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# Editorial:
# Conceptualizing and Intervening on Affective Determinants of Health Behaviour

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Understanding the determinants of health behaviours has been an important focus of health psychology for more than 30 years, as understanding forms the basis for successful behaviour-change interventions. The dominant health behaviour theories (HBTs) emphasize conscious behaviour-specific cognitions as determinants of health behaviour (see Conner & Norman, 2015a; Glanz & Bishop, 2010; Painter, Borba, Hynes, Mays, & Glanz, 2008) consistent with the cognitive paradigm in psychology that came into favour in the 1950s (Edwards, 1954; Rotter, 1954; Tolman, 1955). Such theories account for substantial portions of the variance in who performs health behaviours based on variables such as intentions, attitudes, norms and self-efficacy (Conner & Norman, 2015b), and place a heavy emphasis on the systematic processing of information usually following the weighted consideration of expectancies and values (Edwards, 1954) to inform plans or intentions to act. However, they have modest utility as mechanisms of behaviour change (Baranowski, Anderson, & Carmack, 1998; Johnson, Scott-Sheldon, & Carey, 2010; Prestwich et al., 2013; Webb & Sheeran, 2006). In order to better understand the determinants of health behaviour and develop novel targets for behaviour-change interventions, the scope of HBTs might be expanded beyond their current emphasis on the expectancy-value framework.

Previous efforts to expand the scope of HBTs have mainly focused on environmental and policy factors (e.g., Sallis, Owen, & Fisher, 2008; Stokols, 1996) and, more recently, non-conscious psychological processes (e.g., Hofmann, Friese, & Wiers, 2008; Sheeran, Gollwitzer,

& Bargh, 2013). In the last couple of decades, however, health behaviour scientists working in diverse disciplines have begun to place greater emphasis on affective factors—pleasure, pain, emotion—as determinants of why people engage in or do not engage in health-related behaviours. To be sure, these affective factors overlap in many ways with the cognitive factors that have been a focus of health behaviour research for over 60 years (e.g., research on anticipated affective response to exercise or drug use). It is only recently though that affective factors have become—in their own right—a major focus of research in health behaviour science. This view is supported by the recent special issue of Psychology and Health (Ferrer & Mendes, 2018) and also an edited volume on this topic (Williams, Rhodes, & Conner, 2018a).

This editorial provides a brief overview of the topic of affective determinants of health behaviour focusing on affect as a putative determinant of health behaviour (e.g., the effects of affective response to exercise on adherence to exercise programs) rather than as an outcome in its own right (e.g., the effects of exercise on clinical depression or anxiety). A broad range of affective determinants of health behaviour are considered including affect-related cognitions, such as anticipated affect and affective attitudes, in addition to affect per se (e.g., moods, emotions, pleasure and displeasure).

The editorial considers three themes. First, the conceptualization of affective determinants in relation to health behaviours is considered. Second, conceptual models that propose how affect may influence health behaviour are reviewed, and a general framework for incorporating these models into existing cognitively oriented health behaviour theories is proposed. Third, implications for intervention in this area are discussed.

## Conceptualizing Affect

There has, until recently, been a relative lack of consensus regarding the conceptualization of affect. Affect can be defined as an evaluative neurobiological state that manifests in: (a) coordinated patterns of physiological (e.g., release of hormones, increased heart rate) and involuntary behavioural (e.g., facial expression, vocalization) changes, and (b) subjective experiential feelings (e.g., the phenomenal experience of pleasure, anger, embarrassment, etc.) (Williams & Evans, 2014; Williams, Rhodes, & Conner, 2018b). Defined in this way, affect can be thoughts of as an umbrella term encompassing related concepts, including core affect (e.g., hedonic response [pleasure/displeasure] and arousal), emotions (e.g., anger, fear, sorrow, joy), and moods (e.g., happy, contented, depressed, irritable) (Davidson, Scherer, & Goldsmith, 2009; Ekkekakis, 2013; Kahneman, Diener, & Schwarz, 1999; Lewis, Haviland-Jones, & Barrett, 2008; Manstead, Frijda, & Fischer, 2004).

**Core Affect**

All affect includes a core affect component (Larsen, 2000; Russell, 1980; Thayer, 1978; Watson & Tellegen, 1985). Core affect can be characterized with respect to two orthogonal dimensions: a "valence" dimension ranging from positive to negative, and an "activation" dimension ranging from high to low (Russell, 1980). Alternatively, the dimensions may be rotated 45 degrees, yielding (a) a "positive activation" dimension ranging from the union of positive valence and high activation (e.g., excited) to the union of negative valence and low activation (e.g., fatigued) and (b) a "negative activation" dimension ranging from the union of negative valence and high activation (e.g., anxious) to the union of positive valence and low activation (e.g., tranquil) (Watson & Tellegen, 1985). Core affect is ever-present when a person is conscious and awake (Russell, 1980) and may shift in direction or magnitude without the need

for cognitive appraisals (e.g., stubbing one's toe or feeling a cool breeze on a hot day) or may underlie more complex appraisal-based emotions and moods (Russell & Barrett, 1999).

There has been considerable confusion regarding the terms positive affect and negative affect in affective science (Russell & Carroll, 1999a, 1999b; Watson & Tellegen, 1999) and health behaviour science (Ekkekakis, 2013, pp. 76-95). Specifically, many authors have incorrectly interpreted the labels "positive affect" and "negative affect" in the rotated circumplex model (Watson & Tellegen, 1985) to be descriptors of pure positive and negative valence, as in the valence dimension of the unrotated circumplex (i.e., Russell, 1980). In an attempt to alleviate this confusion, Watson and Tellegen renamed their rotated dimensions "positive activation" and "negative activation" to distinguish them from the opposite (positive and negative) poles of Russell's unrotated hedonic valence dimension (Watson, Wiese, Vaidya, & Tellegen, 1999). Unfortunately, few authors seem to be aware of this relabelling and so the confusion and misinterpretation of the literature persists.

**Emotions and Moods**

Emotions (e.g., anger, fear, sorrow, joy) involve cognitive appraisals of a specific stimulus, which lead to a combination of coordinated and distinctive physiological and/or behavioural responses and experiential feelings with an underlying core affect component (Frijda, 2008). For example, the emotion of anger involves the appraisal that one has been wronged, accompanied by increased heart rate, flushed skin, a scowling facial expression, and an increase in negative activated affect, culminating in the distinctive phenomenal experience (i.e., feeling) of anger. Moods (e.g., happy, contented, anxious, depressed/sad, irritable) involve the same components as emotions (i.e., cognitive appraisal, change in core affect, physiological, behavioural, and experiential manifestations), but, relative to emotions are (a) more diffuse

rather than focused on a specific stimulus; and (b) less time-limited (Morris, 1999). For example, relative to the emotion of anger, an irritable mood may not be attributable to any specific stimulus and can last for days or weeks, with no distinct beginning and end.

**Integral versus Incidental Affect**

Orthogonal to the above distinctions among core affect, emotions, and moods, affect can be further organized into integral and incidental affect. Integral affect is one's affective response to the target behaviour or the immediate consequences of the behaviour, the latter including the taste of the food that one is eating, the sensation of vigorous exercise, or the feeling of alcohol or drug intoxication. Incidental affect is affect that is not experienced in the context of the behaviour but may nonetheless influence the behaviour (e.g., effects of job-related stress on smoking) or be influenced by the behaviour (e.g., effects of regular exercise on general mood or well-being) (Bodenhausen, 1993).

Integral affect may occur either during or immediately following the target behaviour. The latter distinction may be particularly important for health-related behaviours, because, for such behaviours, during-behaviour affective response often has a valence that is opposite from the post-behaviour affective response. For example, the taste of calorie-dense foods is often experienced as pleasurable, but, one is likely to feel guilty or disappointed afterwards, particularly when trying to lose weight or refrain from eating sweets. Conversely, exercise is often experienced as painful or uncomfortable, particularly for those who are newly trying to adopt a program of regular exercise. However, people often feel a sense of satisfaction or accomplishment once they are finished with exercise.

**Affect Processing, Affective Judgments, Cognitively Mediated Affect**

Affect processing, affective judgments, and cognitively mediated affect are umbrella terms (hereafter we use the term affect processing, but the three terms are essentially synonymous) that encompass cognitive processing of previous or anticipated affective responses to the target behaviour, including anticipated affect, affective attitudes, implicit attitudes, and affective associations (Conner et al., 2015; Rhodes, Fiala, & Conner, 2009; Williams & Evans, 2014). Affect processing concepts are cognitive in nature, but are considered within the purview of affective determinants of behaviour because there are affective foundations for the cognitive processing (i.e., anticipated affective reaction) and/or include an affective component (i.e., affective associations, affective attitudes, and implicit attitudes) (Baumeister, Vohs, DeWall, & Zhang, 2007; Rhodes, Fiala, & Conner, 2009).

Anticipated affect is an expectation of one's affective response to the target behaviour, consistent with the concept of outcome expectancy in socio-cognitive theories of behaviour (Ajzen, 1991; Bandura, 1986; Fishbein, 1979; Prochaska & DiClemente, 1983; Rosenstock, 1966). Affective attitudes are evaluations of the target behaviour based on aggregation of anticipated affective responses. Affective attitudes differ from instrumental attitudes in which the target behaviour is evaluated (e.g., beneficial versus harmful) based on aggregation of expected instrumental outcomes (e.g., health-related outcomes) (Ajzen, 1991; Crites, Fabrigar, & Petty, 1994). Anticipated affect and affective attitudes are distinct from actual affective responses to the target behaviour in that the former are about the behaviour and thus can be experienced and reported at any time, whereas affective responses are how one feels immediately in response to performing the behaviour and thus is only relevant in the context of the target behaviour (Rhodes et al., 2009).

Attitudes may be either explicit or implicit (Gawronski & Bodenhausen, 2006). Explicit attitudes are based on an aggregation of thoughtful consideration of the affective or instrumental outcomes of the behaviour (see above). Implicit attitudes are automatically activated evaluations of the target behaviour based on an aggregation of affective associations (Gawronski & Bodenhausen, 2006). Affective associations, in turn, are automatic associations between the target behaviour and previously experienced affective responses to the target behaviour (Kiviniemi, Voss-Humke, & Seifert, 2007). Thus, theoretically, anticipated affect is to affective attitudes, as affective associations are to implicit attitudes (Williams & Evans, 2014). In terms of how the constructs are operationalized, however, they may look similar, particularly affective attitudes, implicit attitudes, and affective associations (Conner, Prestwich, & Ayers, 2011).

**A Taxonomy of Affect Constructs in the Context of Health Behaviour**

In an attempt to organize the numerous affect-related constructs, we present here a taxonomy (Figure 1). The taxonomy distinguishes between affect proper and affect processing. Incidental affect, anticipatory affect, during-behaviour affect, and post-behaviour affect are included within the affect proper category. We do not try to distinguish affect experienced above or below awareness (Lambie & Marcel, 2002), because definitions of affect usually include subjectively experienced feelings so affect that is below awareness would not qualify (Davidson, Scherer, & Goldsmith, 2009; Ekkekakis, 2013; Kahneman, Diener, & Schwarz, 1999; Lewis, Haviland-Jones, & Barrett, 2008; Manstead, Frijda, & Fischer, 2004). Within the affect processing category, a distinction is made between automatic affect processing (that includes affect associations and implicit affective attitudes) and reflective affect processing (that includes anticipated affective responses and affective attitudes). The solid downward arrows indicate that

affect proper has causal effects on affect processing; indeed, the category label "affect processing" refers to the processing of affect proper.

### Future Directions

Future research might also usefully explore whether the different types of affect that are distinguishable show differential predictive power (i.e., effect size) for different health behaviours (e.g., health-protection versus health-risk behaviours). For example, affect proper may be more predictive for some health behaviours and thus show only partial overlap with predictions from hedonic motivation or affect processing variables (affective attitudes, regret, or satisfaction, passion). McEachan and colleagues (2016) in a meta-analysis of the Reasoned Action Approach (RAA) showed affective attitudes to be significantly stronger predictors of intentions and behaviour for risk compared to protection behaviours. Whilst in a multi-behaviour study testing the RAA, Conner, McEachan, Lawton, and Gardner (2017) showed affective attitudes to be stronger predictors of behaviour for risk compared to protection behaviours even when controlling for other RAA variables and past behaviour.

## Models, Theories, and Frameworks of Affect and Behaviour

Numerous theories or conceptual models have been proposed on how affect influences behaviour. An underlying, though often implicit assumption of most, if not all, of these theories and models is psychological hedonism—the ancient and intuitive idea that people act in ways that serve to increase pleasure and decrease displeasure (Cabanac, 1992; Kahneman, Wakker, & Sarin, 1997; Williams, 2018). Put simply, if one feels good (or less bad) while engaging in a behaviour then that behaviour is likely to be repeated and vice versa. Within the past 30-40 years, researchers have proposed various versions of psychological hedonism, often focusing on a particular psychological construct or process. These include the risk-as-feelings hypothesis

(Loewenstein, Weber, Hsee, & Welch, 2001), the affect heuristic (Finucane, Alhakami, Slovic, & Johnson, 2000), decision affect theory (Mellers, Schwartz, Ho, & Ritov, 1997), and the somatic marker hypothesis (Bechara & Damasio, 2005) from the broader psychological literature, as well as models more specific to health behaviour, including models of implicit attitudes and affective associations (Kiviniemi & Klasko-Foster, 2018), anticipated affect and affective attitudes (Conner, 2018), and perceived satisfaction (Baldwin & Sala, 2018). Also consistent with the basic principle of psychological hedonism, a number of theoretical approaches have taken a dual-processing perspective in attempting to explain how automatic processes influence health-related behaviours at the time that those behaviours are cued and available (Berkman, 2018; Hofmann, Friese, & Strack, 2009; Van Cappellen, Rice, Catalino, & Fredrickson, 2018; West & Brown, 2014; Wiers, Anderson, Van Bockstaele, Salemink, & Hommel, 2018; Williams, 2018, 2019). Common to all of these theories or conceptual models is the assumption that the effects of integral affect on behaviour is mediated by some form of affect processing, either reflective and explicit or automatic and implicit, or both.

Other theories or conceptual models of affect and behaviour emphasize the effects of incidental affect on behaviour. According to these formulations, behaviour is a function of how someone feels leading up to a behaviour, but independent of any anticipation of the behaviour. Sometimes, but not always, the effect of incidental affect on behaviour is moderated by how one expects to feel as a result of the behaviour (i.e., anticipated affect). For example, someone may be more likely to binge drink if they are feeling down and believe that drinking will make them feel better. Specific theories or conceptual models of incidental affect and behavior include affect congruency theory (Forgas, 1995; Schwarz & Clore, 1983), theories of stress and coping (Lazarus, 1993; O'Leary, Suri, & Gross, 2018), and affect regulation theory (Andrade, 2005;

Gross, 2015; Morris & Reilly, 1987; Tice, Bratslavsky, & Baumeister, 2001; Wegener & Petty, 1994). In addition to theories of affect-regulation, in which affect is the target of regulation, the role of affect has recently been emphasized in theories of self-regulation, in which behaviour, including health-related behaviour, is the target of regulation (Hall, Fong, & Lowe, 2018; Sheeran, Webb, Gollwitzer, & Oettingen, 2018; Rhodes, 2017).

Finally, multiple integrative frameworks have been proposed that take a broad approach by characterizing the differences and possible interrelationships among numerous affect-related constructs, rather than focusing on how one or two such constructs may influence behaviour. Williams and Evans (2014) distinguish between affect proper (including integral and incidental affect), affect-related cognition (including anticipated affect, affective attitudes, affective associations, and implicit attitudes), and affectively charged motivation (including wanting, desire, fear, and dread), with integral affective responses to a target behaviour influencing future performance of the behaviour through the mediational processes of affect related cognitions. Rhodes and Gray (2018) posit various pathways through which reflective affect (including affective judgments and anticipated affective reactions) and reflexive affect (including affective associations and peripheral affect) influence whether and how behavioural intentions are translated into behaviour. Kiviniemi and colleagues (2018) provide a broad framework for understanding how affective and cognitive factors may interrelate to influence behaviour, with (a) affect mediating or moderating the effects of cognition on behaviour, (b) cognition mediating or moderating the effects of affect on behaviour, or (c) contextual factors moderating the effects of both affect and cognition on behaviour. Likewise, the present authors propose a general framework (Figure 1) in which affect processing is posited to partially or completely mediate the effects of previous integral affect on future behaviour (Williams, Rhodes, & Conner, 2018b).

**Future Directions**

More research is needed to test these relatively recently advanced conceptual models of affect and behaviour, including distinctions among affect-related concepts. For example, is it possible to distinguish empirically (both in terms of measurement and manipulation) between affective associations and affective attitudes, and do these concepts have different relationships with behaviour? Another area for future research is the effects of during-behaviour versus post-behaviour affective response on future behaviour, and whether there are different mediators of these effects.

Relatedly the overlap between different types of affect as described in Figure 1 may vary across behaviours and this may have consequences for their relative power to predict behaviour. For example, Conner et al. (2015) showed that affective attitudes and anticipated regret were more strongly inter-correlated for risk compared to detection health behaviours (but not different from protection behaviours). Consistencies and inconsistencies between affective determinants and how this varies across behaviours may be an interesting area for further research on health behaviours. For example, in one individual physical activity might be performed only because of the positive affect experienced while performing the behaviour, while in another individual it is performed only to avoid the anticipated regret of not taking physical activity, while in a third individual both types of affective determinant are important. The relationship of differing types of affect and how they vary across health behaviours could be an interesting avenue for future research. For example, work has considered affective ambivalence concerning differently valenced affective influences and cognitive-affective ambivalence where affective and cognitive influences are differently valenced (Conner et al., 2002). Relatedly, the coherence of motivational influences including cognitive and affective factors as a moderator of intention-

health behaviour relationships has recently been examined (Sheeran & Conner, 2017). Theory and applied comparisons in relation to various different individual or groups of health behaviours may yield interesting insights.

## Implications for Health Behaviour Change

While a sound taxonomy of affect constructs and clear conceptual models for affective determinants of health behaviour are instrumental to advance affective science, using this evidence for behaviour change is paramount. Most research at this stage is focused on basic science (e.g., conceptualization of affect, the interplay among different affect concepts and between affect and cognition, and the relationships between affect and health-related behaviour) with either laboratory based or field-based observational designs. Also needed, however, is more applied research that translates theory and research on affective determinants of health behaviour into behaviour change interventions. Ideally, there is an ongoing feedback loop between basic and applied research, such that basic research provides a basis for intervention research and intervention research is used to further test and refine conceptual models (Head & Noar, 2014; Rothman & Salovey, 2007). As the discipline moves forward, we believe that behavioural interventions could focus on three routes: (1) direct modification of the affect constructs; (2) direct modification of other sources of behavioural influence (e.g., traditional social cognitive factors) in order to over-compensate for the effect of affective constructs; or (3) intervention upon moderators of the affect-behaviour link (Conner, Williams, & Rhodes, in press).

The most straightforward intervention approach to changing behaviour through affective constructs is likely by direct intervention. Interestingly, this has seen limited attention. There has been some evidence that priming (Kiviniemi & Klasko-Foster, 2018; Hofmann et al., 2010), messaging (Conner, 2018; Day & Coups, 2018; Rhodes & Gray, 2018) and altering experiences

(Rhodes & Gray, 2018), may foster health behaviour change directly by targeting the affect construct as a putative mediator. Still, there is a considerable gap in knowledge on interventions that approach behaviour change through more automatic means of affect (e.g., dual-process perspectives, hedonic motivation), despite the potential for the effectiveness of this approach (Williams, 2018; Hoffman, Friese, & Wiers, 2008). For example, interventions might be designed to reduce desires and cravings for health-related targets such as calorically dense foods, cigarettes, and alcohol, or to reduce dread for behaviours such as vigorous exercise and cancer screenings. This area of research is in its infancy, with only a handful of studies on any particular health behaviour. Reviews of behaviour change techniques in interventions (Michie et al., 2013) also demonstrate this paucity of direct intervention upon affective constructs in current research, as few expected techniques (e.g., monitoring of emotional consequences; e.g., information about emotional consequences) are ever present (Rhodes, Gray, & Husband, 2018). We believe this route of affect-behaviour intervention is an important area for sustained future research.

In contrast to direct intervention upon affect constructs, considerable experimental research has accumulated on modifications of cognitive sources of behavioural influence with mixed outcomes (Abraham & Michie, 2008; Prestwich et al., 2014). What is often missing in this literature, however, is an exploration of whether over-compensating on these cognitive factors may help alleviate the impact of detrimental affective factors on health behaviour. For example, a focus on various anticipated affective reactions (e.g., I will feel so proud of myself if I refrain from eating that cookie) in order to lessen the effects of affective attitude (e.g., eating that cookie would be a pleasure) on a given health behaviour could be an effective means of intervention. This may be a particularly effective means of intervention if a particular affective construct is considered less amenable to change due to evolutionary bases or powerful conditioning (Conner,

McEachan, Taylor, O'Hara, & Lawton, 2015; Wiers et al., 2018; Williams, 2018). More research is needed to examine how manipulations of one construct may improve health behaviour by over-riding the potency of other affect-behaviour relationships.

Finally, intervention upon moderators of the affect-behaviour link, may be the most important future direction for affective science and health behaviour (Sheeran et al., 2018). This route of intervention highlights affect regulation, with an overriding assumption that while affect constructs may be difficult to change (i.e., due to an evolutionary foundation), we may be able to mitigate their impact upon behaviour (Williams, 2018, 2019). Most conceptual models of affect and health behaviour do propose affect regulation through this form. For example, habit (Baldwin & Sala, 2018; Hall et al., 2018; McCarthy et al., 2018; Rhodes & Gray, 2018), identity (Rhodes & Gray, 2018), implementation intentions (Sheeran et al., 2018), mindfulness (Reese et al., 2018) and pharmaceuticals (Day & Coups, 2018; Reese et al., 2018) have all been proposed as possible ways to alter the impact of affect related constructs on health behaviour. Still, it is also clear that the research on this route of intervention is in its very early stages of evidence gathering. We hope that burgeoning research in this area will provide for a more definitive understanding of interventions on the affect-health behaviour link (see Conner et al., in press).

**Future Directions**

While direct intervention on the affect construct has received the most research attention in relation to health behaviour change, other ways to change behaviour that involve affect are promising. For example, implementation intentions (simple if-then plans) could be used to focus attention on cognitive influences (and detract from affective influences), to change affect, or to change the impact of affect on behaviour (Sheeran et al., 2018; e.g., "As soon as I feel anxious about attending my medical appointment then I tell myself that that feeling is perfectly

understandable"). A focus on anticipated affect in order to lessen the effects of affective attitude on a given behaviour could be an effective means of intervention, particularly when the affective experience of the behaviour is less amenable to change. Future research could fruitfully use multiple mediation tests to explore the effect of affective interventions that change behaviour on different affect mediators such as affective attitudes and anticipated affect. A further area for future research could be testing whether a focus on an alternative cognitive or affective influence might be more effective in reducing an existing affective influence.

Possibly the most important future direction for affect and behaviour change, however, may be through interventions targeting change in the moderators of the affect-behaviour link (Sheeran et al., 2018). This route to intervention highlights affect regulation, based on the assumption that while affect constructs may be difficult to change (i.e., due to an evolutionary foundation), it may be possible to mitigate the impact of affect on behaviour. For example, habit (e.g., Rhodes & Gray, 2018), identity (Rhodes & Gray, 2018), and implementation intentions (Sheeran et al., 2018) have all been discussed as possible ways to alter the impact of affect-related constructs on health behaviour. For example, Webb, Miles, and Sheeran (2012) provide a review of the effectiveness of different emotion regulation strategies including distraction, reappraisals, suppression, and concentration (distraction, reappraisal and suppression were shown to be an effective means to regulate emotions, while concentration was not). Future research should seek to explore differences between increasing and decreasing the impact of affect on behaviour, the extent to which there are differences for behaviours that need to be promoted versus those that need to be reduced, and the value of interventions designed to both change affect and change the impact of affect on behaviour simultaneously (see also Conner et al., in press).

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Figure 1: Proposed taxonomy of affect constructs

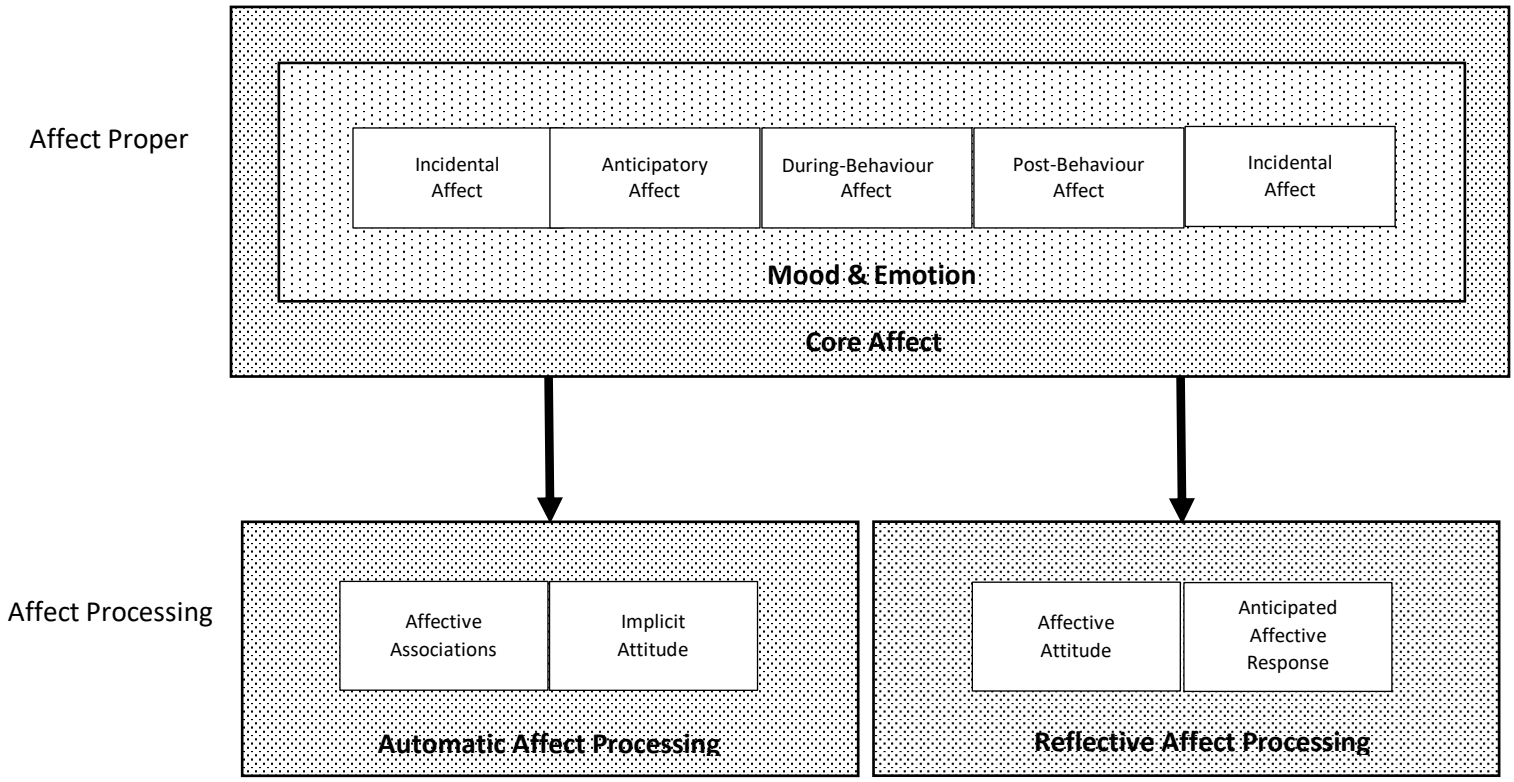

Figure 2. A model of the impact of integral affect on behaviour.