Noar, S. M., Parada, H., Stein-Seroussi, A., Bach, L. E., ... Ribisl, K. M. (2016). Effect of pictorial cigarette pack warnings on changes in smoking behaviour: A randomized clinical trial. *JAMA Internal Medicine*, 176(7), 905–912.
- Cameron, D. S., Bertenshaw, E. J., & Sheeran, P. (2017). Positive affect and physical activity: Testing effects on goal setting, activation, prioritisation, and attainment. *Psychology & Health*, 33, 1–7.
- Carpenter, S. M., & Niedenthal, P. M. (2017). Emotional processes in risky and multiattribute health decisions. *Psychology & Health*, 33, 1–9.
- Cohen, S., Janicki-Deverts, D., & Miller, G. (2007). Psychological distress and disease. *Journal of the American Medical Association*, 298, 1685–1687.
- Conner, M., & Norman, P. (1996). The role of social cognition in health behaviours. In M. Conner & P. Norman (Eds.), *Predicting health behaviour: Research and practice with social cognition models* (pp. 1–22). Maidenhead: Open University Press.
- Conner, M., & Norman, P. (2017). Health behaviour: Current issues and challenges. *Psychology & Health*, 32, 895–906.
- Czajkowski, S. M., Lynch, M. R., Hall, K. L., Stipelman, B. A., Haverkos, L., Perl, H., ... Shirley, M. C. (2016). Transdisciplinary translational behavioural (TDTB) research: Opportunities, barriers, and innovations. *Translational Behavioural Medicine*, 6(1), 32–43.
- Damasio, A. R. (1994). *Descartes’ error: Emotion, rationality and the human brain*. New York: Putnam.
- DeSteno, D., Gross, J. J., & Kubzansky, L. (2013). Affective science and health: The importance of emotion and emotion regulation. *Health Psychology*, 32(5), 474–486.

- de Ridder, D., Kroese, F., Evers, C., Adriaanse, M., & Gillebaart, M. (2017). Healthy diet: Health impact, prevalence, correlates, and interventions. *Psychology & Health*, 32, 904–941.
- Dhabhar, F. (2011). Effects of stress on immune function: Implications for immunoprotection and immunopathology. In R. J. Contrada & A. Baum (Eds.), *The handbook of stress science: Biology, psychology and health* (pp. 47–63). New York, NY: Springer.
- Dickerson, S. S., Gruenewald, T. L., & Kemeny, M. E. (2009). Psychobiological responses to social self threat: Functional or detrimental? *Self and Identity*, 8, 270–285.
- Ekkekakis, P., & Petruzzello, S. J. (1999). Acute aerobic exercise and affect. *Sports Medicine*, 28, 337–374.
- Ellis, E. M., & Ferrer, R. A. (in press). Affect and decision making in cancer. In D. M. Williams, R. E. Rhodes, & M. T. Conner (Eds.), *Affective determinants of health-related behaviour*. New York, NY: Oxford University Press.
- Ellis, E. M., Rajagopal, R., & Kiviniemi, M. T. (2017). The interplay between feelings and beliefs about condoms as predictors of their use. *Psychology & Health*, 33, 1–7.
- Emerson, J. A., Dunsiger, S., & Williams, D. M. (2017). Reciprocal within-day associations between incidental affect and exercise: An EMA study. *Psychology & Health*, 33, 1–4.
- Evans, A. T., Peters, E., Shoben, A. B., Meilleur, L. R., Klein, E. G., Tompkins, M. K., & Tusler, M. (2017). Cigarette graphic warning labels increase both risk perceptions and smoking myth endorsement. *Psychology & Health*, 33, 1–22.
- Evers, C., Marijn Stok, F., & de Ridder, D. T. (2010). Feeding your feelings: Emotion regulation strategies and emotional eating. *Personality and Social Psychology Bulletin*, 36(6), 792–804.
- Falk, E. B., Berkman, E. T., Mann, T., Harrison, B., & Lieberman, M. D. (2010). Predicting persuasion-induced behaviour change from the brain. *Journal of Neuroscience*, 30(25), 8421–8424.
- Felder, J. N., Epel, E. S., Coccia, M., Puterman, E., & Prather, A. A. (2017). Effects of daily maladaptive coping on nightly sleep in mothers. *Psychology & Health*, 33, 1–4.
- Ferrer, R. A., Green, P. A., & Barrett, L. F. (2015). Affective science perspectives on cancer control. *Perspectives on Psychological Science*, 10(3), 328–345.
- Ferrer, R. A., Green, P. A., Oh, A. Y., Hennessy, E., & Dwyer, L. A. (2017). Emotion suppression, emotional eating, and eating behavior among parent-adolescent dyads. *Emotion*, ePub ahead of print.
- Ferrer, R. A., Klein, W. M. P., Lerner, J. S., Reyna, V., & Keltner, D. (2016). Emotions and health decision making: Extending the appraisal tendency framework to improve health and health care. In C. Roberto & I. Kawachi (Eds.), *Behavioral economics and public health* (pp. 101–131). New York, NY: Oxford University Press.
- Ferrer, R. A., Padgett, L., & Ellis, E. M. (2016). Extending emotion and decision making beyond the laboratory: The promise of palliative care contexts. *Emotion*, 16(5), 581–586.
- Feldman, P. J., Cohen, S., Hamrick, N., & Lepore, S. J. (2004). Psychological stress, appraisal, emotion and Cardiovascular response in a public speaking task. *Psychology & Health*, 19, 353–368.
- Ganzel, B. L., Morris, P. A., & Wethington, E. (2010). Allostasis and the human brain: Integrating models of stress from the social and life sciences. *Psychological Review*, 117(1), 134–174.
- George, W. H., Davis, K. C., Norris, J., Heiman, J. R., Stoner, S. A., Schacht, R. L., ... Kajumulo, K. F. (2009). Indirect effects of acute alcohol intoxication on sexual risk-taking: The roles of subjective and physiological sexual arousal. *Archives of Sexual Behaviour*, 38(4), 498–513.
- Gerrard, M., Gibbons, F. X., Fleischli, M. E., Cutrona, C. E., & Stock, M. L. (2017). Moderation of the effects of discrimination-induced affective responses on health outcomes. *Psychology & Health*, 33, 1–20.

- Glasgow, R. E. (2008). What Types of evidence are most needed to advance behavioral medicine? *Annals of Behavioral Medicine*, 35(1), 19–25.
- Greenberg, N., Carr, J. A., & Summers, C. H. (2002). Causes and consequences of stress. *Integrative and Comparative Biology*, 42, 508–516.
- Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, 26(1), 1–26.
- Gross, J. J., & Barrett, L. F. (2011). Emotion generation and emotion regulation: One or two depends on your point of view. *Emotion Review*, 3(1), 8–16.
- Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3–24). New York, NY: Guilford Press.
- Hash-Converse, J. M., & Kusnecov, A. W. (2011). Behavioral, emotional, and cognitive sequelae of immune system activation. In A. Baum & R. Contrada (Eds.), *The handbook of stress science: Biology, psychology, and health* (pp. 65–76). New York, NY: Springer.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, 76, 408–420.
- Heathers, J. A., Brown, N. J., Coyne, J. C., Friedman, H. L. (2015). The elusory upward spiral: A reanalysis of Kok et al. (2013). *Psychological Science*, 26(7), 1140–1143.
- Hogan, C. L., Catalino, L. I., Mata, J., & Fredrickson, B. L. (2015). Beyond emotional benefits: Physical activity and sedentary behaviour affect psychosocial resources through emotions. *Psychology & Health*, 30(3), 354–369.
- Hooper, A. E. C., Bryan, A. D., & Hagger, M. S. (2014). What keeps a body moving? The brain-derived neurotrophic factor val66met polymorphism and intrinsic motivation to exercise in humans. *Journal of Behavioral Medicine*, 37(6), 1180–1192.
- Jamieson, J. P., Koslov, K., Nock, M. K., & Mendes, W. B. (2013). Experiencing discrimination increases risk taking. *Psychological Science*, 24(2), 131–139.
- Jamieson, J. P., Mendes, W. B., & Nock, M. K. (2013). Improving acute stress responses: The power of reappraisal. *Current Directions in Psychological Science*, 22(1), 51–56.
- Kagan, J. (2016). Why Stress Remains an Ambiguous Concept: Reply to McEwen & McEwen (2016) and Cohen et al. (2016). *Perspectives on Psychological Science*, 11(4), 464–465.
- Kassam, K. S., Koslov, K., & Mendes, W. B. (2009). Decisions under distress: Stress profiles influence anchoring and adjustment. *Psychological Science*, 20(11), 1394–1399.
- Keltner, D. & Gross, J. J. (1999). Functional accounts of emotions. *Cognition & Emotion*, 13(5), 467–480.
- Kemeny, M. E. (2009). Psychobiological responses to social threat: Evolution of a psychological model in psychoneuroimmunology. *Brain, Behavior, and Immunity*, 23, 1–9.
- Kiviniemi, M. T. (2017). Structure and content of affective associations with health behaviours: Is the behaviour ‘good OR bad’ or ‘good AND bad’. *Psychology & Health*, 33, 1–17.
- Kiviniemi, M. T., Ellis, E. M., Hall, M. G., Moss, J. L., Lillie, S. E., Brewer, N. T., & Klein, W. M. (2017). Mediation, moderation, and context: Understanding complex relations among cognition, affect, and health behaviour. *Psychology & Health*, 33, 1–19.
- Kok, B. E., Coffey, K. A., Cohn, M. A., Catalino, L. I., Vacharkulksemsuk, T., Algoe, S. B., ... Fredrickson, B. L. (2013). How positive emotions build physical health: Perceived positive social connections account for the upward spiral between positive emotions and vagal tone. *Psychological Science*, 24(7), 1123–1132.
- Kok, B. E., & Fredrickson, B. L. (2015). Evidence for the upward spiral stands steady: A response to Heathers, Brown, Coyne, and Friedman (2015). *Psychological Science*, 26(7), 1144–1146.
- Kuntsche, E., Kuntsche, S., Thrul, J., & Gmel, G. (2017). Binge drinking: Health impact, prevalence, correlates and interventions. *Psychology & Health*, 976–1017.
- Lazarus, R. S. (1991). Progress on a cognitive-motivational-relational theory of emotion. *American Psychologist*, 46(8), 819–834.

- Lazarus, R. S. (1994). From psychological stress to the emotions: A history of changing outlooks. *Annual Review of Psychology*, 44, 1–21.
- Lazarus, R. S. (1999). *Stress and emotion: A new synthesis*. New York, NY: Springer.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer.
- Lerner, J. S., Dahl, R. E., Hariri, A. R., & Taylor, S. E. (2007). Facial expressions of emotion reveal neuroendocrine and cardiovascular stress responses. *Biological Psychiatry*, 61, 253–260.
- Lerner, J. S. & Keltner, D. (2000). Beyond valence: Toward a model of emotion-specific influences on judgement and choice. *Cognition & Emotion*, 14(4), 473–493.
- Lerner, J. S. & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology*, 81(1), 146.
- Lerner, J. S., Dahl, R. E., Hariri, A. R., & Taylor, S. E. (2007). Facial expressions of emotion reveal neuroendocrine and cardiovascular stress responses. *Biological Psychiatry*, 61, 253–260.
- Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015). Emotion and decision making. *Annual Review of Psychology*, 66, 799–823.
- Leventhal, H., Patrick-Miller, L., Leventhal, E. A., & Burns, E. A. (1997). Does stress-emotion cause illness in elderly people? *Annual Review of Gerontology and Geriatrics*, 17, 138–184.
- Lighthall, N. R., Mather, M., & Gorlick, M. A. (2009). Acute stress increases sex differences in risk seeking in the balloon analogue risk task. *PLoS ONE*, 4(7), e6002.
- Loewenstein, G. (2005). Hot-cold empathy gaps and medical decision making. *Health Psychology*, 24(4S), S49–S56.
- Loewenstein, G. & Lerner, J. S. (2003). The role of affect in decision making. *Handbook of Affective Science*, 619(642), 3.
- Mahler, H. I. (2017). The relative role of cognitive and emotional reactions in mediating the effects of a social comparison sun protection intervention. *Psychology & Health*, 33, 1–23.
- McCaffery, J. M. (2011). Genetic Epidemiology of Stress and Gene by Stress Interaction. In A. Baum & R. Contrada (Eds.), *The handbook of stress science: Biology, psychology, and health* (pp. 77–85). New York, NY: Springer.
- McEwen, B. S. (1995). *Stressful experience, brain, and emotions: Developmental, genetic, and hormonal influences*. Cambridge, MA: MIT Press.
- Mendes, W. B., Major, B., McCoy, S., & Blascovich, J. (2008). How attributional ambiguity shapes physiological and emotional responses to social rejection and acceptance. *Journal of Personality and Social Psychology*, 94(2), 278–291.
- Mendes, W. B., Reis, H. T., Seery, M. D., & Blascovich, J. (2003). Cardiovascular correlates of emotional expression and suppression: Do content and gender context matter? *Journal of Personality and Social Psychology*, 84(4), 771–792.
- Miller, G., Chen, E., & Cole, S. W. (2009). Health psychology: Developing biologically plausible models linking the social world and physical health. *Annual Review of Psychology*, 60, 501–524.
- Noar, S. M., Hall, M. G., Francis, D. B., Ribisl, K. M., Pepper, J. K., & Brewer, N. T. (2016). Pictorial cigarette pack warnings: A meta-analysis of experimental studies. *Tobacco Control*, 25, 341–354.
- Noar, S. M., & Zimmerman, R. S. (2005). Health behavior theory and cumulative knowledge regarding health behaviours: Are we moving in the right direction? *Health Education Research*, 20(3), 275–290.
- O’Leary, D., Suri, G., & Gross, J. J. (2017). Reducing behavioural risk factors for cancer: An affect regulation perspective. *Psychology & Health*, 33, 1–23.
- Panksepp, J. (2007). Neurologizing the psychology of affects: How appraisal-based constructivism and basic emotion theory can coexist. *Perspectives on Psychological Science*, 2, 281–296.

- Peters, E., Lipkus, I., & Diefenbach, M. A. (2006). The functions of affect in health communications and in the construction of health preferences. *Journal of Communication*, 56(s1), S140–S162.
- Reynolds, J. P., Webb, T. L., Benn, Y., Chang, B. P., & Sheeran, P. (2017). Feeling bad about progress does not lead people want to change their health behaviour. *Psychology & Health*, 33, 1–7.
- Rhodes, M. T., Williams, D. M., & Conner, M. T. (in press). Affective determinants of health behavior: Common themes, future directions, and implications for health behavior change. In D. M. Williams, R. E. Rhodes, & M. T. Conner (Eds.), *Affective determinants of health-related behavior*. New York, NY: Oxford University Press.
- Rothman, A. J. (2000). Toward a theory-based analysis of behavioural maintenance. *Health Psychology*, 19(1S), 64–69.
- Scherer, L. D., Shaffer, V. A., Caverly, T., Scherer, A. M., Zikmund-Fisher, B. J., Kullgren, J. T., & Fagerlin, A. (2017). The role of the affect heuristic and cancer anxiety in responding to negative information about medical tests. *Psychology & Health*, 33, 1–21.
- Schnohr, P., Kristensen, T. S., Prescott, E., & Scharling, H. (2005). Stress and life dissatisfaction are inversely associated with jogging and other types of physical activity in leisure time – The Copenhagen City Heart Study. *Scandinavian Journal of Medicine & Science in Sports*, 15(2), 107–112.
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, 7, 422–445.
- Slovic, P., Peters, E., Finucane, M. L., & MacGregor, D. G. (2005). Affect, risk, and decision making. *Health Psychology*, 24(4S), S35–S40.
- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48(4), 813–838.
- Sussman, S., Valente, T. W., Rohrbach, L. A., Skara, S., & Ann Pentz, M. (2006). Translation in the health professions: Converting science into action. *Evaluation & the Health Professions*, 29(1), 7–32.
- Taylor, S. E., Lerner, J. S., Sage, R. M., Lehman, B. J., & Seeman, T. E. (2004). Early environment, emotions, responses to stress, and health. *Journal of Personality*, 72, 1365–1394.
- Tomiyaama, A. J., Dallman, M. F., & Epel, E. S. (2011). Comfort food is comforting to those most stressed: Evidence of the chronic stress response network in high stress women. *Psychoneuroendocrinology*, 36(10), 1513–1519.
- Van Cappellen, P., Rice, E. L., Catalino, L. I., & Fredrickson, B. L. (2017). Positive affective processes underlie positive health behaviour change. *Psychology & Health*, 33, 1–21.
- Vandewalle, J., Moens, E., Beyers, W., & Braet, C. (2016). Can we link emotional eating with the emotion regulation skills of adolescents? *Psychology & Health*, 31(7), 857–872.
- Vanteghem, I., Marcoen, N., Mairesse, O., & Vandekerckhove, M. (2016). Emotion regulation mediates the relationship between personality and sleep quality. *Psychology & Health*, 31(9), 1064–1079.
- Vrinten, C., Boniface, D., Lo, S. H., Kobayashi, L. C., von Wagner, C., & Waller, J. (2017). Does psychosocial stress exacerbate avoidant responses to cancer information in those who are afraid of cancer? A population-based survey among older adults in England. *Psychology & Health*, 33, 1–13.
- West, R. (2017). Tobacco smoking: Health impact, prevalence, correlates and interventions. *Psychology & Health*, 1018–1036.
- West, R., & Shiffman, S. (2016). *Smoking cessation* (3rd ed.). Abingdon: Health Press.
- Williams, D. M., & Evans, D. R. (2014). Current emotion research in health behaviour science. *Emotion Review*, 6(3), 277–287.

- Williams, D. M., Rhodes, R. E., & Conner, M. T. ([in press](#)). Overview of affective determinants of health behavior. In D. M. Williams, R. E. Rhodes, & M. T. Conner (Eds.), *Affective determinants of health-related behaviour*. New York, NY: Oxford University Press.
- Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behaviour*, 27(5), 591–615.
- Zawadzki, M. J. (2015). Rumination is independently associated with poor psychological health: Comparing emotion regulation strategies. *Psychology & Health*, 30(10), 1146–1163.