

Eating in response to emotions: Alexithymia, emotional eating,  
and associated psychological mechanisms



Katherine McAtamney  
BSc (Hons), MSc

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School of Psychology  
Faculty of Business, Law and Social Sciences  
Birmingham City University

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### **Abstract**

The overarching objective was to elucidate the relationship between alexithymia and eating in response to emotions. First, a systematic review synthesised the findings of nine eligible articles, providing preliminary evidence for a positive association between alexithymia and self-reported emotional eating. As the Dutch Eating Behaviour Questionnaire (DEBQ-EE) was the subjective emotional eating measure most frequently used by previous research, it became the subject of an exploratory ‘think aloud’ study. This study audio-recorded participants’ spoken aloud thoughts as they completed the DEBQ-EE online. Two cross-sectional studies were conducted to further explore alexithymia and emotional eating using other self-report measures (Emotional Eating Scale [EES] and Salzburg Emotional Eating Scale [SEES]) and identify mechanisms for potential intervention targets. Findings indicated an indirect relationship between alexithymia and emotional eating (EES) via emotion dysregulation, and subsequently a positive conditional indirect effect whereby greater emotion dysregulation and greater self-compassion interacted, leading to greater emotional eating (EES). It was concluded that neither emotion dysregulation nor self-compassion would be appropriate targets for emotional eating interventions. The construct of ‘feeling fat’ was introduced, considered to be a proxy description used when individuals are otherwise unable to identify/describe their negative feelings, and associated with unfavourable outcomes. Existing literature is largely situated within clinical contexts, despite presence within general populations, offering an opportunity to design a brief intervention to test whether encouraging identification and description of feelings would lead to reduced state sensations of feeling fat, within the general population. The findings of the study were unexpected, as despite no significant difference in change scores across groups, the control condition elicited the greatest mean reduction in feeling fat compared to the intervention conditions. A gap in the literature examining the relationship between self-compassion and feeling fat was also examined in this final study, providing preliminary support for an inverse relationship between the traits.

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## Dissemination of Research

### Chapter 2

McAtamney, K., Mantzios, M., Egan, H., & Wallis, D. J. (2023). A systematic review of the relationship between alexithymia and emotional eating in adults. *Appetite*, 180. doi: 10.1016/j.appet.2022.106279

### Chapter 3

McAtamney, K., Mantzios, M., Egan, H., & Wallis, D. J. (2022, June 9). *How do individuals with and without alexithymia report eating in response to emotions? A think-aloud study: Work in progress* [Poster Presentation]. Midlands Health Psychology Network, Online.

The findings of Chapter 3 will be prepared for submission to an appropriate journal, once identified.

### Chapter 4

McAtamney, K., Mantzios, M., Egan, H., & Wallis, D. J. (2021). Emotional eating during COVID-19 in the United Kingdom: Exploring the roles of alexithymia and emotion dysregulation. *Appetite*, 161(4). doi: 10.1016/j.appet.2021.105120

McAtamney, K., Mantzios, M., Egan, H., & Wallis, D. J. (2020, December 17). *Emotional eating during COVID-19 in the United Kingdom: The roles of alexithymia and emotion dysregulation* [Poster Presentation]. RESFEST, Birmingham City University, Online.

McAtamney, K., Mantzios, M., Egan, H., & Wallis, D. J. (2021, March 30-April 1). *Alexithymia and self-reported emotional eating: The mediating role of*

*difficulties in emotion regulation* [Poster Presentation]. British Feeding and Drinking Group Annual Conference, Online.

McAtamney, K., Mantzios, M., Egan, H., & Wallis, D. J. (2022, April 11). *Self-reported emotional eating: The roles of alexithymia and emotion dysregulation* [Poster Presentation]. RESJAM, Birmingham City University, Birmingham, United Kingdom.

## **Chapter 5**

McAtamney, K., Mantzios, M., Egan, H., & Wallis, D. J. (2021, July 29-30). *Examining the roles of self-compassion and emotion dysregulation in the relationship between alexithymia and emotional eating* [Oral Presentation]. Psychology Postgraduate Affairs Group, Online.

The findings of Chapter 5 are being prepared for submission to *Appetite*.

## **Chapter 6**

McAtamney, K., Pink, A. E., Williams, C., Mantzios, M., Egan, H., & Wallis, D. J. (2023, April 13). *Testing the efficacy of a brief emotion identification and description intervention for the state sensation of feeling fat* [Poster Presentation]. British Feeding and Drinking Group Annual Conference, Leeds University, Leeds, United Kingdom.

The findings of Chapter 6 will be prepared for submission to an appropriate journal, once identified.

## **List of Abbreviations**

BAQ-FF = Body Attitudes Questionnaire feeling fat subscale

BMI = Body Mass Index

DDF = Difficulty describing feelings characteristic of alexithymia

DEBQ = Dutch Eating Behaviour Questionnaire

DEBQ-EE = Dutch Eating Behaviour Questionnaire emotional eating subscale

DERS-SF = Difficulties in Emotion Regulation Scale Short Form

DIF = Difficulty identifying feelings characteristic of alexithymia

DDF = Difficulty describing feelings characteristic of alexithymia

EES = Emotional Eating Scale

EOT = Externally oriented thinking characteristic of alexithymia

SCS = Self Compassion Scale

SEES = Salzburg Emotional Eating Scale

TAS-20 = Toronto Alexithymia Scale

## **CHAPTER 1: GENERAL INTRODUCTION**

### **1.1 Chapter introduction**

This chapter will introduce and discuss existing empirical literature on the constructs explored within the research chapters of this PhD. It will present the constructs of emotional eating, emotion dysregulation, alexithymia, feeling fat, and self-compassion, to contextualise and justify the research aims and questions.

### **1.2 Emotional eating**

#### **1.2.1 What is emotional eating?**

Emotions are considered to be the states experienced by an individual, comprising three broad components: cognitive (i.e. self-reported), behavioural (i.e. observable), and physiological (i.e. measurable; Evers et al., 2018). Mood is distinct from emotion, as it is considered a more diffuse state which lasts longer (Gross, 1998). Affect, however, includes a range of emotions and moods either inferred by others from one's behaviour, an observable discrete emotional state, or generally feeling negative or positive (Evers et al., 2018). The common variance between all unpleasant emotions is referred to as negative affect. There is no widely agreed definition of *emotion*, but there is general consensus that discrete emotion types (e.g. joy, sadness, and fear) influence thought, decision-making and actions (Izard, 2007).

Emotional eating can be understood as eating in response to internal emotional signals (i.e. anxiety, anger, depression, loneliness) or stress (Arnow et al.,

1995; Heatherton & Baumeister, 1991; Polivy & Herman, 1985; van Strien, 2018), rather than physical hunger or satiety cues. Whilst stress is not an emotion, these are highly interdependent constructs which often accompany each other (Lazarus, 2006). Stress refers to the appraisal of a situation to exceed the individual's resources of coping (Lazarus & Folkman, 1984), in response to which negative emotions typically arise (i.e. anger, shame, anxiety) (Du et al., 2018). Therefore, eating in response to stress reflects eating in response to the negative cognitive, emotional and biological reactions that stressors evoke (Klatzkin et al., 2021).

Emotional eating is considered an atypical response to negative affect and stress, compared to the typical response of not eating (Gold & Chrousos, 2002). Although emotional eating is not exclusive to women, they generally rate themselves higher on self-report measures than men (Rasouli et al., 2019; Sukariyah & Sidani, 2014; Smith et al., 2020), and are more likely to respond to negative emotional states and life stressors with food consumption (Devonport et al., 2019; Ergang et al., 2019).

Emotional eating can be operationalised in several ways. For example, laboratory studies which measure quantity of food eaten in relation to changes in emotions (e.g. Altheimer et al., 2021; Oliver et al., 2000), self-reported estimations of amounts consumed to relation to usual (e.g. Meule et al., 2018), or self-reported ratings of desire/urge to eat food (e.g. Geliebter & Aversa, 2003; van Strien et al., 1986). However, as a result of these varying methods, each captures a different aspect of the emotional eating construct (Bongers & Jansen, 2016). The focus of this PhD is on the subjective experience of emotional eating, including self-reported estimations and desires to eat, rather than the measurement of objective food ingestion.

### **1.2.2 Is emotional eating problematic?**

For some individuals, increased self-reported negative affect is associated with greater intake of palatable foods (Epel et al., 2001; Fay & Finlayson, 2011; Fong et al., 2019), but for others, negative affect is associated with decreased food intake or unrelated to eating at all (Cardi et al., 2015; Evers et al., 2018). Not all individuals who eat in response to emotions overeat or experience a loss of control over their eating behaviour (Lindeman & Stark, 2001). However, for some individuals emotional eating is associated with disordered eating and body image dissatisfaction (Johnson & Wardle, 2005; Ricca et al., 2012). It may play a role in the development and maintenance of eating disorders (see Vögele et al., 2018) and negatively influence an individual's recovery (Ricca et al., 2010). Eating in response to negative emotions may be an important risk factor for disordered eating, independent of BMI in a community sample of adult women (Sultson & Akkermann, 2019). Emotional eating has been associated with food addiction (Davis et al., 2011; Nolan & Jenkins, 2019) and weaker inhibitory control (Jasinska et al., 2012), and eating dysregulation (Tan & Chow, 2014), which are constructs related to eating psychopathology. Reported urges to eat in response to negative emotions is higher in relation to eating disorders linked to overeating, but not restriction of food (Klatzkin et al., 2021).

Emotional eating is particularly relevant in relation to binge eating. It has been related to (van Strien et al., 2005) and identified as a predictor of binge eating in women (Pinaquy et al., 2003), and found to predict future binge eating in adolescent girls (Stice et al., 2002). Regardless of BMI and gender, emotional eating has been significantly correlated with the onset of binge eating behaviours and disorder (Masheb & Grilo, 2006), although only one third of the sample were men. Whilst

emotional eating and binge eating behaviours share similarities, they remain distinct constructs with different criteria surrounding emotional antecedent, perceived loss of control, and quantity of food consumed (Černelič-Bizjak & Guiné, 2022). Emotional eating can be problematic regardless of binge eating presence (Lindeman & Stark, 2001).

Emotional eating may present as a risk factor for aspects of physical health, as negative affect and distress are associated with an increased quantity of consumed snacks (O'Connor & O'Connor, 2004; Oliver & Wardle, 1999; van Strien et al., 2012) and less healthful choices such as opting for sweet and fatty foods (Oliver et al., 2000; Wallis & Hetherington, 2009; Zellner et al., 2006). The type of food consumed during emotional eating is not specified in the definition, although typically self-reported emotional eaters opt for comfort foods high in fat and/or sugar in response to negative affect (Fong et al., 2019; Kontinen et al., 2010; Macht, 2008). As such, this may increase the risk of physical health problems in individuals who frequently engage in emotional eating behaviours.

Emotional eating may also be problematic for psychological wellbeing. Research has found that eating in response to anxiety, anger, boredom and particularly depression was found to be associated with poorer wellbeing, greater eating disorder symptomatology and difficulties in emotion regulation (Braden et al., 2018; Geliebter & Aversa, 2003; Meule et al., 2018; Nolan et al., 2010). The homeostatic theory of obesity posits a circle of discontent involving increased body dissatisfaction, negative affect, and subsequent consumption of energy-dense foods (Marks, 2015). Research demonstrated that negative affect is associated with emotional eating urges, which in turn predict worsened negative affect (Haedt-Matt

et al., 2014), partially reflecting this reciprocal model. It has been proposed that the relationship between food consumption and negative emotions is likely bi-directional, with emotion affecting food intake and food intake affecting mood (Gibson, 2006). Elucidating the role of coping strategies as a function of eating behaviour would further our understanding of emotional eating and its potential effects on the onset and/or development of eating disorders (Spoor et al., 2007).

Research into emotional eating was initiated as an attempt to research obesity (e.g. Faith et al., 1997; Ganley, 1989) and has focused largely on individuals living with obesity and/or eating disorders. However, research indicates that emotional eating is an important clinical dimension for eating psychopathology (Ricca et al., 2012), even within the general population (Newman et al., 2007; Nguyen-Rodriguez et al., 2008; Polivy et al., 1994). Emotional eating behaviours have been reported and observed in women across all bodyweights and within community, clinical and non-clinical samples across the lifespan (Evers et al., 2010; Gibson et al., 2012; Litwin et al., 2016; van Strien et al., 1985, Vandewalle et al., 2016). It is important to continue to research emotional eating within non-clinical populations, as this may inform targeted interventions to reduce the risk of future eating disorders and associated adverse outcomes.

### **1.2.3 Positive emotional eating**

Whilst emotional eating is typically defined as overeating in response to negative emotions (negative emotional eating), eating in response to positive emotions has also been explored (positive emotional eating). However, positive emotional eating may reflect a different construct to negative emotional eating (Nolan



et al., 2010; van Strien et al., 2013), whereby positive emotional eating does not necessarily indicate inapt responses to emotions (van Strien et al., 2014) and predicts overeating via different mechanisms (Sultson et al., 2017). For example, positive emotional eating may be reflective of celebrations and the social facilitation of eating (de Castro, 1995; Herman, 2017) and instead represent a functional, healthy eating style (Braden et al., 2018; Geliebter & Aversa, 2003; Meule et al., 2018; Nolan et al., 2010). Whilst overeating in response to positive emotions has been observed (Cardi et al., 2015; Evers et al., 2013), it is often found not to be related to the poorer physical and psychological outcomes associated with negative emotional eating.

However, there is some evidence for poorer outcomes in response to positive emotional eating. When measured with the positive subscale of the self-reported Emotional Appetite Questionnaire (Geliebter & Aversa, 2003; EMAQ-P), positive emotional eating was related to binge eating in adults who have high emotional reactivity (i.e., increased ease with which positive emotions are activated; Barnhart et al., 2020). Furthermore, scores on the EMAQ-P have also been positively correlated with weight concerns, shape concerns, and dietary restraint, but not disordered eating, in a sample of university students (Barnhart et al., 2021).

The relationship between positive and negative emotional eating and their specific outcomes requires further research, but this is beyond the scope of the present thesis. There is a need to understand the mechanisms underlying emotional eating, particularly the generally agreed atypical and potentially problematic response of eating in response to negative emotions. As there is some evidence for the association between positive emotional eating and problematic aspects of eating behaviours and body image, it will not be excluded entirely from the research

conducted as part of this PhD and measures which capture aspects of negative and positive emotional eating will be utilised. However, the overarching focus of this thesis is negative emotional eating, as there is at present a wider body of evidence for its role in eating psychopathology and health implications.

### **1.2.4 Theories of negative emotional eating**

Several theories have been postulated to explain eating in response to negative emotions. These theories focus in varying degrees on learning processes, cognitive processes and interoception. The affect regulation theory (Gross, 1998) focuses on inadequate learned affect/emotion regulation strategies, the restraint theory (Herman & Polivy, 1980) proposes disinhibition occurs following restraint, the escape theory (Heatherton & Baumeister, 1991) focuses on attempts to escape aversive self-awareness, and the psychosomatic theory (Bruch, 1973) proposes a lack of interoceptive awareness surrounding bodily sensations and emotions. The emotion regulation model (Leehr et al., 2015) proposes a broader approach which draws upon the multiple theories of negative emotional eating. The range of theories highlights the complexity and multidimensional nature of emotional eating behaviour.

**1.2.4.1 Affect Regulation Theory.** Gross (1999) described affect or emotion regulation as how individuals experience and express their emotions, which plays an important role in maintaining mental and physical health (Gross, 2013). Expressive suppression is an emotion regulation strategy which attempts to reduce the negative emotional state experienced (Gross & John, 2003), and it is associated with lower wellbeing, life satisfaction and self-esteem (Gross & John 2003; John & Gross,

2004). The affect regulation theory posits that emotional eating is a method of using food to avoid directly addressing the emotions, as an expressive suppression strategy. This considers emotional eating to be a maladaptive coping strategy for negative emotion, whereby individuals *learn* to overeat in response to negative emotional states as an attempt to suppress them. Bruch (1971) proposed that parent-child feeding dynamics can influence the narrative that eating relieves negative emotional states and provides satisfaction, and that learning this can lead to future problematic eating behaviours. Similarly, Kaplan and Kaplan (1957) considered emotional eating to be the result of early life experiences where food was used as a coping strategy for psychological problems. Empirical support for this theory comes from research within clinical (i.e. binge eating) and non-clinical populations (Arnold et al., 1995; Kenardy et al., 1996; Heatherton & Baumesiter, 1991; Polivy & Herman, 1993) where it was found that food consumption was used to reduce negative emotional states.

**1.3.4.2 Restraint Theory.** The restraint theory (Herman & Polivy, 1980) posits that negative emotions trigger overeating in restrained eaters, also described as chronic dieters. Research suggests that individuals who diet or restrict food intake are prone to overeating in response to negative affect (Jackson et al., 2003). Research supporting this theory found a significant association between self-reported eating restraint and emotional eating, in samples of both men and women (Smith et al., 2020). Further, compared to non-restrained eaters, restrained eaters were found to exhibit disinhibition when experiencing negative emotions (Heatherton et al., 1991; Polivy et al., 1994; Ward & Mann, 2000), and that following the

*perceived* consumption of caloric foods, restrained eaters overate regardless of the actual caloric content of the consumed foods (Herman & Polivy, 2004; Knight & Boland, 1989; Spencer & Fremouw, 1979). Feelings of guilt or disappointment about breaking the diet may further perpetuate overeating; Herman and Polivy (2004) explained that whilst it may appear irritational to overeat in response to negative emotional states triggered by perceived overeating, the overeating is in response to the negative emotions invoked by the experience (Herman & Polivy, 2004). These findings indicate that restrained eaters experience disinhibition following the perceived breaking of their lower-calorie intake goals, underpinned by cognitive mechanisms and beliefs about permitted foods, rather than physiological effects of caloric intake.

However, some research suggests that restrained eating is unrelated to emotional eating. Wallis and Heatherington (2004) found that restrained eaters increased their food intake in response to all stressors, whilst emotional eaters increase their food intake only in response to ego-threat stressors, indicating that emotional eating is different in that it only functions to target self-focused negative emotions.

**1.3.4.3 Escape Theory.** The Escape Theory (Heatherton & Baumeister, 1991) proposes that overeating in response to negative emotions reflects an attempt to escape from ego-threatening stimuli that cause aversive self-awareness, to avoid the negative affect and implications. By focusing attention on something external, such as overeating food, the individual escapes this unwanted self-awareness. Evers et al. (2010) suggest that this narrowing of the attention focus may result in a greater

likelihood of bingeing. Experimental findings support this theory, whereby emotional eaters were observed to have an increased intake of chocolate when responding to an ego-threatening stimulus, compared to a control condition (Wallis & Heatherington, 2004). Escape theory shares similarities with other emotional eating theories in that the trigger is negative emotional states, however, it differs in its proposal of relief. In escape theory, negative emotions are reduced during the act of eating (instead of after) due to reduced self-awareness, proposing that negative emotions will subsequently increase as eating ceases and self-awareness returns (Heatherton & Baumeister, 1991).

**1.3.4.4 Psychosomatic Theory.** Building upon the affect regulation theory, Bruch (1973) later described eating in response to emotions as a result of poor interoception and inability to distinguish between emotions and physical sensations of hunger and satiety, reflecting an inaccurate “programming” of hunger and satiety signals (Bruch, 1973). Another mechanism may be the role of experiential avoidance, which is related to maladaptive coping (Hayes et al., 1999) but a broader construct describing an unwillingness to engage with internal events, including bodily sensations and emotions, and attempts to alter their form or frequency (Hayes et al., 1996; Litwin et al., 2016). Experiential avoidance may include engaging in distraction activities to avoid emotions and is considered a maintenance factor for eating disorders with short- and long-term negative implications (Hayes et al., 1999; Rawal et al., 2010). Research has identified that negative emotions may lead to emotional eating through experiential avoidance, suggesting that promotion of acceptance of internal states (i.e. bodily sensations and negative emotions) may prevent and

reduce emotional eating (Litwin et al., 2016). Inaccurate awareness of physiological sensations may lead to increased negative emotional states, which could in turn increase the risk of disordered eating behaviours serving to regulate these states (Boswell et al., 2015; Zucker & Bulik, 2020).

**1.3.4.5 Emotion regulation model.** Leehr et al. (2015) conducted a systematic review of overeating and binge eating behaviours, to test a proposed emotion regulation model of eating in response to negative emotions. They drew upon the earlier theories, and presented the emotion regulation model which comprised three components: (1) negative emotions as a trigger, (2) eating to regulate the emotions, and (3) down-regulation of the emotions either during or after eating, resulting in relief. The review found support for this model in a sample of individuals with binge eating disorder and those without the disorder, all of whom were living with obesity. Klatzkin et al. (2021) built upon this, proposing a positive feedback loop exists in which eating in response to negative emotions and stressors is in turn strengthened over time, in part due to emotional relief not being sustained. This highlights that emotional eating may not achieve the aim of emotional relief, and as such interventions to break the feed-forward cycle are required.

### **1.2.5 Eating to regulate negative emotions**

A common underpinning feature of the above theories is that emotional eating occurs in response to negative emotions and/or self-awareness, and potentially serves as a function to relieve the individual from these aversive states. Coping refers to the effective management of stressful stimuli and negative emotions these

trigger (Folkman & Lazarus, 1985), with three strategies proposed: problem-focused (addressing the problem), emotion-focused (regulating negative emotions caused by the problem), and avoidance (distracting oneself; Endler & Parker, 1994). Whilst it is argued that there are neither adaptive nor maladaptive coping strategies, a reliance on emotion-focused and avoidance coping strategies is considered unhelpful beyond the short-term and associated with poorer psychological wellbeing (see Biggs et al., 2017; Graven et al., 2014). Previous research has highlighted an association between emotion-focused and avoidance coping strategies with binge eating and disordered eating attitudes (Freeman & Gil, 2004; Koff & Sangani, 1997), as well as emotional eating (Spoor et al., 2007). Spoor et al. identified this relationship in clinical and community samples, highlighting that a reliance on these coping strategies, rather than task-focused coping, was linked to greater levels of emotional eating. These findings provide support for the emotional eating theories underpinned by maladaptive regulation and avoidance of aversive emotional states.

It has been hypothesised that some individuals have fewer adaptive emotion regulation strategies and therefore exhibit overeating due to learned experiences of food combatting these aversive states (Andrews et al., 2011; Bongers & Jansen, 2015). The above theories of negative emotional eating indicate that individuals who experience negative emotional states utilise strategies available to them and for some this refers to (over)eating (Evers et al., 2010; Wiser & Telch, 1999). This suggests that emotional eating may function as a method of emotion regulation, attempts to control or escape affect, or learned behaviours. However, research indicates that for some individuals this strategy may be maladaptive and have negative implications for mental and physical wellbeing. Therefore, it is not the

presence of negative emotions that is problematic, but the narrow availability of more adaptive coping and regulation strategies to manage these emotions. It has been proposed that those engaging in emotional eating may benefit from treatments addressing emotion through the enhancement of emotion regulation skills via cognitive behavioural therapy, relaxation training, or mindfulness training (Manzoni et al., 2009; O'Reilly et al., 2014; van Strien, 2018). Understanding the psychological mechanisms underpinning and associated with emotional eating will help to develop and inform these interventions.

### **1.3 Emotion dysregulation**

#### **1.3.1 What is emotion dysregulation?**

Emotion regulation is defined as the “attempt to influence which emotions we have, when we have them, and how these emotions are experienced or expressed” (Gross, 1998, p.224). On the other hand, emotion dysregulation (or difficulties in emotion regulation, these terms will be used interchangeably) is indicated by the relative absence of adaptive emotion regulation techniques including: an awareness, understanding and acceptance of emotions; a flexible use of non-avoidant, situationally appropriate strategies to modulate intensity and duration of emotion responses to meet desired goals and situational demands; in addition to a willingness to experience negative emotions (Gratz & Roemer, 2004).

Maladaptive emotion regulation, such as persistent avoidance or control of emotion (Gratz et al., 2018), is thought to function to regulate emotions when putatively adaptive strategies are unavailable (Gratz, 2003). Reviews support that emotion dysregulation underpins broad mental health difficulties and



psychopathology (Aldao et al., 2010; Gross & Munoz, 1995). The role of emotion dysregulation is supported in loss-of-control eating (Kenardy et al., 1996) and disordered eating (Lavender & Anderson, 2010; Whiteside et al., 2007), with greater reports of bingeing and purging behaviours coinciding with distress (Racine & Wildes, 2013). Emotion dysregulation has been identified as a moderator in the relationship between emotional eating and disordered eating, with difficulties in emotion regulation strengthening the relationship between negative emotional eating and disordered eating (Barnhart et al., 2021), and not positive emotional eating.

Emotion dysregulation is integral to understanding emotional eating, because as identified by the theories discussed above, it may be the lack of adaptive emotion regulation strategies for addressing negative emotions, and not the experience of negative emotions itself that influences eating behaviours (Evers et al., 2010). Therefore, the concept of emotional eating may not refer simply to eating when feeling negative, but rather to eating when negative emotions are regulated in putatively maladaptive ways (Evers et al., 2010).

### **1.3.2 Promoting emotion regulation to target emotional eating**

This means emotion regulation strategies may be a clear intervention target for those who would benefit from support with emotional eating behaviours. It may be possible to minimise engagement in emotional eating and reduce risk of adverse outcomes by instead promoting a broader range of adaptive emotion regulation strategies (Macht & Simons, 2011), and it has been suggested that teaching emotion regulation skills could result in decreased emotional eating (Roosen et al., 2012). However, adaptive emotion regulation requires the awareness and understanding of

emotions and the ability to monitor emotional states (Lane & Schwartz, 1987). For some individuals, promoting adaptive emotion regulation may be difficult as adaptive regulation first requires the ability to identify and describe the emotions being experienced (Vine & Aldao, 2014) – these are the key affective difficulties characterising alexithymia.

### 1.4 Alexithymia

#### 1.4.1 What is alexithymia?

Sifneos (1973) coined the term alexithymia (may be translated from the Greek a [no] – lexis [words] – thymia [emotion]; literal meaning “no words for emotion”) to describe a cluster of characteristics observed in psychosomatic disorders, thought to be observable in other groups too, including mood disorders (e.g., Wise et al., 1990; Zeitlan & McNally, 1993), abuse and substance dependency (e.g., Uzun, 2003; Haviland et al., 1994), and eating disorders (e.g., Petterson, 2004; Taylor et al., 1996). Nemiah et al. (1976) noted key characteristics related to alexithymia, and further noted that individuals exhibiting these appeared *wooden and stiff* in their manner, displaying few non-verbal expressions of emotion, and occasionally manifested brief outbursts of emotion without an awareness of what prompted this behaviour. They may report feeling sad or angry, but when asked, are unable to elaborate upon this experience. In emotional situations, vague expressions may be made (e.g., I feel sad), physical complaints may be expressed (e.g., My stomach feels upset), or uncertainly demonstrated (e.g., I don't know) (Krystal, 1979). Individuals may also appear chronically dysphoric or display outbursts of emotion, but upon questioning it is usually revealed that “they know very little about their own

feelings and, in most instances, are unable to link them with memories, fantasies, or specific situations” (Taylor & Bagby, 2000, p.29).

A consensus was reached at the 11<sup>th</sup> European Conference on Psychosomatic Research, held in Germany in 1976, to widely accept alexithymia as an interconnected set of differences in emotional processing, with salient characteristics of: (a) difficulty identifying feelings and distinguishing these from other bodily sensations that accompany emotions; (b) difficulty describing feelings to other people; (c) constricted imaginal processes evidenced by a paucity of fantasies referable to feelings; and (d) cognitive style characterised by a preoccupation with external events rather than inner experiences (Nemiah et al., 1976; Taylor et al., 1997; Taylor & Bagby, 2000). The cognitive characteristics of absence of fantasy and externally oriented cognitive style correspond to *pensée opératoire*, the operational thinking style observed by Marty and M’Uzan (1963) amongst French patients experiencing somatic disorders.

It is best conceptualised as a dimensional construct which is normally distributed in the general population (Mattila et al., 2010; Parker et al., 2008), whereby individuals present with varying degrees of alexithymic characteristics. However, when approaching alexithymia as a categorical construct it is considered to have a prevalence of approximately 10% of the general population (Honkalampi et al., 2000; Kokkonen et al., 2001; Mattila et al., 2006; Salminen et al., 1999), and a greater prevalence within particular clinical groups, such as those with eating disorders, mood disorders, and autism spectrum conditions (Carano et al., 2006; Honkalampi et al., 2000; Kinnaird et al., 2018; Schmidt et al., 1993). Alexithymia is not a discrete psychiatric disorder, nor related to a specific disorder or

developmental condition (Lumley et al., 2007). Rather, it is viewed a personality trait associated with greater vulnerability to mental disorders and poorer treatment outcomes (Leweke et al., 2012; Pinna et al., 2020).

The construct of alexithymia remains subject to various conceptualisations and theoretical perspectives. It has been proposed that alexithymia is due to defective cognitive ability to associate perceived feelings with their mental representations, defective cognitive interoception of physical symptoms accompanying emotions, or faulty appraisal of attention (Ferraro & Taylor, 2021; Preece et al., 2017; Taylor & Bagby, 2021). Some researchers question whether alexithymia reflects difficulty putting emotions into words (i.e. feelings), or an unawareness of what they feel (Lane et al., 2015). This is termed affective agnosia (i.e., not knowing or recognising emotions), which has been rebutted by other key researchers within the field of alexithymia, remaining an ongoing point of debate of alexithymia conceptualisation (see Taylor et al., 2016; Taylor & Bagby, 2021). The argument against this is that alexithymia does not refer to a reduced experience of emotional feelings and/or arousal by emotion-inducing events. Rather, individuals with a greater degree of alexithymic characteristics experience emotions in response to stimuli, but subsequently have difficulty identifying and describing the subjective feelings to others (Taylor et al., 2016). There have also been discussions surrounding the extent to which alexithymia relates to interoception. Brewer et al. (2016, p.16) conclude that “alexithymia is synonymous with interoceptive impairment”. However, other researchers argue that interoception levels may predict affective alexithymic characteristics, but this does not provide evidence they are the same construct (Gaggero et al., 2021). Future research into alexithymia and

interoception should examine whether interoception related to alexithymia reflects difficulties detecting physiological states, or rather difficulties interpreting emotional and physiological states accurately (Taylor & Bagby, 2021).

Whilst the aetiology of alexithymia remains to be elucidated, numerous theoretical explanations have been proposed. Some existing literature refers to *primary* and *secondary* alexithymia. Primary alexithymia is conceptualised as a “life-long dispositional factor that can lead to psychosomatic illness” (Lesser, 1981), which stems from early developmental events such as childhood trauma and negative relationships with caregivers (Krystal, 1979). Secondary alexithymia is conceptualised as characteristics deriving from significant events, trauma across the lifespan, sociocultural or psychodynamic factors (Taylor et al., 1997). The key distinction is that primary alexithymia may present as a vulnerability factor for adverse outcomes and psychopathology, whereas secondary alexithymia is considered a consequence of these (de Vente et al., 2006). Regardless of the proposed aetiology, the characteristics of alexithymia remain the same.

The most common conceptualisation of alexithymia considers it to be a trait deficit in the cognitive processing of emotional experience, such that individuals have a limited capacity to symbolise emotions and elaborate upon emotional experience (Taylor et al., 2016). There is also debate surrounding the relative stability of alexithymia as either a stable personality trait or a state-dependent phenomenon (Luminet et al., 2001), which reflects the argument for primary and secondary classifications of alexithymia. Some consider alexithymia to be a trait and whilst levels can fluctuate, individual differences remain similar over time (Norman et al., 2019), with support from findings that levels of alexithymic characteristics were found

to be stable over 11 years in adulthood (Tolmunen, 2011) and unlikely to be affected through interventions (Iancu et al., 2006; Schmidt et al., 1993). However, other interventions aimed at improving emotion regulation and reducing stress have resulted in reduced levels of alexithymia (Cameron et al., 2014; Levant et al., 2009; Melin et al., 2010) and emotion-focused therapeutic interventions for eating disorders have also led to reductions in alexithymia levels (for a review, see Nowakowski et al., 2013). A recent systematic review identified that emotion-focused therapy (i.e. dialectical behaviour therapy) may be related to self-reported decreases in levels of alexithymic characteristics and increases in ability to identify emotional states (Salles et al., 2022), although this was limited by heterogeneity of the limited number of studies. Further research into the application of suitable clinical approaches to working with alexithymia, as a state or trait construct, have been called for (Samur et al., 2013).

### **1.4.2 Alexithymia and emotion dysregulation**

Alexithymia is associated with greater levels of emotion dysregulation (Pandey et al., 2011). These constructs are conceptually closely related but are considered independent, with some overlap which may reflect a shared underlying deficit in understanding of emotions, i.e. a lack of emotional awareness (of emotion dysregulation) and difficulty identifying feelings (of alexithymia). Pandey et al. (2011) also suggested that the relationship between alexithymia and increased levels of mental health difficulties is potentially a result of difficulties with emotion regulation. Individuals with higher levels of alexithymia experience problems with processing and subsequently regulating emotions (Barrett et al., 2001), which in turn increases

the risk of developing conditions characterised by (Goerlich, 2018) or behaviours associated with emotion dysregulation. Alexithymia has been associated with many excessive behaviours, such as problematic alcohol and drug use (Cruise & Becerra, 2018; Lyvers et al., 2013; Lyvers et al., 2014), exercise and internet addictions (Lyvers et al., 2021), and non-suicidal self-injury (Sleuwaegen et al., 2017). In addition to a higher prevalence of alexithymia in these and other clinical groups, alexithymia has also been linked to poorer well-being and emotion regulation in the general population (Honkalampi et al., 2000; Pandey et al., 2011; Saxena et al., 2011), leading to it being considered a transdiagnostic risk factor for poor emotional functioning (Valdespino et al., 2017).

### **1.4.3 Alexithymia and disordered eating**

Vanheule (2008, p.332) described alexithymia as a “difficulty in processing and regulating affective arousal by means of mental representations”. This offers a theoretical understanding of the underlying processes in the relationship between alexithymia and eating disorders (Morie & Ridout 2018), as negative emotional states are not processed or regulated adaptively, leading to expression as somatic sensations or excessive behaviours, as an attempt to downregulate arousal (Bagby et al., 2020). The relationship between alexithymia and eating disorders has been examined by a systematic review (see Nowakowski et al., 2013) and meta-analysis (see Westwood et al., 2017), with findings highlighting higher levels of alexithymia in populations with eating disorders compared to control groups. There is evidence of alexithymia manifesting in individuals with eating disorders through affective characteristics (difficulty identifying and describing feelings) rather than the cognitive

characteristics (Corcos et al., 2000; Pinaquy et al., 2003; Taylor et al., 1996; Troop et al., 1995). The presence of alexithymia is related to poorer clinical and treatment outcomes in patients with eating disorders (Pinna et al., 2015; Speranza et al., 2007).

Alexithymia is most strongly associated with binge eating disorder (BED; Aloï et al., 2017; Wheeler et al., 2005). BED is an eating disorder prevalent in approximately 1% of adult women (Giel et al., 2022), characterised by the overconsumption of food and a sense of loss of control often in the absence of hunger and unaccompanied by compensatory behaviours (American Psychiatric Association [APA], 2013). The association between alexithymia and binge eating may be understood through the emotion regulation and interoceptive deficit frameworks, reflecting the earlier discussed theories of negative emotional eating (as discussed, conceptually similar behaviours but differences in characteristics). Already discussed is the idea that alexithymia is related to mental health difficulties through emotion regulation, but also considering a characteristic of alexithymia is “the impaired ability to distinguish feelings from other bodily sensations”. This is conceptually similar to poor interoception and a diminished recognition and interpretation of bodily sensations (Murphy et al., 2018), as identified in the psychosomatic theory (Bruch, 1973). This was recently tested by Lyvers et al. (2022), who examined models to see if the link between alexithymia and binge eating was better explained by maladaptive emotion regulation or deficits in interoceptive awareness. The study offered support for the emotion dysregulation framework of the association between alexithymia and binge eating, and no support for the interoceptive deficit framework.



There is also evidence for the relationship between alexithymia and non-clinical disordered eating. A recent review of studies with non-clinical samples of children and adolescents identified distinct domains of emotional regulation, including difficulty describing feelings, as predictive factors of overeating behaviour (Favieri et al., 2021), although not all studies employed specific measures of alexithymia. In a sample of adults from the general population, affective characteristics of alexithymia were found to predict disordered eating directly, and indirectly via negative affect (Wallis & Ridout, 2022). Consequently, the authors called for interventions targeting the identification and description of feelings for individuals at risk of disordered eating.

### **1.4.4 Alexithymia and emotional eating**

The suggestion that individuals with heightened levels of alexithymia experience difficulties processing and regulating emotions and then subsequently experience conditions and behaviours underpinned by this (Goerlich, 2018; Pandey et al., 2011), is evidenced by the relationship with disordered eating in clinical and non-clinical populations. A recent review proposed alexithymia and emotion dysregulation to be among possible mechanisms of emotional eating (van Strien, 2018), yet the relationship between alexithymia and emotional eating has not been extensively researched. Existing research indicates a potential positive relationship between these constructs, more specifically between emotional eating and the affective characteristics of difficulty identifying and describing feelings (Larsen et al., 2006; Ouwens et al., 2009; Pink et al., 2019). Emotional eating was found to be significantly predicted by difficulty identifying feelings in individuals with binge eating

disorder (Pinaquy et al., 2003), and experimental findings with student samples suggest those with difficulties identifying and describing their feelings showed more stress-induced eating (van Strien & Ouwens, 2007). Lyvers et al. (2022) found that after controlling for demographic variables, emotional eating partially mediated the relationships between both alexithymia and emotion dysregulation with binge eating. This highlights the role of emotional eating in subsequent binge eating behaviour, in samples characterised by higher levels of alexithymic characteristics and difficulties in emotion regulation, and alludes to the importance of informing and developing interventions for emotional eating to prevent exacerbation of disordered eating behaviours and associated negative implications.

How alexithymia relates to emotional eating remains unclear. Two theoretical mechanisms have been proposed, reflecting those related to binge eating behaviour: (1) alexithymia as a deficit of interoception results in insensitivity to satiety cues, thus eating in response to bodily sensations that are not hunger such as emotional arousal; and (2) eating to regulate negative affective states common in alexithymia, thus emotional eating represents maladaptive regulation of those emotions. These mechanisms are not necessarily mutually exclusive (Lyvers et al., 2019), and logically may both be supported through learning to identify and respond to emotions and bodily sensations more adaptively. Given the findings of Lyvers et al. (2022) when examining binge eating, it may be hypothesised that the findings can be extrapolated to the context of alexithymia and emotional eating, in that emotion dysregulation rather than interoceptive deficits drive the relationship. Indirect support for the relationship between alexithymia and emotional eating, through emotion dysregulation comes from Spence and Courbasson (2012) who tested two models,

within a sample of men and women seeking treatment for eating and substance use disorders. The first model found that affective characteristics of alexithymia (i.e., difficulties identifying and describing feelings) were negatively related to negative mood regulation, whilst the cognitive characteristic (i.e., an externally oriented thinking style) was positively related to negative mood regulation. This indicated that those who experienced difficulties identifying and describing feelings felt less capable at regulating negative mood, and those who focus more on external stimuli than emotional stimuli felt more capable at regulating their mood. The second model found that both poorer and greater negative mood regulation were related with emotional eating. The authors concluded that this finding may reflect differences in the purpose of emotional eating, as either (a) an effective behavioural coping strategy, or (b) an ineffective coping strategy for negative mood, out of despair.

Whilst there have been reviews and meta-analyses of the research exploring the relationship between alexithymia and disordered eating (see Nowakowski et al., 2013; Westwood et al., 2017), to date there has been no review into the relationship specifically between alexithymia and emotional eating. This PhD will aim to synthesise current literature and explore this relationship and its underpinning mechanisms further, with the purpose of informing future emotional eating interventions.

## **1.5 Feeling fat**

### **1.5.1 What is feeling fat?**

Feeling fat was first proposed to be a broad concept under the umbrella of body image dissatisfaction (Garner & Garfinkel, 1981), but this understanding

developed and it is now described as a specific affective aspect of body image dissatisfaction more complex than objective or subjective body weight (Striegel-Moore et al., 1986; Tiggeman, 1996). Feeling fat is conceptualised as the somatic experience of carrying excess weight, regardless of objective body mass (Striegel-Moore et al., 1986), reported to fluctuate in intensity across the day (Fairburn, 2008) regardless of physical body changes, unlike other more stable traits of body image dissatisfaction. Whilst the state of feeling fat is considered to fluctuate across the day, it has also been conceptualised as a trait, with some individuals more vulnerable to the sensation of feeling fat (Fairburn, 2008). Research finds strong associations between feeling fat and negative affect across clinical and non-clinical populations (Linardon et al., 2018; Mehak & Racine, 2019), and this may offer an explanation for fluctuating levels of feeling fat across the day (Figure 1.1; Fairburn, 2008). Feeling fat was initially understood to reflect emotional distress and an impairment in ability to identify this distress (Andersen, 2000), but has since been further elaborated to include somatic experiences (Fairburn, 2008). Such somatic experiences may include tight fitting clothing, abdominal bloating, and thighs touching. The construct is defined in the transdiagnostic theory of eating disorders as

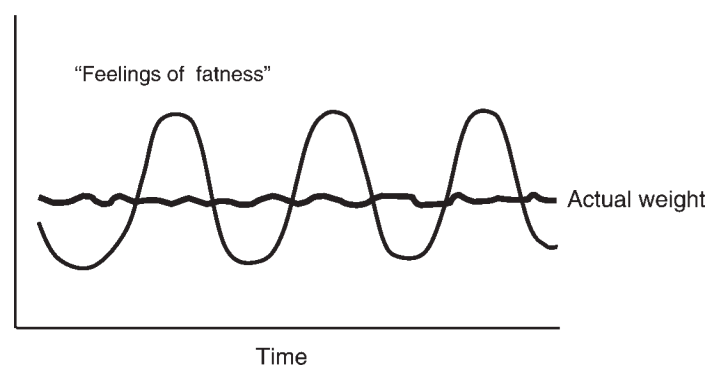


Fig. 1.1 A schematic diagram illustrating fluctuating “feelings of fatness” from Fairburn (2008)

a cognitive attribution error, whereby negative emotional states and somatic sensations which fluctuate across the day are inaccurately labelled (Fairburn, 2008).

Feeling fat holds much relevance in the field of clinical psychology, as the experience of feeling fat has several implications regarding the psychological health of those with and without eating disorders. This is important, as the prevalence of feeling fat is widespread. One study found that whilst all participants with eating disorders and all who diet reported feeling fat, so did 82% of the non-dieting general population group, and across all groups this was associated with distress, negative self-beliefs and negative emotions (Cooper et al., 2007). It has been proposed that the sensation of feeling fat may be more prevalent and detrimental than being overweight is considered to be (Cohen et al., 2019; Jansen et al., 2008). Provisional support for the amenability of the state sensation of feeling fat comes from a recent experimental study (Pink et al, 2021), making it a potential area for intervention given the negative implications it has for clinical and non-clinical populations. Despite its significance, empirical research on feeling fat is limited, particularly in groups without an eating disorder diagnosis for whom feeling fat is still prevalent and associated with adverse emotional outcomes and wellbeing (Mehak & Racine, 2021).

The body displacement hypothesis aims to explain feeling fat, by positing that negative affect is projected onto the body experienced as feeling fat (McFarlane et al., 2011). Support comes from research which found that depressive symptoms correlated with 'feeling fat' intensity and associated distress among non-dieters, dieters and women with anorexia nervosa (Cooper et al., 2007). However, feeling fat remained associated with eating pathology when controlling for negative affect (Cooper et al., 2007; Linardon et al., 2018; Mehak & Racine, 2021), suggesting that

body displacement does not sufficiently explain 'feeling fat'. Further, an experimental induction of anxiety (giving a speech) led to greater perceived weight gain than imagined consumption of fattening foods among non-clinical restrained eaters, whereas only an imagined food consumption induction increased feeling fat among individuals with eating disorders (Coelho et al., 2008). This finding indicates that feeling fat is more than just an expression of negative affect, meaning the experience of feeling fat is not universal and that differences may exist in the understanding and experiences of feeling fat for those in clinical vs non-clinical groups.

It is likely that feeling fat is influenced by culture and gender. Traditionally in western societies, weight and shape are intrinsically linked to women's social success, with a minimal effect upon men's success (Rodin, 1993). Stigmatisation of fatter bodies remains a prevalent issue within western cultures (Fikkan & Rothlum, 2012; Gailey & Harjunen, 2019), and internalised weight stigma and thin ideals are found to contribute to clinical and subclinical disordered eating (Mehak et al., 2018; Striegel-Moore & Bulik, 2007). As such, feeling fat is found to be an important contributor to eating disorders in research conducted amongst western populations (Mehak & Racine, 2020). Eating disorder symptoms underpinned by fear of fatness are documented to increase with exposure to western societies (Lai, 2000), and it is proposed that similar effects are seen for the experience of feeling fat with an reduced prevalence of this sensation in contexts with lower weight stigma.

Typically, women experience greater general body dissatisfaction (Frederick et al., 2007) and much of the research in this area focuses on women. A stronger relationship between feeling fat and clinical impairment (related to eating disorder symptoms) was reported in women compared to men, but the strength of the

relationship between feeling fat and eating pathology in non-clinical groups was not found to differ by gender (Mehak & Racine, 2021). Whilst it may be potentially less prevalent, it appears that feeling fat still presents psychological implications regardless of gender and therefore men should be included in research. However, it has been proposed that the mechanisms underpinning the relationship between feeling fat and eating pathology may differ by gender, with negative emotional experiences underpinning the relationship in women, and cognitive elements (e.g. intrusive thoughts about body shape) underpinning the relationship in men (Mehak & Racine, 2021). This makes research with mixed-gender samples difficult to draw conclusions from, when the aim is to inform interventions. These findings indicate the importance of research into feeling fat, and the need to consider the context of culture and gender, as well clinical vs non-clinical groups, when designing research and concluding findings to inform interventions.

### **1.5.2 Relationship with alexithymia**

Related to the understanding of feeling fat as an expression of negative affect, the experience of feeling fat has been explained as a type of alexithymia (term used in its literal sense of *no words for feelings*; Andersen, 2000). It has been specifically proposed that individuals with eating disorders voice “I feel fat” when they are otherwise unable to identify and/or describe the negative emotion they are experiencing, alongside inaccurate labelling of somatic sensations and overconcern with weight and shape (Fairburn, 2008). Recent research has found feeling fat and alexithymia to be associated (Pink et al., 2021; Morales et al., 2022), which may be underpinned by the alexithymic characteristics of difficulty identifying and describing

feelings and distinguishing these from other bodily sensations. However, Morales et al. (2022) found that alexithymia did not predict feeling fat, rather depressive symptoms were the strongest predictor of feeling fat.

The manipulation of the sensation of ‘feeling fat’ has been the subject of a recent study (Pink et al., 2021). Using four different conditions, researchers were able to elicit sensations of ‘feeling fat’ via negative self-comparison – but only in those with higher levels of alexithymic characteristics. As discussed above, conceptualisations of alexithymia as both a trait and a state are argued, with some support for the amenability to reduction of levels of alexithymia. As reporting the sensation of feeling fat may be an expression of negative emotions, this may be an appropriate momentary measure of ability to identify and describe feelings within the context of developing interventions to increase these abilities to improve associated adverse eating and body image outcomes.

### **1.5.3 Relationship with eating behaviours**

Feeling fat is a clinically relevant feature of eating disorders and a treatment target within clinical populations (Messer & Linardon, 2021). One study found that whilst all participants with anorexia nervosa reported having felt fat at some point, so did all participants who reported dieting and 82.4% of participants who reported not dieting (Cooper et al., 2007). This demonstrates that feeling fat is not specific to individuals diagnosed with eating disorders. Further, within a sample of undergraduate students, feeling fat related to eating pathology regardless of the severity of reported eating disorder symptoms (Mehak & Racine, 2021). In samples of women with eating disorders (anorexia nervosa or bulimia nervosa), and non-



clinical mixed-gender samples, feeling fat is found to significantly explain variance in eating pathology even when controlling for over-evaluation of weight and shape and depressive symptoms, which are well-established predictors of eating pathology (Linardon et al., 2018; Mehak & Racine, 2021).

A greater experience of feeling fat was found among restrained, than non-restrained eaters (Wardle & Foley, 1989) and common assumptions are that feeling fat would motivate restrictive eating behaviours (i.e. dieting) to counter this feeling of fat (Fairburn, 2013). However, recent research highlights a positive relationship between feeling fat and binge eating behaviours, and this was partially mediated by negative emotions (Anderson et al., 2022). Research conducted with an undergraduate mixed-gender sample found that frequency of feeling fat was positively associated with binge eating severity, even when controlling for BMI (Mehak & Racine, 2021). The sensation of feeling fat was found to be more intense immediately before and after an episode of binge eating, compared to baseline levels (Powell & Thelen, 1996). Even after compensatory behaviours, the sensation of feeling fat reduced but remained significantly greater than it was at baseline. This study also found that negative affect intensified immediately before an episode, which aligns with the body displacement hypothesis of feeling fat and the notion that feeling fat reflects negative affect.

Whilst there is research into the relationship between feeling fat and clinically disordered eating behaviours, research is limited in relation to emotional eating. Initial research found that feeling fat correlated with lack of control overeating and emotional eating among undergraduate students (Striegel-Moore et al., 1986). This relationship reflects that of alexithymia, particularly affective characteristics, and

disordered eating behaviours and emotional eating, and the proposal that inaccurate or absent identification and description of emotions may lead to unfavourable and potentially problematic eating behaviours.

In a group of clinical and subclinical participants during the Covid-19 pandemic, emotion dysregulation strengthened the effect of trait feeling fat on frequency of binge eating thoughts and behaviours (Mehak et al., 2022). This led to conclusions that improving emotion regulation could be an appropriate intervention target for disordered eating, in those who feel fat. Anderson et al. (2022) also suggested that interventions aiming to reduce negative emotions experienced in association with feeling fat may help to reduce binge eating behaviours. However, as discussed earlier, the promotion of adaptive emotion regulation skills is not helpful if the emotions are yet to be identified or described (Vine & Aldao, 2014). Similarly, Andersen (2000) suggested that without identifying the underlying emotion that 'fat' replaces, no progress will be made. Therefore, the main aim when addressing feeling fat therapeutically is identifying the specific negative emotions that are being experienced (Anderson, 2000). Cognitive behavioural therapy for eating disorders (CBT-E) directly targets feeling fat, teaching individuals that this is unrelated to their objective body size and instead monitoring triggers of the experience. Patients are then taught to identify the negative emotions and physical sensations that are misinterpreted as "feeling fat" (Fairburn, 2008). As a result, feeling fat is found to decrease over the course of CBT-E within clinical groups diagnosed with anorexia nervosa (Calugi et al., 2018). However, there is no research into reducing the sensation of feeling fat in non-clinical populations. As it predicts the onset of clinical eating disorders (Stice et al., 2021) and has negative impacts on psychological

wellbeing (Cohen et al., 2019; Jansen et al., 2008), feeling fat appears to be an appropriate target for intervention which is worthy of exploring within the general population.

## **1.6 Self-compassion**

### **1.6.1 What is self-compassion?**

Broadly, self-compassion refers to the compassion directed towards oneself during times of suffering. Compassion can be defined as “the feeling that arises when witnessing another’s suffering and that motivates a subsequent desire to help” (Goetz et al., 2010, p. 351). There are two main conceptualisations of self-compassion, which offer distinct frameworks for understanding the construct. Neff conceptualises self-compassion as a multi-faceted construct which considers the kindness extended towards oneself when faced with feelings of inadequacy, shortcomings, or failures (Neff, 2003a). Neff (2016) defines self-compassion as comprising three key conceptually distinct components, each with a positive (compassionate) and negative (uncompassionate) pole: self-kindness versus self-judgment, a sense of common humanity versus isolation, and mindfulness versus over-identification. Synergistically, these components create a self-compassionate frame of mind. Neff (2003a) proposed that individuals characterised by higher levels of self-compassion are less likely to experience their emotions adversely as instead emotions are acknowledged as valid and important, leading to emotion identification and regulation. This conceptualisation suggests that individuals higher in self-compassion are more likely to approach their emotions with a sense of

acceptance and understanding, potentially reducing the likelihood of engaging with maladaptive coping mechanisms such as emotional eating.

Gilbert (2009, p. 13) describes self-compassion as “a sensitivity to suffering in self and others with a commitment to try and alleviate and prevent it”. This conceptualisation is rooted in evolutionary psychology. Gilbert (2005) posits that self-compassion involves activating the soothing system in the brain, which counters the threat and self-criticism system. This conceptualisation proposes that individuals who are less compassionate towards themselves experience difficulties generating and activating self-soothing emotions. These individuals are subsequently unable to regulate adverse and threat-based emotions and may find alternative ways to address these emotional states. This highlights how a lack of self-compassion may theoretically relate to emotion dysregulation and the drive to engage with maladaptive coping mechanisms. This stronger emphasis on the evolutionary basis, and the idea of self-compassion as a strategy for managing threat-based emotions (Gilbert, 2005), led researchers to adopt a different conceptualisation and measurement of Neff’s self-compassion theory and scale whereby three compassionate behaviours towards the self (self-kindness, common humanity, and mindfulness) and three uncompassionate behaviours towards the self (self-judgement, isolation, and over-identification) formulated two subscales (Lopez et al., 2015; Muris, 2015) which were debated in other research (Neff et al., 2019).

Neff primarily focuses on self-compassion as a construct related to emotional resilience and well-being, whereas Gilbert integrates self-compassion within a broader therapeutic framework. Neff emphasises that self-compassion is a trait that can enhance personal wellbeing and reduce self-criticism through direct practice of

core components, whereas Gilbert uses self-compassion as a component of therapeutic interventions designed to address deeper emotional and psychological issues with a focus on its role in reducing threat and promoting mental health. Both approaches consider self-compassion to be an adaptive way of regulating adverse emotions (Gilbert, 2019; Neff, 2003a), which can be cultivated through specific intervention (Germer & Neff, 2013; Gilbert & Proctor, 2006). This amenability to modification indicates that increasing levels of self-compassion could be a viable strategy for addressing maladaptive behaviours and managing emotions. The potential for change underscores the importance of considering self-compassion not only as a protective factor but also as a therapeutic target for intervention to elicit positive outcomes.

Self-compassion has been proposed as a process that may reduce eating pathology and body image issues and may play a central role in supporting individuals who otherwise demonstrate difficulties in emotion regulation. This is valuable as self-compassion is a skill which can be developed and learned in clinical and non-clinical populations (for a review, see Neff, 2023). Exploration of the role of self-compassion, as a cultivatable construct, and its relationship with eating behaviours and body image may help to inform related interventions.

### **1.6.2. Self-compassion and eating in response to emotions**

Previous research has proposed that self-compassion may buffer against risk factors for eating and body concerns (e.g., Ferreira et al., 2014; Braun et al., 2016) and reduce existing eating and body image problems (e.g. Breines et al., 2015). Various interventions underpinned by self-compassion have been tested, e.g.

exposure to self-compassionate quotes (Slater et al., 2017), writing compassionately to oneself about weight and appearance (Moffitt et al., 2018), and various other self-compassion interventions (for a review, see Turk & Waller, 2020) and these have been found to have positive impacts on eating behaviours and body image. In one study by Adams and Leary (2007), students who were restrained eaters and were asked to consume a preload (one doughnut) and then think self-compassionately were found to have reduced distress and consume fewer sweets during a bogus taste test than those who were not told to think self-compassionately.

Self-compassion has been found to negatively relate to emotional eating in samples of mothers and daughters (Carbonneau et al., 2020; Carbonneau et al., 2021), and direct and indirect effects of self-compassion on emotional eating were identified which concluded that treating oneself with kindness and having an awareness of one's emotions acted as a protective factor against emotional eating. It has been proposed that self-compassion may impact upon emotion regulation in eating disorders (Turk & Waller, 2020), and may disrupt common cognitive-affective precipitants of emotional eating specifically through engaging adaptive emotion regulation skills (e.g. tolerating aversive emotions) and accepting (versus attempting to suppress or escape) unwanted/distressing aspects of the self (Neff, 2003). Within a sample of adolescents, self-compassion was negatively indirectly associated with emotional eating through emotion regulation (Gouveia et al., 2019). The authors conclude that their findings supported an underlying role of emotion dysregulation in emotional eating as a short-term attempt to relieve negative internal states, rather than because of non-compassionate responses towards the self.

Self-compassion is negatively related to difficulties with emotion regulation (Finlay-Jones et al., 2015). It may be that self-compassion operates by providing a more adaptive means of coping with emotions as it requires a mindful awareness of negative emotions, so that unwanted feelings are not avoided or suppressed (Neff, 2003). Promoting a mindful awareness and non-judgemental acceptance of the present moment may enable individuals to change their relationship with emotions (Brown et al., 2007), through directing attention towards their emotions, thoughts and somatic sensations, then accepting them as they are. Taking this approach may enable the individual to confront distressing emotions (Finlay-Jones et al., 2015) and employ more adaptive strategies to regulate these, rather than eating in response to them. Evidence within a sample of Canadian undergraduate students indicated that self-compassion training may reduce levels of eating as a method of coping, through enabling individuals to accept their emotional responses (Wisener & Khoury, 2022). Taken together, these previous findings indicate that increased levels of self-compassion skills may enable more adaptive emotion regulation and in turn reduce emotional eating.

Alexithymia has also been found to negatively correlate with self-compassion (Lyvers et al., 2020), and positively correlate with fearful attitudes regarding giving and receiving compassion from themselves and others (Lyvers et al., 2022) and specifically the fear of compassion for the self (Gilbert et al., 2012). There have been calls for an examination of the role of self-compassion in the relationship between alexithymia and risky or problematic behaviours (Lyvers et al., 2020), and emotional eating may constitute such a behaviour for some individuals. Understanding the role of self-compassion in the relationship between alexithymia and emotional eating may

inform psychological interventions for this population characterised by heightened levels of alexithymia. This may be a promising avenue to explore, as findings indicate that self-compassion is a potentially important quality to cultivate for promoting a range of positive health behaviours (Sirois et al., 2014), and a malleable quality that can be enhanced via relatively simple interventions (Adams & Leary, 2007) including self-directed exercises.

### **1.6.3 Self-compassion and feeling fat**

There has been significant research into the association between body image and self-compassion. A review into this detailed support for the relationship between self-compassion and many aspects of negative body image including body shame, weight and shape overvaluation, social physique anxiety, and body image avoidance (see Braun et al., 2016). Interventions promoting self-compassion have been found to reduce aspects of negative body image in clinical and non-clinical populations (Linardon et al., 2017; Linardon et al., 2018), with suggestions that the cultivation of self-compassion may protect against adverse outcomes of weight and shape overvaluation (Linardon et al., 2020). In one study, writing compassionately towards one's body resulted in lower body weight and appearance dissatisfaction than self-esteem or positive distraction focused writing tasks (Moffitt et al., 2018). Self-compassion specific to one's body is termed *body compassion* and reflects the same components of self-compassion but specifically with the feelings towards one's body (Murn, 2013; Beadle et al., 2021). Standard self-compassion may promote body compassion through minimising the effects of the distress caused by body image-related threat (Tylka & Wood-Barcalow, 2015).



Despite the previous publications exploring the relationship between self-compassion and aspects of body image and body compassion, there remains a paucity of research into the relationship between self-compassion and feeling fat, a specific affective aspect of body image. Previous research by Toole and Craighead (2016) described employing the Body Shape Questionnaire (BSQ-16; Evans & Dolan, 1993) to measure “concerns about body shape and body dissatisfaction, in particular the subjective experience of feeling fat” (p.107). Whilst this study found a negative relationship between self-compassion and total BSQ-16 scores, the scale items measure a more general body dissatisfaction and as such the study did not specifically examine the relationship between self-compassion and feeling fat. This gap in the literature will be addressed as part of this thesis.

### **1.7 The impact of Covid-19**

This PhD began in February 2020, so role of the Covid-19 pandemic which was declared the month after commencing this project must be acknowledged. The pandemic and its limitations have posed challenges for the research conducted and have shaped the nature of the studies and interpretation of findings. Previous research has demonstrated that disordered eating behaviour in the general population can be triggered by feelings of boredom and loneliness (Bruce & Agras, 1992), and distress following a disaster (Kuijer & Boyce, 2012). Research exploring how Covid-19 lockdown measures impacted upon the general population found that a third of individuals with no history of eating disorders reported an increase in binge eating behaviours compared to before the pandemic (Phillipou et al., 2020). Furthermore, 17% of adults in the United Kingdom reported eating more food than

usual, and 23% reported eating less healthfully than usual (Fancourt et al., 2020a). These changes may reflect emotional eating behaviours, due to lockdown measures eliciting feelings of isolation and distress (Brooks et al., 2020) and the fact that the frequency of emotional eating is greater when individuals are alone and eating at home (Baumeister et al., 1994) – which was logically more likely during enforced lockdowns. Research into eating behaviours in the United Kingdom during the early stages of the lockdown, when this thesis commenced, found that higher pre-lockdown levels of emotional eating were associated with increased emotional eating during the lockdown (Coulthard et al., 2021). However, the pandemic may have also presented opportunity and time for some individuals to putatively improve their eating behaviours (Caso et al., 2022). Across the timeframe of this PhD, there have been varying levels of enforced lockdowns and isolation in the United Kingdom, and ongoing disparity in perceived threat (Hanna et al., 2023) which logically influences related actions and emotions. The presence of the pandemic in fluctuating severity may have influenced the findings of the studies conducted during this timeframe, so the findings should be considered in the context of changes to eating behaviours potentially influenced by the circumstances.

### **1.8 Research aims and questions**

Based on existing literature, the overarching aim of this research at the point it commenced was to further elucidate the relationship between alexithymia and emotional eating and identify psychological mechanisms which underpin this relationship within the general population, to inform the development of an intervention supporting those with difficulty identifying and describing feelings. The

development of an intervention to reduce emotional eating may reduce the risk of associated adverse outcomes for these individuals, enabling early intervention and prevention of emerging clinically disordered eating behaviour.

This research project first aimed to elucidate the relationship between alexithymia and subjective experiences of emotional eating, through synthesising existing literature. This presented opportunity to then explore the content validity of a self-report scale of emotional eating and test innovative research methods during the pandemic. As identified in the previous chapter, emotional eating can be a predictor of disordered eating (Masheb & Grilo, 2006; Pinaquy et al., 2003) and relate to negative wellbeing and outcomes individuals with and without eating disorders (Newman, 2007; Ricca et al., 2012). Therefore, this thesis approaches emotional eating as a behaviour which may benefit from intervention for some individuals in the general population. The constructs of emotion dysregulation and self-compassion will be examined as potential mechanisms in this relationship, to explore their potential as intervention targets. The overarching aim was to inform and test a brief intervention which would be appropriate for the general population, targeting the association between alexithymia and emotional eating. As the thesis progressed, the focus of the intervention narrowed to promoting identification and description of feelings (i.e. affective characteristics of alexithymia). Alexithymia is measured as a relatively stable trait and is a broad construct, rendering it an inappropriate brief intervention target. The state of feeling fat is theorised to reflect momentary difficulty identifying and describing negative states and the displacement of these onto the body (Anderson, 2000; Fairburn, 2008) and is associated with unfavourable eating behaviours (Fairburn, 2008; Linardon et al., 2018). Therefore, a brief intervention

was tested with the aim of reducing the state of feeling fat through the identification and description of current feelings. The findings that emerged as each study took place allowed for an iterative exploration of the following research questions:

1. What is the relationship between alexithymia and emotional eating?
2. What do subjective emotional eating questionnaires measure?
3. What is the role of emotion dysregulation in the relationship between alexithymia and emotional eating?
4. What is the role of self-compassion in the indirect relationship between alexithymia and emotional eating?
5. What is the relationship between self-compassion and feeling fat?
6. Can we reduce feeling fat through identifying and describing feelings?

## **1.9 Chapter summary**

This thesis comprises 7 chapters. Chapter 1 has provided an overview of relevant constructs, to contextualise the current thesis, and has examined previous empirical research and theories. It also introduced the research aims and questions. Chapter 2 systematically reviewed extant literature examining the relationship between alexithymia and self-reported emotional eating, whilst Chapter 3 explored the content validity of a commonly used self-report measure of emotional eating. Chapter 4 and Chapter 5 examined potential mechanisms which may underpin the relationship between alexithymia and emotional eating. Chapter 6 saw a shift away from emotional eating, to test a brief intervention for state sensation of feeling fat, which encouraged identification and description of feelings. And finally, Chapter 7

discussed the answering of the research questions and provided conclusions based on the research findings.

## CHAPTER 2: SYSTEMATIC REVIEW

### 2.1 Chapter introduction

The first study of this thesis involved conducting a systematic review to establish whether extant research supports a statistical relationship between the constructs of alexithymia and emotional eating. Elucidating psychological characteristics associated with emotional eating may further inform interventions for this behaviour related to eating psychopathology. The present systematic review aimed to examine the relationship between alexithymia and self-reported emotional eating in adults, and provide a narrative synthesis of the existing literature. Using the PRISMA method for systematic reviews, six databases (MEDLINE, PsycInfo, PsycArticles, PubMed, SCOPUS, and Web of Science) were searched for peer-reviewed, quantitative research published between 1<sup>st</sup> January 1994 and 20<sup>th</sup> July 2021, when the searches were conducted. Eligible articles investigated the association between alexithymia, as measured by the Toronto Alexithymia Scale (Bagby et al., 1994), and emotional eating, as measured by any validated self-report instrument. At the end of the chapter, relevant articles subsequently published between the systematic review search date and the 4<sup>th</sup> May 2023 are also reviewed.

### 2.2 Literature review and rationale

It was determined that a systematic review would be the most appropriate method to address the first research question, “*What is the relationship between alexithymia and emotional eating?*”. The relationship between alexithymia and eating disorders has been previously examined by a systematic review (see Nowakowski et

al., 2013) and meta-analysis (see Westwood et al., 2017), with findings highlighting higher levels of alexithymia in populations with eating disorders compared to the general population. When examining specific characteristics of alexithymia, Individuals with anorexia nervosa or binge eating disorder reported significantly greater affective (difficulties identifying and describing feelings) but not cognitive (externally oriented thinking style) characteristics than control groups (Pinaquy et al., 2003; Taylor et al., 1996). Understanding the relationship is important, as the presence of alexithymia is related to poorer clinical and treatment outcomes in patients with eating disorders (Pinna et al., 2015; Speranza et al., 2007). The relationship between alexithymia and eating behaviours is not limited to clinical populations, with positive associations also identified between alexithymia and non-clinical disordered eating (Wallis & Ridout, 2022).

Emotional eating, as eating in response to negative emotions, is considered an important clinical dimension for eating psychopathology (Ricca et al., 2012) and may predict binge eating (Pinaquy et al., 2003; Stice et al., 2002). It has been proposed that emotional eating may better refer to eating when negative emotions are regulated in unhealthy ways, rather than simply eating in response to negative emotions (Evers et al., 2010). Affective characteristics of alexithymia (i.e., difficulties identifying and describing feelings) have been found to significantly predict self-reported emotional eating in samples of women with binge eating disorder (Pinaquy et al., 2003). However, existing literature exploring the association between alexithymia and emotional eating has not been systematically reviewed to ascertain any trends. A comprehensive examination of this relationship will offer further

understanding of the psychological characteristics that relate to emotional eating and potentially influence intervention outcomes.

There are issues with the validity of self-report measures of emotional eating, beyond the general limitations of self-report measures (see Paulhus & Vazire, 2007). For example, triple recall bias may present a risk as participants must retrospectively recall their emotions, eating behaviours and connections between the two (Evers et al., 2009). Furthermore, the concept of emotional eating is disputed, as researchers are failing to observe objective changes in eating behaviours in individuals considered to be emotional eaters based on subjective self-report measures (Adriaanse et al., 2011; Althemer et al., 2021; Braden et al., 2020; Bongers & Jansen, 2016). Considering these limitations of the conceptualisation and operationalisation of emotional eating, the scope of the present review was limited to literature using subjective self-report only.

### **2.2.1 Objectives**

This review aimed to examine the relationship between alexithymia and self-reported emotional eating in adults, through methodological searching and synthesising of existing literature.

## **2.3 Methods**

### **2.3.1 Search strategy**

Systematic reviews utilise explicit methods to methodologically search, critically evaluate, and synthesise previously published literature (Collins & Fauser,



2005). Using standardised recommendations such as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (Moher et al., 2009; Page et al., 2021), the systematic review is conducted and reported in an objective way which facilitates transparent research (Sarkis-Onofre et al., 2021). A systematic review will clearly outline reasons for exclusion of articles and how the validity of each included article is determined, minimising impacts of researcher bias. It has been proposed that systematically reviewing existing literature as the primary research project of a PhD is beneficial for students in this context to familiarise themselves with existing literature and confidently identify gaps in the literature to explore in subsequent studies (Pickering & Byrne, 2013). The systematic review was conducted according to the PRISMA 2020 Statement (Page et al., 2021) and using the associated PRISMA checklists (see Appendix A).

**Table 2.1 Search string used to systematically search electronic databases for relevant articles. Bold terms indicate Boolean operators.**

Search String	Databases Searched
("alexithymia" <b>OR</b> "alexithymic" <b>OR</b> "alexithymi*" <b>OR</b> "toronto alexithymia scale" <b>OR</b> "difficulty identifying feelings" <b>OR</b> "difficulty describing feelings" <b>OR</b> "difficulty identifying emotions" <b>OR</b> "difficulty describing emotions") <b>AND</b> ("emotional eat*" <b>OR</b> "emotional overeate*" <b>OR</b> "stress eat*" <b>OR</b> "comfort eat*")	MEDLINE, PsycINFO, PsycArticles, PubMed, SCOPUS, Web of Science

On 20<sup>th</sup> July 2021, electronic databases were searched systematically for original research articles published in peer-reviewed journals. Truncated terms relating to alexithymia and emotional eating were used with Boolean operators (see Table 2.1). Results were independently screened for relevance by two authors (KM, DJW), first by title and then by abstract. If the abstract indicated eligibility, full texts were retrieved to determine inclusion or exclusion.

### **2.3.2 Eligibility criteria**

Articles were considered if they included quantitative observational or experimental research, were written in English, and were published in peer-reviewed journals. Conference abstracts or letters, clinical guidelines, book chapters, reviews which do not use original data, and dissertations or theses were not included. Articles with any adult clinical or non-clinical populations of interest were eligible for inclusion if they clearly reported associations between alexithymia and emotional eating.

Due to ongoing discussion surrounding the conceptualisation and operationalisation of alexithymia (see Taylor & Bagby, 2021), alexithymia must have been measured using the twenty-item version of the Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994; see Appendix B.1) to be included in the present review. Earlier versions of this scale were not included due to their psychometric shortcomings (Bagby et al., 2020). Searches were limited to research published since 1<sup>st</sup> January 1994, being the publication year of the TAS-20. As aforementioned, only self-reported emotional eating using previously validated

measures was examined; these measures capture how individuals perceive changes in their eating behaviour in response to emotional states.

### **2.3.3 Data extraction and quality assessment**

A data extraction form was created to compile and standardise the following information from each included article: authors, year of publication, location, research design, sample characteristics, recruitment methods, measures of alexithymia and emotional eating, and reported associations between variables. A finding was deemed statistically significant when  $p < .05$  was reported. Risk of bias was assessed to evaluate how the methods may have affected the results and reporting of the research. Included articles were all cross-sectional design, so only the Appraisal Tool for Cross-Sectional Studies (AXIS; Downes et al., 2016) was employed. The AXIS outlines, for each article, 20 items considering the clarity of rationale and methods, reporting of results, and ethical dimensions. Items are answered with 'yes', 'no', or 'do not know', with higher scores reflecting higher quality. Two authors evaluated risk of bias, with any discrepancies discussed and resolved by consensus.

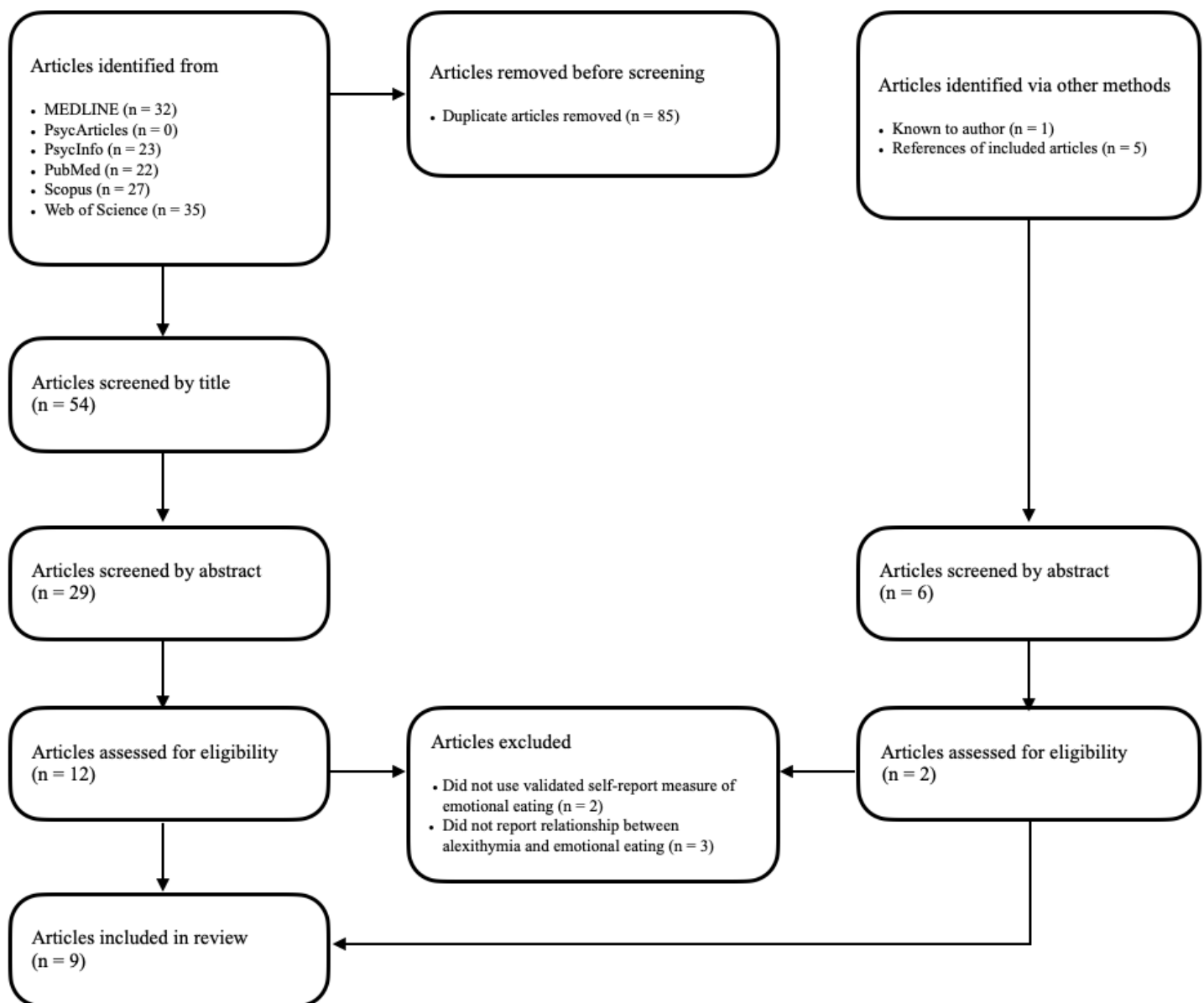


Fig. 2.1 PRISMA 2020 Flow Diagram illustrating the process of selecting articles.

## 2.3.4 Data synthesis

Findings of included articles were brought together using narrative synthesis. Steps taken were informed by best practice guidelines (Popay et al., 2006) and comprised: (1) the development of selection process, (2) a preliminary synthesis, (3) an exploration of relationships based on data extraction, and (4) the production of a

textual narrative synthesis. The findings of included articles were grouped by outcome measures for the analysis and reporting of findings. This was determined as the most appropriate way to make sense of the relationship between alexithymia and emotional eating, as different aspects of the construct are captured by different self-report measures, for example urges, desires or perceived changes in emotional eating behaviour.

### 2.3.5 Ethical considerations

The systematic review did not require ethical approval prior to commencement due to the nature of secondary data collection. The codes of general and human research ethical conduct followed throughout the PhD project will be discussed in Chapter 3.

**Table 2.2 Excluded full-text articles and reasons for exclusion (n = 5).**

Reason for exclusion	Article authors
Did not measure emotional eating or use a validated self-report measure of emotional eating	Noli et al. (2010); van Strien & Ouwens (2007)
Did not report the relationship between alexithymia and emotional eating	Spence & Courbasson (2012); Zeeck et al. (2011); Wheeler & Broad (1994)

## 2.4 Results

### 2.4.1 Search results

The process of determining article eligibility is outlined in Figure 2.1. Initial database searches identified 139 articles, with six further articles identified from

other sources. Of the 35 titles considered potentially eligible, 14 were accepted based on their abstracts. Five full-text articles were excluded (see Table 2.2), and nine eligible articles were included in the narrative synthesis.

### **2.4.2 Characteristics of included articles**

Nine cross-sectional articles published between 2003 and 2021 were included. Sample sizes used in the analyses ranged from 40 to 549, totalling 2754 participants across all articles. Two articles investigated the relationship between alexithymia and emotional eating in university populations (Lyvers et al., 2019; Pink et al., 2019), one of which replicated the research with a general population sample (Pink et al., 2019). Three further articles examined alexithymia and emotional eating within general population samples (Cecchetto et al., 2021; McAtamney et al., 2021; Strodl & Wylie, 2020). Three articles sampled only individuals living with obesity (Larsen et al., 2006; Pinaquy et al., 2003; Zijlstra et al., 2012), one of which grouped participants based on whether they met criteria for binge eating disorder or not (Pinaquy et al., 2003). One article recruited participants who were concerned about their weight (Ouwens et al., 2009). See Table 2.3 for key characteristics and methodological quality ratings of included articles.

### **2.4.3 Quality of included articles**

Methodological quality is reported individually for both studies conducted within the article by Pink et al. (2019). All articles met 11 or more of the outlined criteria, meaning quality was at least moderate. All articles failed to meet criteria related to addressing and categorising, or describing non-responders. Three articles

did not report details of ethical approval nor of obtaining consent from participants (Larsen et al., 2006; Ouwens et al., 2009; Pinaquy et al., 2003). Only two articles justified their sample size (Strodl & Wylie, 2020; Zijlstra et al., 2012). Reported results appear internally consistent for most articles, with data clearly reporting the sample size. All articles had generally a low risk of bias. One study reported additional analyses within the discussion, conducted using participants excluded from the main analyses for reporting having a current or past eating disorder (Cecchetto et al., 2021). The authors acknowledged the limitations of these additional analyses, due to them being outside the aim of the study and the small sample size ( $n = 35$ ). As such, the additional analyses were not included in the present review.

### **2.4.4 Associations between alexithymia and emotional eating**

Alexithymia was measured across all articles using the TAS-20, as either total scores or individual subscale scores. Emotional eating was measured with four different self-report scales: the emotional eating subscale of the Dutch Eating Behaviour Questionnaire (DEBQ-EE; van Strien et al., 1986), the Emotional Eating Scale (EES; Arnow et al., 1995), the Salzburg Emotional Eating Scale (SEES; Meule et al., 2018), or the Three Factor Eating Questionnaire emotional eating subscale from either the 18-item (TFEQ-R18-EE; Karlsson et al., 2000) or 21-item revised versions (TFEQ-R21-EE; Tholin et al., 2005). Reported associations from included articles are presented below, grouped by emotional eating measure.

Seven articles reported bivariate correlation analyses between alexithymia and emotional eating scores. Eight articles reported effects of alexithymia on

**Table 2.3 Key characteristics of included articles and methodological quality ratings.**

Authors (Year)	Country	Analytical sample size	% Female	Emotional eating measure	Relationship between alexithymia and emotional eating	Methodological quality rating
Cecchetto, Aiello, Gentili, Ionta, & Osimo (2021)	Italy	General population (n = 365)	73.1	DEBQ-EE	Higher DEBQ-EE scores were found among those with higher TAS-20 scores. DEBQ-EE scores were predicted by the interaction between TAS-20 and quality of life.	15
Larsen, van Strien, Eisinga, & Engels (2006)	Netherlands	Individuals living with obesity (n = 410)	82.9	DEBQ-EE	TAS-20 total, DIF and DDF scores positively correlated with DEBQ-EE. No significant correlations between EOT and DEBQ-EE. DIF and DDF were more strongly associated with DEBQ-EE in men than women.	13
Lyvers, Brown, & Thorberg (2019)	Australia	University students were at least occasional consumers of caffeine products (n = 224)	82.1	DEBQ-EE	TAS-20 total scores positively correlated with DEBQ-EE. TAS-20 total scores were a significant positive predictor of DEBQ-EE.	14



## EATING IN RESPONSE TO EMOTIONS: CHAPTER 2

McAtamney, Mantzios, Egan, & Wallis (2021)	United Kingdom	General population (n = 136)	64.7	EES, SEES	No significant correlations between TAS-20 total nor subscale scores and total EES scores. There were also no significant correlations with any SEES subscale scores. DIF and DDF each exerted indirect effects on EES total scores, via emotion dysregulation. No significant effects of DIF nor DDF on SEES subscales.	15
Ouwens, van Strien, & van Leeuwe (2009)	Netherlands	Individuals living with obesity (n = 549)	100	DEBQ-EE	DIF positively correlated with DEBQ-EE. DIF mediated the relationship between depression and DEBQ-EE.	12
Pinaquy, Chabrol, Simon, Louvet, & Barbe (2003)	France	Individuals living with overweight/obesity, with (n = 40) and without (n = 129) binge eating disorder	100	DEBQ-EE	TAS-20 total scores predicted DEBQ-EE in the group with binge eating disorder only. Further analyses with subscales identified that only DIF predicted DEBQ-EE in this group.	11
Pink, Lee, Price, & Williams (2019)	United Kingdom	Study 1: Students (n = 125)	85.6	EES, TFEQ-R18-EE	TAS-20 total and DIF scores positively correlated with EES. No significant correlation between DDF nor EOT with EES. No significant correlations between TAS-20 total nor subscale scores and TFEQ-R18-EE.	15

		Study 2: General population (n = 342)	81.2	EES, TFEQ-R18-EE	TAS-20 total, DIF and DDF scores each positively correlated with EES and TFEQ-R18-EE. No significant correlation between EOT and either measure of emotional eating.	14
Strodl & Wylie (2020)	Australia	General population (n = 332)	90.7	TFEQ-R21-EE	Both DIF and DDF were positively correlated with TFEQ-R21-EE.	17
Zijlstra et al. (2012)	Netherlands	Individuals with obesity (n = 102)	100	DEBQ-EE	Positive correlation between DIF and DEBQ-EE, which became non-significant after correcting for external and restrained eating scores. No significant correlation between DDF and DEBQ-EE.	17

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*Note:* DEBQ-EE = Dutch Eating Behaviour Questionnaire, emotional eating subscale. EES = Emotional Eating Scale. SEES= Salzburg Emotional Eating Scale; TFEQ-R18-EE = Three Factor Eating Questionnaire, revised 18-item version, emotional eating subscale. TFEQ-R21-EE = Three Factor Eating Questionnaire, revised 21-item version, emotional eating subscale. TAS-20 = Toronto Alexithymia Scale. DIF = Difficulty Identifying Feelings subscale. DDF = Difficulty Describing Feelings subscale.

emotional eating, and one article reported effects of emotional eating on alexithymia. All articles included report relationships from cross-sectional studies.

**2.4.4.1 DEBQ-EE.** The emotional eating subscale of the DEBQ comprises 13 items corresponding to the desire to overeat in response to negative emotions. Lyvers et al. (2019) reported a positive relationship of medium strength between total TAS-20 scores and emotional eating ( $r(222) = .21, p < .01$ ). Larsen et al. (2006) reported a stronger relationship in males ( $r(68) = .40, p < .01$ ) than females ( $r(338) = .18, p < .01$ ). When exploring TAS-20 subscales, they reported that DIF and DDF were also more strongly related to emotional eating in males (DIF  $r(68) = .50, p < .001$ ; DDF  $r(68) = .41, p < .001$ ) than females (DIF  $r(338) = .28, p < .001$ ; DDF  $r(338) = .17, p < .01$ ), whilst EOT was not significantly related to emotional eating in males ( $r(68) = -.07, \text{n.s.}$ ) nor females ( $r(338) = -.05, \text{n.s.}$ ). Ouwens et al. (2009) reported a significant positive correlation between DIF and emotional eating ( $r(547) = .34, p < .01$ ), as did Zijlstra et al. (2012) ( $r(100) = .35, p < .01$ ) although this became non-significant after accounting for external and restrained eating as measured by the DEBQ ( $r(100) = .19, p = .06$ ). They did not find a significant relationship between DDF and emotional eating ( $r(100) = .18, \text{n.s.}$ ).

Among the general population sample, Cecchetto et al. (2021) reported higher desire toward emotional eating among individuals with higher TAS-20 scores ( $X^2 (1) = 7.91, p = .005$ ). Post-hoc analyses identified a significant interaction between TAS-20 scores and quality of life ( $X^2 (1, N = 365) = 4.70, p = .030$ ; researchers defined quality of life with a measure combining quality and quantity of personal space at home and family income, see Cecchetto et al. 2021 for details), in which higher TAS-

20 scores were associated with higher emotional eating among individuals with higher quality of life ( $t(482) = 3.88, p < .001$ ), while TAS-20 scores did not exert effects on emotional eating in individuals with lower quality of life. Lyvers et al. (2019) found that after controlling for demographic variables (i.e. age, gender, education), alexithymia (as TAS-20 total scores) predicted emotional eating ( $F_{\text{change}}(1, 219) = 10.29, p = .002$ ), the presumed mediator in the tested model examining effects of alexithymia on caffeine consumption. The final model was not significant. A separate hierarchical regression was conducted to assess predictors of emotional eating, in which they found alexithymia to be a significant predictor contributing 5% of the variance ( $F_{\text{change}}(1, 217) = 11.10, p < .001$ ). Pinaquy et al. (2003) reported that TAS-20 total scores significantly predicted emotional eating ( $\beta = .365, p = .005$ ), with further analyses with subscales identifying DIF as the only significant predictor ( $\beta = .77, p = .001$ ). These findings were reported for the group with binge eating disorder, whilst no significant associations were reported for those without binge eating disorder. Larsen et al. (2006) explored the association between alexithymia and emotional eating in males and females, reporting significant interactions between gender and both DIF ( $F_{\text{change}}(1, 403) = 5.31, p = .02$ ) and DDF ( $F_{\text{change}}(1, 403) = 7.70, p = .006$ ), but not EOT. Subscales of DIF and DDF were categorised as high and low, with higher scores on each specifically associated with greater levels of emotional eating in men than women. Ouwers et al. (2009) reported a potential indirect effect of depression on emotional eating *through* DIF, in which depression predicted DIF ( $\beta = .60, p < .01$ ) and in turn DIF predicted emotional eating ( $\beta = .14, p < .01$ ).

Lyvers et al. (2019) also tested the reverse of the model which assessed the alexithymia-caffeine relationship via emotional eating, instead assessing effects of emotional eating on caffeine consumption via alexithymia. In this model, they found that emotional eating was a predictor of alexithymia when added to the model after demographic variables ( $F_{\text{change}}(1, 219) = 10.29, p = .002$ ). The final model was significant, indicating potential mediation in this direction. Of relation to the present review, this was the only article to investigate and report the effects of emotional eating on alexithymia.

**2.4.4.2 EES.** This scale comprises 25 items that measure *urges* to eat in response to negative emotions, used as either a total score or individual subscale scores for depression, anxiety, and anger. Pink et al. (2019) reported a positive correlation between TAS-20 and EES total score within both the student sample ( $r(123) = .176, p < .05$ ) and the general population sample ( $r(340) = .217, p < .01$ ). When looking at TAS-20 subscales, DIF correlated with EES in the student ( $r(123) = .203, p < .05$ ) and general population sample ( $r(340) = .265, p < .001$ ), whilst DDF correlated with EES only in the general population sample ( $r(340) = .174, p < .001$ ). The correlation between DDF and EES in the student sample was not significant ( $r(123) = .085, \text{n.s.}$ ). The EOT subscale did not correlate with EES in either the student sample ( $r(123) = .115, \text{n.s.}$ ) nor the general population sample ( $r(340) = .058, \text{n.s.}$ ). However, McAtamney et al. (2021) did not report any significant correlations between TAS-20 (total nor subscales) and EES total scores (TAS-20  $r(134) = .123, \text{n.s.}$ ; DIF  $r(134) = .124, \text{n.s.}$ ; DDF  $r(134) = .072, \text{n.s.}$ ; EOT  $r(134) = .086, \text{n.s.}$ ). Four subscales (i.e. depression, anxiety, anger, and somatic arousal)

identified by Goldbacher et al. (2012) were used within these analyses. When examining EES subscales, weak correlations were identified between TAS-20 total scores and EES subscales of anger ( $r(134) = .149, p < .05$ ) and somatic symptoms ( $r(134) = .142, p < .05$ ), as well as DIF and depression ( $r(134) = .146, p < .05$ ), and EOT and anger ( $r(134) = .153, p < .05$ ). When examining the effects of DIF and DDF on EES total scores, they did not identify a significant direct effect. However, positive indirect effects were reported for both DIF ( $\beta = .671, 95\%CI = 0.0452, 1.2178$ ) and DDF ( $\beta = .736, 95\%CI = 0.1924, 1.3360$ ) on EES, through emotion dysregulation.

**2.4.4.3 SEES.** This 20-item scale measures perceived over- and under-eating behaviour in response to negative and positive emotions, using subscale scores of happiness, sadness, anger and anxiety. McAtamney et al. (2021) reported no significant correlations between TAS-20 (total nor any subscale) with any subscales of the SEES. Further, there were no direct nor indirect effects of DIF nor DDF, via emotion dysregulation, on any SEES subscales.

**2.4.4.4 TFEQ-EE.** The TFEQ-R18-EE comprises three items measuring self-reported emotional eating behaviour, whilst the TFEQ-R21-EE comprises six items. Pink et al. (2019) reported that the relationship between TAS-20 total and TFEQ-R18-EE scores was not significant for the student sample ( $r(123) = .076, n.s.$ ) but was significant for the general population sample ( $r(340) = .135, p < .05$ ). Neither DIF nor DDF significantly correlated with TFEQ-R18-EE scores in the student sample (DIF  $r(123) = .074, n.s.$ ; DDF  $r(123) = .018, n.s.$ ), but weak correlations were significant in the general population sample (DIF  $r(340) = .180, p < .001$ ; DDF  $r(340)$

= .218,  $p < .05$ ). Emotional eating did not significantly relate to EOT in either the student sample ( $r(123) = .090$ , n.s.) nor the general population sample ( $r(123) = -.004$ , n.s.). Strodl and Wylie (2020) reported weak correlations between TFEQ-R21-EE and both DIF ( $r(330) = .20$ ,  $p < .001$ ) and DDF ( $r(330) = .11$ ,  $p < .05$ ). They also tested whether these affective characteristics mediated the effects of forms of childhood trauma on emotional eating, but no significant indirect effects were identified.

## 2.5 Discussion

The present systematic review aimed to synthesise findings of published research articles that examined the association between alexithymia and self-reported emotional eating. Despite a general paucity of research examining the association between these variables, nine articles were identified as eligible for inclusion. The DEBQ-EE was the most frequently used measure of emotional eating, and used within six articles. Two articles employed the EES, whilst the SEES, TFEQ-R18-EE and TFEQ-R21-EE were each employed only once.

Reported results from articles using the DEBQ-EE to measure emotional eating generally indicate a positive relationship with alexithymia as total scores or affective characteristic subscale scores (Larsen et al., 2006; Lyvers et al., 2019; Ouwens et al., 2009; Zijlstra et al., 2021). A higher desire to eat when in an emotional state was identified among those with higher alexithymia total scores (Cecchetto et al., 2021). Results also provide preliminary support for the role of alexithymia in predicting emotional eating, as measured by the DEBQ-EE (Lyvers et al., 2019; Ouwens et al., 2009; Pinaquy et al., 2003), with potential gender

differences in the strength of association between affective alexithymia characteristics and emotional eating (i.e. a stronger association in males; Larsen et al., 2006).

Reported results from articles using the EES were mixed in their support for the association between variables. Significant relationships were found between alexithymia (total TAS-20, DIF, DDF) and emotional eating across general population and student samples, with the exception of DDF in the student sample (Pink et al., 2019). Other findings did not identify a clear relationship between alexithymia (total nor subscale scores) and emotional eating, but did report possible indirect effects of DIF and DDF on emotional eating *through* emotion dysregulation (McAtamney et al., 2021).

The TFEQ-R18-EE, TFEQ-R21-EE and SEES were each used by one article. Limited findings report no significant associations between alexithymia and SEES subscale scores (McAtamney et al., 2021), nor with TFEQ-R18-EE scores in a student sample (Pink et al., 2019). However, within general population samples, weak correlations were identified between affective alexithymic characteristics and TFEQ-R18-EE (Pink et al., 2019) and TFEQ-R21-EE scores (Strodl & Wylie, 2020). Overall, existing research indicates there may be a positive association between alexithymia (as TAS-20 total, DIF or DDF scores) and DEBQ-EE scores. These findings suggest that higher levels of alexithymia, and its specific affective characteristics, may relate to greater tendencies towards emotional eating. However, only six studies used this measure of emotional eating, so these findings are discussed with caution within this review. Reported results using other emotional eating measures are less consistent and have even fewer articles employing each of



the measures. The emotional eating measures used in the included studies focus largely on negative emotions, and the typically used definition of emotional eating refers to increased food consumption in response to negative emotions (van Strien et al., 2007). However, emotional eating is also found to occur in response to positive emotions (Cardi et al., 2015) and may be unrelated to the poor physical and psychological outcomes implicated in negative emotional eating (Braden et al., 2018; Meule et al., 2018). Only the SEES measure considers positive emotions (happiness subscale), of which only one study reported the association with alexithymia and this was non-significant (McAtamney et al., 2021). There is a paucity of research examining alexithymia and differences in difficulty identifying/describing positive versus negative feelings. An interesting avenue for future research would be to explore whether there are differences here in how this may affect food intake in response to positive and negative emotions, particularly as positive emotional eating and negative emotional eating are considered to be different constructs (van Strien et al., 2013).

Three articles recruited only female participants (Ouwens et al., 2009; Pinaquy et al., 2003; Zijlstra et al., 2012), and four of the remaining six articles comprised at least 81% female samples. Larsen et al. (2006) explored gender differences and identified that there was a stronger relationship between alexithymia and emotional eating in males than females. However, their sample was only 17% male ( $n = 40$ ), and to date there has been no further research to explore these differences. Longitudinal research within a sample of adolescents found an association between longer breastfeeding duration and lower levels of emotional eating, mediated by a lower degree of DIF; this was significant for boys, but not girls

(van Strien et al., 2019). This highlights the need to understand sex/gender-differences in the relationship between alexithymia and emotional eating across the lifespan, and particularly further research within samples of non-female adults. Included articles reported associations between alexithymia and emotional eating, but there was limited examination of mechanisms underpinning the association.

McAtamney et al. (2021) reported the specific indirect effect of alexithymia on emotional eating through emotion dysregulation. Two models were presented, with DIF and DDF as predictors, but in each model only about 14% of variance in emotional eating was explained. Two mechanisms of how alexithymia relates to emotional eating have been proposed: (1) alexithymia as a deficit in interoceptive awareness results in insensitivity to satiety cues, thus eating in response to other bodily sensations such as emotional arousal; and (2) eating as a way of regulating negative affective states which are common in alexithymia, thus representing maladaptive emotion regulation. However, these are not necessarily mutually exclusive (Lyvers et al., 2019). Both of these mechanisms could be supported through learning to identify and respond to emotions adaptively.

Teaching emotion regulation skills may result in decreased emotional eating (Roosen et al., 2012), but for individuals with higher levels of alexithymia focusing on the affective characteristics should take priority as the ability to identify and understand emotions is a logical prerequisite to developing skills to regulate them (Vine & Aldao, 2014). Emotional eating is important to explore given its association with eating psychopathology (Pinaquy et al., 2003; Ricca et al., 2012; Stice et al., 2002), and understanding related psychological characteristics is important to help inform the development of strategies to manage it. The identification of preliminary

support for an association between alexithymia and emotional eating is useful, as the presence of alexithymia may present a barrier to psychotherapeutic treatment approaches (Lumley et al., 2007) and relates to less favourable outcomes (Pinna et al., 2015).

The present review reported the results of a comprehensive search of existing research, systematically searching key databases for research articles. Two reviewers independently screened articles for eligibility and evaluated methods of those included. However, inclusion of articles was limited to those published in peer-reviewed journals and in English, which may have resulted in publication bias and potential overestimation of any association between variables. Five additional articles were identified from the references of other articles, which potentially highlighted limitations in the search criteria. However, upon screening it was noted that they did not examine alexithymia and emotional eating, which explains their absence from the search results. Whilst in general, reviewed articles indicated that alexithymia may predict emotional eating as measured by the DEBQ-EE, one article also found that emotional eating predicted alexithymia (Lyvers et al., 2019). Due to the limited number of articles, all of which are cross-sectional, causation between alexithymia and emotional eating cannot be inferred and indication of support for the relationship is discussed with caution.

Five different self-report measures of emotional eating were used in the included articles. The authors discussed and discounted conducting a meta-analysis, instead favouring a narrative synthesis. This was decided due to the small pool of available articles ( $n = 9$ ), which were conducted with varying populations and used various measures of emotional eating that captured different aspects of the

construct. This heterogeneity of data, coupled with the limitations of self-report measures of emotional eating, led to authors determining that the findings of a meta-analysis with the eligible studies would not offer any meaningful conclusions. Issues with the validity of self-report retrospective measures of emotional eating have been identified (for a review, see Bongers & Jansen, 2016), and specifically there may be a triple recall bias due to the need to recall emotions, eating behaviours, and their association (Evers et al., 2009). Other research has proposed that when retrospectively asking about emotional eating behaviours, participants may be attributing past overeating to emotions retroactively, rather than accurately reporting emotional eating retrospectively (Adriaanse et al., 2016). As self-report measures of emotional eating do not appear to accurately predict actual food intake when feeling negative (Adriaanse et al., 2011; Althimer et al., 2021; Braden et al., 2020; Bongers & Jansen, 2016), future research should consider research designs in which actual food intake is measured, e.g. observed in laboratory studies or ecological momentary assessments, in addition to self-report questionnaires to explore causality and more accurately inform potential interventions. There is a need to ascertain what objective and subjective emotional eating measures are measuring to better understand research using these measures.

The present review included only quantitative research using the TAS-20 which is considered the gold-standard of alexithymia self-report measurement. Whilst issues have been discussed in relation to its validity and reliability, particularly the measurement of the EOT and IMP features of alexithymia (Kooiman et al., 2002), a recent meta-analysis demonstrated support for the three-factor structure originally proposed by Bagby et al. in 1994 (Schroeders et al., 2021). Despite

recommendations to use the TAS-20 alongside other self-reported and observer-rated measures (Bagby et al., 2020; Kooiman et al., 2002), this is not commonly used and was not exhibited by any of the studies included in this review.

Further research using gold-standard, validated and consistent measures of alexithymia and emotional eating, administered with recommended methods, is required to provide stronger evidence for the nature of the relationship and enable feasibility of a meta-analysis to examine the statistical relationship between variables. Considering these limitations, qualitative work to explore experiences of alexithymia and emotional eating would also be valuable to further elucidate the nature of any associations between these constructs.

### **2.5.1 Conclusions**

These findings add to extant literature through highlighting current evidence into the association between alexithymia and emotional eating. The included evidence considered from nine articles provides preliminary support for a positive relationship between alexithymia and emotional eating, most frequently as measured by the DEBQ-EE as a desire to eat more in response to negative emotions. The review has highlighted the need for further research to evidence and examine underlying mechanisms across more diverse samples. This would have the potential to subsequently inform support strategies and interventions to reduce emotional eating in alexithymic populations.

## 2.6 Updated literature searches

This systematic review was conducted on 20<sup>th</sup> July 2021. On 4<sup>th</sup> May 2023, a scoping search was conducted using the review search strategy to capture any articles published between these time points. It identified there was further research published during this period which would have been eligible for inclusion in the systematic review. Four research articles and a poster abstract have since been published which examine the relationship between alexithymia and self-reported emotional eating in adult samples. Other research was identified to examine the relationship between alexithymia and emotional eating, but it was deemed ineligible for inclusion based on the review criteria, due to the adolescent sample (Rice et al., 2022). Of the articles recruiting adult samples, one employed the TFEF-R18-EE, whilst the remaining three articles and poster abstract employed the DEBQ-EE. This further demonstrates that the DEBQ-EE is the most widely used measure of self-reported emotional eating in this field, which means the suggestion for further research with other measures remains true.

Marmouch et al. (2021) examined alexithymia and emotional eating in the context of obesity. They recruited 34 participants (52.94% women) who completed the TAS-20 and TFEQ-R18-EE. Findings indicate a positive relationship between alexithymia and emotional eating in women ( $r = .423$ ,  $p = .016$ ) but not in men ( $r = .246$ ,  $p = .092$ ). Despite the very small sample size, this further indicates potential differences in the relationship between alexithymia and emotional eating in men and women.

Lyvers et al. (2022) explored the relationship between alexithymia and binge eating, and within this study considered the potential mediating role of emotional

eating. They recruited 532 Australian adults (71% women; age  $M = 24.77$ ,  $SD = 3.57$ ), with a positive correlation was reported between TAS-20 total and DEBQ-EE scores ( $r = .34$ ,  $p < .001$ ). Mediation analyses indicate support for the indirect effect of emotional eating in the relationship between alexithymia and binge eating ( $\beta = .129$ ,  $95\%CI = 0.073, 0.195$ ). Whilst this was only a partial mediation, indicating that other variables are involved, this contributes to the rationale of developing an intervention targeting emotional eating for individuals with heightened levels of alexithymia.

Harland et al. (2022) explored the relationship between family functioning and emotional eating, via alexithymia. They recruited 202 young women (age  $M = 19.76$ ,  $SD = 1.80$ ) in Australia. A significant positive correlation was reported between TAS-20 and DEBQ-EE scores ( $r = .19$ ,  $p < .01$ ). Regression analyses were conducted, and alexithymia was not found to predict emotional eating in this sample ( $\beta = .009$ ,  $95\%CI = -0.002, 0.021$ )

Yaprak et al. (2023) examined the impact of alexithymia and depression on emotional eating, in a sample of 180 adults with type diabetes in Turkey (56.11% women; age  $M = 44.21$ ,  $SD = 11.33$ ). Significant positive correlations were reported between TAS-20 subscales of DIF and EOT with the DEBQ-EE ( $r = .269$ ,  $p < .01$ ;  $r = .125$ ,  $p < .05$  respectively), whilst DDF was not associated with emotional eating. A multiple regression was conducted, with gender entered in Model 1 and TAS-20 subscales entered in Model 2. The article describes findings of DIF predicting emotional eating, but this is not displayed with statistics within the article. They reported that DDF exerted a negative effect on emotional eating levels ( $\beta = -.167$ ;  $t(179) = -4.17$ ;  $p < .05$ ) as did EOT ( $\beta = .186$ ;  $t(179) = 2.99$ ;  $p < .05$ ) although the statistic in parentheses does not indicate negative effect and is not further clarified

from the regression statistics presented in the corresponding table (DDF  $\beta = -.33$ ,  $p < .05$ ; EOT  $\beta = .68$ ,  $p > .05$ ). The reporting of regression results is unclear from the article, but potentially indicate a negative effect of alexithymic characteristics on emotional eating which does not align with previous findings whereby positive effects are typically reported.

Whilst not a published research article, so would not have been included in the systematic review, Favieri (2021) published a poster abstract, which explored the relationship between alexithymia and emotional eating using the TAS-20 and DEBQ-EE in a sample of 84 young adults from the general population (gender not reported; age  $M = 23.38 \pm 2.50$ ). Their study focused on participants with 'normal weight' although how the authors defined this was not stated in the poster abstract. The relationship between alexithymia and emotional eating was not significant in this sample.

In summary, four research articles were identified in subsequent scoping searches to complement the literature included in the systematic review. Three articles employed the DEBQ-EE, and provided further evidence for the preliminary support for a relationship between alexithymia and self-reported emotional eating using this scale (Harland et al., 2022; Lyvers et al., 2022; Yaprak et al., 2023), although the methodological quality of Yaprak et al. (2022) may be limited when examining the reporting of findings. However, these further papers were not subject to risk of bias analysis as they were not part of the systematic review. Mamouch et al. (2021) reported a significant relationship between alexithymia and emotional eating as measured by the TFEQ-R18-EE in women but not men, although limited by



a small sample size. This adds to the one previous article identified to measure emotional eating with the TFEQ-R18-EE (Pink et al., 2019).

## **2.7 Chapter Summary**

This chapter explored the first research question, asking what the relationship is between alexithymia and self-reported emotional eating. This systematic review concluded that existing research is limited but lends preliminary support to the positive relationship between levels of alexithymia and subjective experiences of emotional eating. It finds that the DEBQ-EE is the most frequently used measure, as such this will be the focus of the next study which will explore what individuals, with and without heightened levels of alexithymia, are thinking as they complete this scale. The review also concluded that there is a relative lack of research utilising other validated measures than the DEBQ-EE, which makes determining whether findings support the relationship across different emotional eating measures difficult. As such, later empirical studies of this PhD will seek to employ other measures of emotional eating to further contribute to the literature available across measures.

The first iteration of the systematic review conducted in the early stages of the PhD identified a relative lack of research utilising other validated measures than the DEBQ-EE, which as seen above remained a valid conclusion in this final version of the review. However, it should be acknowledged that due to the timeline of completing this review and preparing the final version for publication, the research study presented in Chapter 4 was in fact published first (McAtamney et al., 2021), making it eligible for inclusion in the systematic review. This slightly obscures the

thread of the thesis as Chapter 4 builds upon the findings from Chapter 2, yet is included in the synthesis of literature of which it subsequently builds upon.

## CHAPTER 3: THINK ALOUD

### 3.1 Chapter Introduction

The systematic review identified that the emotional eating subscale of the Dutch Eating Behaviour Questionnaire (DEBQ-EE; van Strien et al., 1986) was the most frequently used questionnaire within alexithymia and emotional eating research, which remained true after reviewing the findings from the updated literature search. The DEBQ-EE aims to capture self-reported desire to eat in response to various negative emotions. However, there is ongoing discussion surrounding *what* exactly subjective emotional eating measures capture, and the specific biases challenging validity of these measures. To date, there is no direct information on how people interpret and respond to this questionnaire nor the nature and extent of the problems that individuals encounter when completing the DEBQ-EE. This line of inquiry is of particular interest within the context of alexithymia research, due to research findings that these individuals have difficulties with recollection of emotional information. The research detailed in this chapter employed a ‘think aloud’ method with individuals reporting varying levels of alexithymia as measured by the TAS-20, with an aim to explore differences between those characterised by high and low levels of alexithymia, if feasible. Participants were asked to complete the DEBQ-EE whilst simultaneously thinking aloud every thought that came to mind. This study was designed during the Covid-19 pandemic, which offered a unique opportunity to test innovative ways of conducting this type of research which has previously been completed either in-person, or if online, with a researcher concurrently present.

### 3.2 Literature review and rationale

Previous literature has identified potential issues in the research examining emotional eating behaviour using self-report measures, questioning the validity of emotional eating scales and their prediction of actual food intake. There are discrepancies between emotional eating scale scores and eating behaviour in both laboratory settings and daily life, with higher emotional eating inconsistently predicting greater food intake (Bongers & Jansen, 2016). Bongers and Jansen (2016) suggested that self-reported emotional eating may reflect the individual's concept of low self-control and concerns about overeating, whilst Adriaanse et al. (2016) proposed that self-reported emotional eating may in fact be a retrospective fabrication to explain perceived overeating in response to negative affect. Evers et al. (2009) posited the risk of *triple recall bias* in self-reported emotional eating, due to the need for individuals to accurately recall negative emotions, eating behaviour, and the association between the two. These findings and suggestions raise questions about what subjective emotional eating measures are actually capturing.

The complete scale of the DEBQ measures restrained, external and emotional eating, with the 13-item emotional eating subscale (DEBQ-EE) often used in isolation to measure the respondent's desire to overeat in response to negative emotions. The DEBQ-EE was identified in the findings of the systematic review (Chapter 2) as the most commonly used self-report measure of emotional eating across existing literature examining emotional eating and alexithymia. This review also highlighted preliminary evidence for a positive relationship between alexithymia, particularly the affective characteristics of DIF and DDF, and DEBQ-EE scores. This indicates that individuals with difficulties identifying and describing their emotional

states, also report recalling desire to overeat in response to negative emotional states. A recent systematic review examining alexithymia and memory for emotional information highlighted a reduction in *explicit* memory for emotional information in individuals with higher levels of alexithymic characteristics (Apgáua & Jaeger, 2019). This may exacerbate the recall biases that individuals face when self-reporting emotional eating behaviour, with questionnaires which by nature require them to recall eating in response to specific emotions. It is possible therefore, that individuals with increased levels of alexithymic characteristics find completing self-report measures of emotional eating to be particularly difficult.

Gaining insight into how individuals are perceiving and self-reporting their engagement in and desire to eat under emotionally challenging circumstances may help to understand what specific self-report measures are capturing, and contribute to discussion around the validity and operationalisation of subjective emotional eating. The think aloud method offers an opportunity to explore this. It involves encouraging participants to speak aloud their thoughts whilst completing the scale of researcher interest (Ericsson & Simon, 1993; Green & Gilhooly, 1996). This method allows scale respondents to express thoughts that would otherwise remain silent (Ericsson & Simon, 1993). The participants are not probed or asked to provide further explanations, they are simply encouraged to share their thoughts as they come to mind, to gain insight into their thought processes whilst completing a task (i.e. a self-report questionnaire).

The aim of this method is to capture what individuals are consciously attending to by speaking aloud their thoughts as they come to mind, offering a verbalisation of short-term memory (Ericsson & Simon, 1993). The think aloud

approach allows for testing of the tacit assumption that respondents understand and answer the questionnaire items as researchers intend for them to do (Collins, 2003). This approach has been employed previously to record respondents' thoughts whilst responding to items of various psychological and health-related scales (Boeije & Janssens, 2004; Darker & French, 2009; French et al., 2007; French & Hevey, 2008; Murtagh et al., 2007; McCorry et al., 2013; van Oort et al., 2011; Westerman et al., 2008), in order to understand how they interpret and answer questions, and identify potential problems to inform scale development across different populations.

### **3.2.1 Aims**

Due to the Covid-19 pandemic, this study explored an innovative format of the think aloud method by conducting the study online without the presence of the researcher. The aim of this research was to capture thoughts of respondents completing the DEBQ-EE, who were asked to 'think aloud' whilst completing the scale. This method allows problems that participants may encounter whilst completing the DEBQ-EE to be recorded and analysed. Recruitment methods were designed to ensure individuals with varying levels of alexithymic characteristics took part. Contingent on the number of participants recruited and the quality of think aloud data, a further aim was to comment on possible differences in problems completing the DEBQ-EE between those characterised by high vs. low levels of alexithymia.

### **3.3 Methods**

#### **3.3.1 Philosophical underpinnings**

The philosophies of the researcher contextualise the decision-making surrounding the research design and methods, as well as the interpretation of research findings and conclusions drawn. Consideration of the researcher's philosophies strengthens the quality of research and construction of knowledge. Whilst more obvious within the framework of qualitative research, the process of researchers exploring their own philosophies remains valid to accompany a quantitative approach to ensure that they are not unaware of the impact this has on how they conduct their research. For example, subjective decisions are made throughout the project, e.g. which measures to use, statistical tests to run, and how to interpret results.

The theoretical and methodological underpinnings of this thesis are heavily influenced by psychology research and practice. I began the studies within of this PhD taking the approach that knowledge exists and is there to be uncovered through quantitative data collection, reflecting a positivist approach. However, as I progressed as a researcher my epistemological perspectives began to align with constructivism. This challenges the existence of an "objective reality, asserting instead that realities are social constructions of the mind, and that there exist as many such constructions as there are individuals (although clearly many constructions will be shared)" (Guba & Lincoln, 1989, p. 43). A constructivist perspective declares that reality is not simply uncovered, but is constructed in the minds of human beings. As a result, multiple realities of a problem may be formed from various 'socially constructed' positions. Whilst most studies of this thesis took a

quantitative and positivist approach, this development in my knowledge and position as a researcher informed the decision to also employ a think aloud method which aligns more with a constructivist perspective. This aimed to explore what individuals were thinking when completing emotional eating measures and take a more critical stance towards the constructs explored and how they are conceptualised and experienced by participants.

### 3.3.2 Research design

To address the second research question, “*What do subjective emotional eating questionnaires measure?*”, a think aloud protocol was utilised. This type of study has been traditionally conducted in-person, with a researcher present during the think aloud process. However, the restrictions associated with Covid-19 posed barriers to conducting this study in the traditional method. This offered an opportunity to test new methods of conducting think aloud studies, by hosting the study online without the concurrent presence of a researcher. This method minimised the time required by the researcher to spend observing participants complete the task and negated the need for in-person studies to take place, enabling the study to go ahead regardless of restrictions. This allowed the trialling of a new method, to adjust to the pandemic research environment using innovative technology. To date, this adapted method has not been reported in any published literature.

The Covid-19 pandemic and the associated restrictions enforced at various stages of my PhD process heavily influenced the decision-making surrounding research design. It was not feasible during much of the active research phase to recruit in-person, meaning the research setting for all empirical research presented



in this thesis was online employing the use of software such as Qualtrics and Phonic for data collection. These are both online survey platforms, with Qualtrics being the primary hosting platform for the research projects, and features of Phonic (i.e. microphone function) being integrated to the Qualtrics survey where required. There were benefits of online data collection including enabling participants to complete the studies from their own devices and chosen locations, and the reduced time required as the researcher to be present on campus for data collection. This allowed for passive collection, whilst other aspects of the research projects were being conducted.

### **3.3.3 Participants**

Individuals from the general population in the United Kingdom were eligible to take part in this study. Individuals were included if they were 18 years or older and fluent in English. Individuals were excluded if they considered there to be a risk of becoming distressed thinking about their eating behaviours or were unable to ‘think aloud’ due to technological limitations. Participants were recruited via social media. For participants recruited from the general population, advertisements were posted on social media pages accessible in the public domain including Facebook, LinkedIn, Twitter, Instagram and Reddit. For the participants recruited who specifically identified with the characteristics of alexithymia, purposive sampling took place by posting advertisements on specific fora for alexithymia, including on Reddit and Facebook. Advertisements shared on general social media pages appealed to those who identified as ‘emotional eaters’, whereas advertisements shared on alexithymia-specific pages appealed to those who considered themselves to be alexithymic.

There are no guidelines for appropriate sample sizes for think aloud research. For the present study, sample size was determined by previous research which ranged between 6 and 13 participants (Aujla et al., 2018; French et al., 2007; van Oort et al., 2011).

### **3.3.4 Procedure**

Ethical approval was granted by Birmingham City University (see Appendix C). Advertisement posters were shared on general social media and specific alexithymia fora, where access was requested and approved by the page moderator (see Appendices D and E). The study took place online, using survey host site Qualtrics with integrated audio recording features from the phonic.ai platform which enabled participants to record themselves as they completed the subject task. The Doctoral Research College awarded funding to subscribe to Phonic.ai software for 6 months to conduct data collection. Data collection took place between December 2021 and May 2022.

Participants took part in the study by following a URL link to the study page on their personal devices. They completed the same study regardless of recruitment from general social media or specific alexithymia fora, but were presented with study information and debrief pages which varied slightly with their reference to alexithymia. All participants were presented with the relevant information sheet before indicating their informed consent including for audio recording to take place (see Appendices F and G). Verbal instructions for thinking aloud were adapted from French et al. (2007) and Aujla et al. (2018) to be relevant for the online method, and were presented following a microphone check (see Table 3.1). Participants began

the study with a practice think aloud task (see Appendix H), before completing the DEBQ-EE with instructions to think aloud displayed within the questionnaire (see Appendix I). They then completed the TAS-20 and provided demographic information, before being presented with debrief information (see Appendix J).

**Table 3.1. Verbal instructions for think aloud task**

Verbal instructions
<p>We are interested in what you think as you complete a short questionnaire during this study. In order to do this, we ask that you talk out loud as you complete the questionnaire – saying every thought that comes into your head as you answer the questions. We would like you to begin thinking aloud and continue continuously from the moment you begin the task, until you complete the task.</p> <p>Please don't try and plan what you would like to say or explain why you are thinking that, just simply say your exact thoughts as they come to you. To remind you, the data collected is anonymous and confidential and we will not know who you are so please just act as though you are alone and speaking to yourself. It is important that you continue to speak, please do not stay silent for any period of time!</p> <p>Please ensure that you are in a quiet space with no loud background noises that will prevent your recording from being heard clearly.</p> <p>Press 'Record' as soon as you begin the task, and then press it again to stop the recording. You will have to press 'Submit' in order to move onto the next page.</p> <p>You will have the option to hear the recording back, and re-record if necessary. We ask that you avoid re-recording where possible, to ensure your authentic first thoughts when completing the questionnaire.</p> <p>Internet connection quality may affect recording upload time, so please note that it could take up to a few minutes to submit with a weak connection.</p>

In line with recommendations for best practice (Green & Gilhooly, 1996), a practice task was completed first. This was developed for the present study. It consisted of five items which were designed with a similar response format as the questionnaire items of the DEBQ-EE, but the content of the items was not related to the content of the DEBQ-EE. The purpose of the practice task was to complete a questionnaire asking the extent to which individuals agree with five proposed changes to a mode of transport (e.g. “Cars should have fewer doors”), rated from 1 “Strongly disagree” to 5 “Strongly agree”. Due to the online nature of the study, there

was no opportunity for participants to ask questions or receive feedback on their practice task. To mitigate this, an audio-recording of an individual known to the researcher was included demonstrating how they thought aloud whilst agreeing or disagreeing to proposed changes to a different mode of transport (train).

Engagement with the practice task enabled participants to familiarise themselves with the think aloud method, before completing the DEBQ-EE.

### 3.3.5 Materials

#### ***3.3.5.1 Dutch Eating Behaviour Questionnaire – Emotional Eating***

**Subscale.** Participants completed the 13-item DEBQ-EE (van Strien et al., 1986), which assess self-reported desire to eat in response to specific emotions. The scale uses a five-point response scale, anchored at each end with the labels “Strongly agree” and “Strongly disagree” to indicate the extent to which they have a desire to eat in response to each emotion. The typically used scale is presented in Table 3.2, with words in italics indicating additions related to the think aloud method. Total mean scores are calculated, with higher scores indicating higher levels of emotional eating desire.

**3.3.5.2 Toronto Alexithymia Scale.** The 20-item Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994) measures three facets of alexithymia: difficulty identifying feelings (DIF), difficulty describing feelings (DDF), and an externally oriented thinking style (EOT). Participants use a five-point Likert scale to indicate how much they agree with each item (1 = Strongly disagree; 5 = Strongly agree). Scores are summed, with a maximum total score of 100. Higher scores indicate a greater presence of alexithymic characteristics. Total subscales scores can also be

used to indicate the presence of specific facets. The TAS-20 total scores are designed to be used continuously, but for research purposes, cut-offs are provided with total scores  $\geq 61$  indicating the presence of alexithymia,  $\geq 52$  indicating non-alexithymia, and scores falling between these categories indicating possible alexithymia.

The TAS-20 is valid across situations and populations (Bagby et al., 2020) and valid for administering online (Bagby et al., 2014) which was the case for all studies conducted for this thesis. It is suggested that multiple measures of alexithymia should be administered simultaneously which utilise different methods e.g. self-report and observer-rated, such as the Toronto Structured Interview for Alexithymia (TSIA; Bagby et al., 2006). However, this instrument requires training and is not validated for online use so it was not feasible to incorporate as part of the measurement of alexithymia in this thesis. When the TAS-20 was revised from the original 26-item version of the scale (Taylor et al., 1985), a fourth subscale measuring imaginal processes was removed due to psychometric shortcomings. This resulted in criticism of the scale for not measuring the construct as defined, yet Bagby et al. (2020) argue that the EOT subscale captures the lack of fantasy life and imaginal processes indirectly, as evidenced by significant correlations between EOT of the TAS-20 and other measures of fantasising (Taylor & Bagby, 2013; Tibon et al., 2005). This is logical, as the cognitive characteristics of the accepted definition of alexithymia both correspond to *pensée opératoire*, an earlier conceptualisation of the cognitive characteristics of alexithymia (Marty & M'Uzan, 1963). Despite potential limitations, the TAS-20 remains the gold-standard measure for self-reported alexithymia. Other self-report measures exist, e.g. the Perth Alexithymia

Questionnaire (Preece et al., 2018), but only the TAS-20 was used in this thesis as it continues to be recommended as the most psychometrically sound self-report measure of alexithymia for research and clinical purposes (Zahid et al., 2023). For this study, scale results were not subject to inferential statistical analyses.

**Table 3.2 Dutch Eating Behaviour Questionnaire – Emotional Eating Subscale**

Please indicate the answer that applies to you by selecting the appropriate response box from the 5 options. <i>Please remember to think out loud for the entire time.</i>				
Never	Rarely	Sometimes	Often	Very Often
1	2	3	4	5
<p>Do you have the desire to eat when you are irritated?</p> <p>Do you have a desire to eat when you have nothing to do?</p> <p>Do you have a desire to eat when you are depressed or discouraged?</p> <p>Do you have a desire to eat when you are feeling lonely?</p> <p>Do you have a desire to eat when somebody lets you down?</p> <p>Do you have a desire to eat when you are cross?</p> <p>Please remember to think out loud for the entire time.</p> <p>Do you have a desire to eat when something unpleasant is about to happen?</p> <p>Do you have a desire to eat when you are anxious, worried or tense?</p> <p>Do you have a desire to eat when things are going against you or when things have gone wrong?</p> <p>Do you have a desire to eat when you are emotionally upset?</p> <p>Do you have a desire to eat when you are frightened?</p> <p>Do you have a desire to eat when you are disappointed?</p> <p>Do you have a desire to eat when you are bored or restless?</p>				

### 3.3.6 Analysis

Data analysis was conducted in line with previous think aloud research examining scales used within psychological and health contexts. Framework analysis was undertaken, following established guidelines for analysing think aloud data (van Someren et al., 1994). First, the audiotaped thinking processes of all participants were transcribed and segmented into material relating to each of the 13 items of the DEBQ-EE. As participants generally read out the items before or during

the thinking aloud of their answers, there were no issues with segmentation of the transcribed text by scale item. Data were then further segmented by coding sections of responses into specific categories. The coding framework was based upon that used by Aujla et al. (2018), which was informed by earlier think-aloud studies (e.g. French et al., 2007; McCorry et al., 2013; van Oort et al., 2011). The coding framework was further developed during the iterative analysis process, to align with the research being conducted and the data collected. The problems captured by the coding framework were:

- (1) No problems, indicating that participants demonstrated no problems with the item or the think aloud method (i.e., thought out loud while responding to the corresponding item);
- (2) Insufficient evidence of thinking aloud, where audio for a particular item was missing or limited due to inadequate thinking aloud (i.e., participant was silent while responding to the question or recorded retrospectively);
- (3) Difficulty generating a response, where participants expressed that they were generally not sure how to respond, or it was not applicable to their current circumstances;
- (4) Difficulty selecting a response, where respondents expressed problems with indicating their answer due to format of the response scale;
- (5) Questioned item content, suggesting problems with how the question was worded or expressing confusion over the items;
- (6) Misinterpreted item content, where participants answered a different question to that being asked;
- (7) Incongruent response, where the written and verbal responses did not match.

Each of the seven problem categories reflected a specific problem, either related to completing the DEBQ-EE or engaging with the think aloud

process. It was possible for item responses to reflect multiple problems, but it was not possible for items to be coded simultaneously as having a specific problem and “No problems”. Cohen’s  $k$  was calculated to establish agreement between the two authors (KM, DJW) who independently coded the data into the specific framework categories. There was moderate agreement between the two authors ( $k = .604$ ;  $p < .001$ ), and when coding was not congruent it required only minimal discussion between authors to achieve consensus.

### 3.3.7 Ethical considerations

**3.3.7.1 Broader ethical considerations.** In line with conducting ethical research under the auspices of Birmingham City University (BCU) and within the field of psychology, codes of ethical conduct outlined by BCU and the British Psychology Society (BPS) were adhered to at all points of the PhD project. The BCU Research Ethical Framework (BCU, 2010) sets out principles to be considered when designing and undertaking research, which are applicable across all faculties. Psychology-specific guidelines are stipulated by the BPS, with a clear code for general ethics and conduct for all research, and further pertaining to the ethics of human research which applied to four of the five studies conducted as part of this thesis, excluding the systematic review as it did not recruit human participants.

The BPS Code of Ethics and Conduct (BPS, 2021a) describes the four general principles of respect, integrity, competence, and responsibility as the overarching guidance for standards of professionalism, ethics, and judgements to encompass all fields of psychology. The BPS Code of Human Research Ethics



(BPS, 2021b) outlines principles which are specific to research contexts involving human participants. These are intended to supplement the general ethics principles of the BPS Code of Ethics and Conduct, with the expectation that psychological researchers adhere to both. The key principles for human research comprise the following: respect for the autonomy, privacy and dignity of individuals and communities; scientific integrity; social responsibility; and maximising benefit and minimising harm. Given the nuances of psychological research, particularly with human participants, the level of risk varies greatly. For this reason, these general moral principles are used to inform research rather than detailed and specific regulations, to ensure applicability to all psychological research (BPS, 2021b).

The BPS defines risk as the potential for physical and psychological harm, discomfort, or stress to the participant as a result of taking part in the research (BPS, 2021b). There are various components of risk to be considered within the scope of the aims of this PhD project. An aspect of the research which may present greater risk to the participant is that which may lead to labelling either by the researcher or by the participant. In studies employing scales measuring traits and eating behaviours, the participant consent form will require agreement to the understanding that completion of standardised measures within the study will not provide sufficient results for diagnostic purposes, and that researchers will not be able to discuss individual scores with participants. This aims to minimise risk of labelling participants.

Only adults were eligible to take part in each study, so there were no issues regarding the participation of children or young people. Generally, the risk to participants was low but all studies provided the details of appropriate helplines within the participant-facing study information and the debrief information, in the

event any issues such as distress arose relating to participation. Support services were signposted in the information and debrief sheet of each study. Participants were reminded that they were able to leave the study at any time by simply closing the webpage and their data would not be included in the analyses and write up. This is a benefit of online data collection where it is feasible, as participants may be more comfortable and prepared to withdraw when they wish to – as opposed to the more direct and potentially uncomfortable desire to leave a study which is taking place in person. Participants were also reminded that they could leave any items blank without penalty (with the exception of the consent form which required agreement to all items to continue), and where this was part of a study which offered incentives that they would remain eligible for these.

The nature of the research aligns closely with disordered eating, and the bias of those interested in disordered eating taking part was considered. Where required, research projects outlined exclusion criteria requesting that participants who would feel distressed thinking about eating behaviours or body image to refrain from taking part in the study, as well as those with histories of eating disorders.

Principles including integrity, social responsibility, and respect, are upheld by reflecting throughout the PhD research process. Reflection is considered important even within quantitative methods, due to interpretation and reporting being susceptible to researcher bias. A potential source of bias is power dynamics when interacting with participants or writing about participants. Depending on the population, certain characteristics may influence the dynamic, such as discrepancies between researcher and participant gender, weight, and behaviours. The ability to reflect is important particularly when writing up findings, in order to monitor language

and definitions used contextualising the research. For example, by ensuring to use the language requested by particular groups to avoid stigmatisation. This is important as existing alexithymia and feeling fat research is often situated within clinical contexts, and emotional eating research focusing upon obesity. Research into obesity and related topics is often stigmatising and places blame on individuals living with obesity, despite experiencing weight stigma identified as a risk factor for reduced quality of life (Puhl & Suh, 2015). However, researchers have a social responsibility to the populations and individuals they are researching, and in this case, avoiding further stigmatisation as a consequence of the research topic and reporting of findings. As emotional eating and other constructs explored across this PhD project (e.g. feeling fat) are associated with a wide range of adverse outcomes, including those of a psychological nature, it is possible to meaningfully explore these constructs without negatively focusing upon objective body weight and shape.

**3.3.7.2 Specific ethical considerations.** The present study was conducted in accordance with the Declaration of Helsinki, with specific ethical approval sought and granted due to data collection from human participants. An application for ethical approval was submitted to BCU's Business, Law and Social Sciences Ethical Review Committee, and data collection did not commence until permitted to do so by this committee. Funding was awarded from the BCU Doctoral Research College to offer financial incentive for participation by advertisement of a prize draw. The BPS (2021b) details potential ethical concerns regarding prize draws endorsing gambling, and outlines that prizes should be modest in value to avoid risk of coercion. As such,

participants of this study were able to opt in for a chance to win 1 of 3 £10 Love2Shop vouchers.

## **3.4 Results**

### **3.4.1 Sample characteristics**

Thirteen participants were recruited in total: eight from general social media advertisements, and five from advertisements on alexithymia-specific pages. The sample included 9 women and 4 men, and they were aged 22 to 52 ( $M = 29.46$ ,  $SD = 8.49$ ). Twelve participants were white, and one participant reported being of mixed ethnicities. The total DEBQ-EE scores ranged from 13 to 61 ( $M = 37.46$ ,  $SD = 13.85$ ). Total TAS-20 scores for the sample ranged from 43 to 89, with 8 participants scoring below the categorical cut-off of 62 and 5 above ( $M = 62.62$ ,  $SD = 14.20$ ).

### **3.4.2 Think aloud**

The average time of the recordings was 172 seconds, ranging from 0 to 482 seconds. Every participant had at least three problems coded from their think aloud data. Out of the 175 total coded responses, participants encountered 110 problems (62.86% of codes). The categories capturing the greatest numbers of problems were insufficient think aloud responses (42.29% of codes), followed by difficulties generating responses (8.00% of codes), and misinterpreting the item content (6.86% of codes). Table 3.3 presents an overview of the problems identified for each of the 13 items of the DEBQ-EE. The number of problems experienced was generally consistent across the 13 items of the DEBQ-EE, ranging from 6 to 11 problems. Item

2 (*Nothing to do*) and Item 4 (*Lonely*) appeared particularly problematic, each associated with 11 problems experienced by respondents. Problems are grouped below based on relation to either completing the DEBQ-EE, or successfully thinking aloud.

**3.4.2.1 Completing the DEBQ-EE.** Problems specific to completing the DEBQ-EE refer to problems identified across categories 3-7. Of all problems faced, those associated with completing the DEBQ-EE made up only 37.73% of problems. The most frequent problems experienced by participants were difficulties generating responses and misinterpretation of the item content. At least one participant experienced one of these problems for all items of the scale, indicating that no item was problem-free for all participants. General themes were identified across the transcribed think aloud data.

**Participants struggled with interpreting the situation items.** Some of the DEBQ-EE items refer to situations the respondent may experience, rather than asking about times they felt a specific emotion (e.g. *When something unpleasant is about to happen*). This led to participants thinking aloud about the emotions they might feel in this situation, and answering the item based on that emotion they have chosen:

*...if something unpleasant is about to happen, I feel more, I have an inability to eat. I get a bit more anxious more nervous so I don't tend to go for food*

(Participant 3, TAS-20 Score 45 – Item 7)

*Um. I feel like that would trigger a sad emotion and then that emotion would make me want to eat. So it's not necessarily that I want to eat because someone has let me down its more that the emotion that has provoked has made me want to eat. I'm going to put down often but it's more to do with the emotions*

(Participant 7, TAS-20 Score 75 – Item 5)

**Participants struggled to generate answers to singular emotions.** Most items on the DEBQ-EE ask participants to report their desire to eat in response to a single emotion. This relies on participants being able to recall their behaviour in response to each discrete emotion, resting on the assumption that they are first able to recall previous experiences in which they felt only this emotion. One participant articulated this and how it hinders their ability to generate an answer:

*...I'm not sure when I'm feeling like multiple emotions at one time I can't really yeah I'm not sure I can say exactly*

(Participant 9, TAS-20 Score 67 – Item 8)

In some cases, this difficulty to respond to isolated emotions specifically overlapped with another item assessed elsewhere on the scale:

*Well when I feel lonely I tend to feel depressed and discouraged so yeah sometimes*

(Participant 1, TAS-20 Score 43 – Item 4)

**Participants expressed that items were similar.** Participants appeared to experience problems with items they perceived to be close in meaning. This may

have affected how they approached the second item, which could be problematic as the scale instructions do not refer to recommendations to randomise items:

*Well that's the same*

(Participant 4, TAS-20 Score 62 – Item 10)

*Feels like we've asked that question sort of around the same thing*

(Participant 9, TAS-20 Score 67 – Item 12)

**Participants expressed that items were vague.** Some problems pertained to participants explicitly questioning the item content:

*What emotion? That's a bit vague. Um. Sometimes. It depends on what's upset me*

(Participant 1, TAS-20 Score 43 – Item 10)

*...am I aware that the unpleasant thing is about to happen?*

(Participant 12, TAS-20 Score 61 – Item 7)

*Er what does that what does things going against me, the illuminati out to get me? Er*

(Participant 12, TAS-20 Score 61 – Item 9)

With some responses, it was agreed by the researchers that *no problems* was an appropriate code as the respondent was able to think aloud and respond to the item, but it was noted that they expressed that their response depends on other factors, and to degree to which they feel this emotion. This led to participants selecting *sometimes* as an appropriate response in this situation. However, it is

important to note as they are inferring that 'sometimes' refers to in some situations always, rather than in all situations some of the time:

*I guess it depends what the unpleasant thing is. Um ill say sometimes*

(Participant 2, TAS-20 Score 45 – Item 7)

*Sometimes. It definitely depends what I'm irritated about though*

(Participant 3, TAS-20 Score 43 – Item 1)

*See I don't know. It depends. Sometimes I do, and sometimes I don't. Oh yeah sometimes is on there*

(Participant 1, TAS-20 Score 43 – Item 3)

*Sometimes. It depends how irritated. If I'm really really irritated then I probably can't but quite irritated yes*

(Participant 4, TAS-20 Score 62 – Item 1)

**Participants struggled with the response scale.** Some of the coded problems related to a lack of response items appropriate for the respondent. They expressed that when items were not applicable there was no choice for them to indicate so:

*...I don't know what feeling lonely often feels like its not I cant really I think it needs a kind of unsure not applicable*

(Participant 10, TAS-20 Score 70 – Item 4)



*That question doesn't really apply to me because I cant remember ever feeling lonely so I can't, there's just no answer to that question.*

(Participant 12, TAS-20 Score 61 – Item 4)

Furthermore, when participants had difficulty interpreting the item they still were required to answer, as there is no response option to indicate that they do not understand. This led to participants appearing to select random responses:

*I guess it depends what the unpleasant thing is. Um I'll say sometimes*

(Participant 2, TAS-20 Score 45 – Item 7)

*Umm. I don't really know how to interpret that one. So I'm gonna put sometimes*

(Participant 7, TAS-20 Score 75 – Item 7)

**Participants recall experiences to justify responses.** A recurring theme was the evidence of participants specifically seeking previous experiences to evidence their response to the items. When participants were unable to recollect this evidence, it presented as a challenge for them to generate an answer:

*Uh when was the last time I was irritated? Now. Umm. Mmm. Rarely?...*

(Participant 1, TAS-20 Score 43 – Item 1)

*...I can't remember being irritated and whether I had a desire to eat or not ... so I couldn't accurately answer that question ...*

(Participant 12, TAS-20 Score 61 – Item 1)

This relates to the previously reported problem whereby participants were unable to recall situations in which they felt emotions in isolation:

*...but these are kind of hard for me to answer. A lot of them mm I don't know I feel like a lot of these emotions I feel simultaneously or not at all. Rather than distinctly like disappointed, frightened, etc.*

(Participant 9, TAS-20 Score 67 – Item 12)

However, respondents' attempts to recall memories made determining whether participants were experiencing problems challenging for the researchers. It was highlighted during the analysis process that coding data was difficult when it was unclear whether participants were potentially unable to generate answers, or were instead just unable to recollect a memory to justify their response in that moment. This exemplifies a limitation of self-report measures, whereby the researcher cannot ask the participant to elaborate or clarify their response.

**Participants were generally congruent with responses.** Only one instance of incongruence between written and spoken responses was coded, whereby the participant thought aloud about a response they did not select on their screen. This indicates that in the present sample, human error when selecting responses was minimal.

**3.4.2.2 Thinking aloud.** Participants also experienced issues with the think aloud method, with the greatest number of problems recorded pertaining to missing and insufficient evidence of thinking aloud (62.27% of problems). Some participants

did not think aloud whilst responding to some or all of the items presented, and one participant appeared to have faced issues with the online and independent data collection which resulted in them submitting a recording of their retrospective thinking aloud – appearing to have recorded after they had already completed the DEBQ-EE.

During the analysis process, the researchers discussed that participants tend to do less thinking aloud when the answer appears immediately obvious to them:

*Absolutely. That's one of probably my worst habits.*

(Participant 3, TAS-20 Score 45 – Item 3)

*I can't think of any time where I have*

(Participant 8, TAS-20 Score 60 – Item 11)

*Yes absolutely*

(Participant 11, TAS-20 Score 83 – Item 3)

This may be representative of their actual thoughts and the minimal cognitive effort required to determine a response. Therefore, in these situations richer think aloud data may not be attainable. However, the lack of concurrent researcher presence limits the ability to prompt participants to continue thinking aloud.

### **3.4.3 High vs low alexithymia**

As outlined in the study aims, exploration of possible differences in the think aloud data between respondents based on TAS-20 scores was contingent on the number of participants recruited and the quality of the think aloud data. Whilst five

**Table 3.3** Total codes and problems across items of the DEBQ-EE whilst thinking aloud ( $N = 13$ )

	<b>1. No problems</b>	<b>2. Insufficient thinking aloud</b>	<b>3. Difficulty generating response</b>	<b>4. Difficulty selecting response</b>	<b>5. Questioned item content</b>	<b>6. Misinterprete d item content</b>	<b>7. Incongruent response</b>	<b>Total N (%)</b>	<b>Total of problems N (%)</b>
<b>Item 1</b>	7	4	2	1	0	0	0	<b>14 (8.00%)</b>	<b>7 (6.36%)</b>
<b>Item 2</b>	3	6	1	0	1	2	1	<b>14 (8.00%)</b>	<b>11 (10.00%)</b>
<b>Item 3</b>	5	6	2	0	0	1	0	<b>14 (8.00%)</b>	<b>9 (8.18%)</b>
<b>Item 4</b>	3	7	1	2	0	1	0	<b>14 (8.00%)</b>	<b>11 (10.00%)</b>
<b>Item 5</b>	3	8	0	0	0	2	0	<b>13 (7.43%)</b>	<b>10 (9.09%)</b>
<b>Item 6</b>	6	6	1	0	0	0	0	<b>13 (7.43%)</b>	<b>7 (6.36%)</b>
<b>Item 7</b>	5	3	1	0	2	2	0	<b>13 (7.43%)</b>	<b>8 (7.27%)</b>
<b>Item 8</b>	6	5	1	0	1	0	0	<b>13 (7.43%)</b>	<b>7 (6.36%)</b>
<b>Item 9</b>	6	5	1	0	1	1	0	<b>14 (8.00%)</b>	<b>8 (7.27%)</b>

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<b>Item 10</b>	5	5	3	0	1	0	0	<b>14</b> <b>(8.00%)</b>	<b>9 (9.18%)</b>
<b>Item 11</b>	7	5	1	0	0	0	0	<b>13</b> <b>(7.43%)</b>	<b>6 (5.45%)</b>
<b>Item 12</b>	5	6	0	0	0	2	0	<b>13</b> <b>(7.43%)</b>	<b>8 (7.27%)</b>
<b>Item 13</b>	4	8	0	0	0	1	0	<b>13</b> <b>(7.43%)</b>	<b>9 (9.18%)</b>
<b>Total codes (%)</b>	<b>65</b> <b>(37.14%)</b>	<b>74 (42.29%)</b>	<b>14</b> <b>(8.00%)</b>	<b>3</b> <b>(1.71%)</b>	<b>6</b> <b>(3.43%)</b>	<b>12</b> <b>(6.86%)</b>	<b>1</b> <b>(0.57%)</b>	<b>175</b> <b>(100%)</b>	<b>-</b>
<b>Total problems (%)</b>	<b>-</b>	<b>62.27%</b>	<b>12.73%</b>	<b>2.73%</b>	<b>5.45%</b>	<b>10.91%</b>	<b>0.91%</b>	<b>-</b>	<b>110</b> <b>(100%)</b>

Note: "Total codes" refers to all coded segments which includes those coded as no problems. "Total problems" refers to segments coded into problem categories, excluding no problems.

participants scored above the cut-off for 'high' levels of alexithymia, one of these failed to engage with the think aloud process and another only engaged for 6/13 items of the DEBQ-EE. Discussion between the researchers led to the consensus that there was insufficient think aloud data for any meaningful exploration of these differences.

### 3.5 Discussion

This study aimed to capture what individuals think as they complete the DEBQ-EE self-report questionnaire of emotional eating to identify possible problems that participants encounter. The think aloud data identified problems in two broader domains: completing the DEBQ-EE, and the process of thinking aloud.

Regarding the problems with completing the DEBQ-EE, the greatest number of problems were observed in relation to generating a response and interpreting the item content. These problems were underpinned by perceiving items to be vague or similar to another item, difficulties interpreting the situation-based items of the scale (e.g. *When something unpleasant is about to happen*), and difficulties responding about specific emotions in isolation. Interpretation of items, particularly situation-based items, led to inferring of other emotional states which then appear to be what the response relates to. This highlights a broader issue with identifying and remembering specific emotions and their individual experience of associated behaviours, which scales such as the DEBQ-EE where each item refers to a discrete emotion relies upon the respondent being able to do. This emphasises aspects of the proposed *triple recall bias* in self-reported emotional eating (Evers et al., 2009), as participants need to be able to accurately recall their emotions but also accurately

distinguish them from other emotions they have felt simultaneously, in order to respond accurately to the scale items.

Whilst some problems related to a lack of response items to indicate items being not applicable or not understood, relatively few problems were related to incongruent responses. This suggests participants generally select the answer they intended to – albeit there were still a small number of problems here, indicating that this does take place and should be considered when using this, and other, self-report measures.

When considering the success of thinking aloud, participants experienced the greatest number of problems in this domain. Almost two thirds of the problems were coded as insufficient think aloud data, which indicates potential problems with the online method tested as part of this study. A previous study utilising the framework employed in this study (Aujla et al., 2018), but which was conducted in person, found only 37% of problems were coded in this category for their participants. This highlights limitations of the methods of this study, particularly the absence of a researcher during the study who would be able to prompt participants to think aloud as they complete the scale. While insufficient thinking aloud may not be indicative of problems completing the scale, the method and analysis relies on participants thinking aloud and providing this insight into their responses (van Someren et al., 1994) and without this audio data, the usefulness of the think aloud method is hindered. Due to the nature of this study, it was not possible to clarify whether participants experienced technology issues (i.e. microphone did not work), did not understand the think aloud instructions, or chose not to engage – this is a further limitation of the lack of researcher presence. This highlights the missed opportunity

for participants to clarify any misunderstanding of instructions, and for researchers to check understanding before the study commenced.

A further limitation of the present study is the entirely white sample, which does not offer diversity in data. Whilst there are currently no standardised guidelines for the number of participants to be included in think aloud research, the sample size was objectively small and future studies could recruit more participants to attempt to improve diversity of the sample. Previous studies often recruited between six and 13 participants, but some recruited over 30 participants. Standardised guidelines for appropriate sample sizes would benefit the quality of future think aloud research.

The small sample size and insufficient think aloud data generated from several participants, particularly within the sample with increased levels of alexithymia, meant it was not feasible to explore differences based on levels of alexithymic characteristics. It was hoped to examine these differences, within the context of the 2019 review (Apgáua & Jaeger, 2019) finding that greater alexithymia was associated with a reduction in *explicit* memory for emotional information, to ascertain if individuals with increased levels of alexithymia experienced more or different problems when self-reporting emotional eating. Nonetheless, findings indicate problems across the recruited sample which can be taken into consideration when conducting future subjective emotional eating research across populations.

Despite these limitations, the online format of the think aloud method which was not contingent on researcher availability allowed participants to complete the studies in locations and at times which suited them, and on their personal devices. From scoping published literature, we believe this to be the first study at the time of being conducted to test the think aloud method virtually without concurrent



researcher presence. It is hoped that this potential for increased ecological validity will have enabled more authentic answers, as the participants were not being directly observed and prompted by an unknown researcher in an unfamiliar laboratory setting. A recent study (Alhejaili et al. 2022) conducted think aloud research via video calling, to enable the researcher to be present for prompting thinking aloud. Whilst this method overcame barriers associated with Covid-19 and in-person research, this would have still posed issues for the ecological validity due to the participant awareness of being observed by the researcher.

The think aloud method, regardless of the format of employing it, has advantages over other approaches of exploring respondents thoughts and experiences of completing scales (e.g. open-ended survey questions, interviews). This method enables capturing of respondents' thought processes whilst completing the scale of interest, concurrently and largely indirectly, which limits risks of bias either related to retrospective recall of thoughts or influence from the researcher (Charters, 2003; Willis & Artino, 2013). This study explores what individuals are thinking as they complete the DEBQ-EE measure, providing preliminary findings from the relatively small sample size and insight into the potential problems respondents face. This has the potential to help to inform developments of self-report emotional eating scales, and future adaptations to the think aloud method as necessitated by barriers to conducting traditional methods of this research.

### **3.6 Chapter Summary**

This chapter presented a think aloud study which aimed to capture what individuals are thinking whilst they complete the commonly use DEBQ-EE. The

Covid-19 pandemic offered an opportunity to test innovative methods of conducting this research, collecting think-aloud data of varying quality and depth. This meant the data collected was not suitable for exploration into differences based on levels of alexithymia as measured by the TAS-20.

The think-aloud findings provided some insight into the use of the DEBQ-EE and particularly potential issues with items related to emotional situations rather than specifically stated emotions. This adds to the systematic review conclusions that research should aim to include other measures of subjective emotional eating, and consider self-report measures which state specific emotions for participants to respond to, such as the Emotional Eating Scale and Salzburg Emotional Eating Scale. These scales will be employed in the cross-sectional studies introduced in the following chapters.

## **CHAPTER 4: EMOTION DYSREGULATION**

### **4.1 Chapter introduction**

The systematic review in Chapter 2 concluded that there may be preliminary support for the relationship between the constructs of alexithymia and emotional eating. This study detailed in this chapter expands upon this, to further elucidate the relationship and explore whether alexithymia exerts an indirect effect on emotional eating through emotion dysregulation. The systematic review noted a lack of research employing the other validated measures of emotional eating which exist, beyond the DEBQ-EE. Considering this, along with limitations of the DEBQ-EE such as its focus on desire to eat after undefined negative emotional states over discrete emotions (Alzheimer & Urry, 2019), the present study employed alternate subjective measures of emotional eating. The lesser-used Emotional Eating Scale (EES; Arnow et al., 1995) and the Salzburg Emotional Eating Scale (SEES; Meule et al., 2018) were used to explore the relationship with alexithymia. A cross-sectional study was designed during the beginning of the Covid-19 pandemic and associated lockdown to explore these areas of interest. To understand the role emotion dysregulation plays in this relationship helps to begin identifying ways to target emotional eating for the individuals who may benefit from this support.

### **4.2 Literature review and rationale**

Negative emotional eating is considered an atypical stress response, compared to the typical response of not eating (Gold & Chrousos, 2002). It may be problematic for physical health, as negative affect and distress are associated with

an increased quantity of consumed snacks (O'Connor & O'Connor, 2004; Oliver & Wardle, 1999; van Strien et al., 2012) and less healthful choices such as opting for sweet and fatty foods (Oliver et al., 2000; Wallis & Hetherington, 2009; Zellner et al., 2006). It may also be problematic for psychological and emotional health, as eating in response to anxiety, anger, boredom and particularly depression was found to be associated with poorer wellbeing, greater eating disorder symptomatology and difficulties in emotion regulation (Braden et al., 2018; Geliebter & Aversa, 2003; Meule et al., 2018; Nolan et al., 2010). There is a need to understand the mechanisms underlying emotional eating, particularly the atypical and potentially problematic response of eating in response to negative emotions.

As discussed in the general introduction, emotion dysregulation is an underlying feature of the theories of negative emotional eating. Difficulties in emotion regulation also play a role in loss-of-control eating (Kenardy et al., 1996) and disordered eating (Lavender & Anderson, 2010; Whiteside et al., 2007), with greater reports of bingeing and purging behaviours accompanying distress (Racine & Wildes, 2013). Emotion dysregulation has been identified as a moderator in the relationship between emotional eating and disordered eating, with difficulties in emotion regulation strengthening the relationship between negative emotional eating and disordered eating (Barnhart et al., 2021).

Furthermore, a recent review proposed alexithymia and emotion dysregulation among possible mechanisms of emotional eating (van Strien, 2018), yet the relationship between alexithymia and emotional eating has not been extensively researched. Whilst the systematic review in Chapter 2 identified preliminary support for the relationship between alexithymia and emotional eating, how alexithymia

relates to emotional eating remains unclear. Two theoretical mechanisms have been proposed: (1) alexithymia as a deficit of interoception results in insensitivity to satiety cues, thus eating in response to bodily sensations that are not hunger such as emotional arousal; and (2) eating to regulate negative affective states common in alexithymia, thus emotional eating represents maladaptive regulation of those emotions. These mechanisms are not necessarily mutually exclusive (Lyvers et al., 2019), and logically may both be supported through learning to identify and respond to emotions adaptively. However, testing whether alexithymia in fact relates to emotional eating via emotion dysregulation requires exploration first. Through testing this indirect relationship, the role of emotion dysregulation will be elucidated and it will provide a foundation for future research to inform interventions to build upon. Through this, theoretical understanding of the mechanisms underpinning emotional eating may support individuals who experience problems and adverse outcomes related to this.

The relationship between alexithymia and eating behaviours in response to emotion is logical, as regulation of emotions first requires a level of emotion processing. Individuals with alexithymia experience an impaired ability to process emotions at an affective and cognitive level, captured by the characteristics of alexithymia (Goerlich, 2018). Therefore, emotion dysregulation may underpin the relationship between alexithymia and emotional eating; individuals with higher levels of alexithymia experience problems with processing and subsequently regulating emotions (Barrett et al., 2001), increasing the risk of developing conditions characterised by (Goerlich, 2018) or behaviours associated with emotion dysregulation.

There is growing consensus for conceptualising alexithymia as a personality trait with relative, rather than absolute stability. This means whilst levels can fluctuate, individual differences remain similar over time (Norman et al., 2019), and it is unlikely to be affected through interventions (Iancu et al., 2006; Schmidt et al., 1993). Therefore, theoretically it would have temporal precedence and as such should be a predictor when examining the direct and indirect effects on targetable skills such as emotion regulation and behaviours such as emotional eating (Fiedler et al., 2018). Alexithymia is typically a risk factor for poorer outcomes in therapeutic eating interventions (Pinna et al., 2015), and specifically, the characteristic of difficulty identifying feelings has been found to be a significant negative predictor of treatment outcomes (Speranza et al., 2007). Exploring specific mechanisms of emotional eating in individuals with greater levels of alexithymia is important for supporting these individuals.

### **4.2.1 Aims**

The aim of this study was to examine the direct and indirect effects of affective characteristics of alexithymia on emotional eating via emotion dysregulation, to expand upon previously proposed models and understand the mechanisms by which alexithymia may relate to emotional eating. It is predicted that the affective characteristics of alexithymia will positively predict emotion dysregulation, which will in turn positively predict emotional eating.

## **4.3 Methods**

### **4.3.1 Research design**

The third research question of the thesis asked what the role of emotion dysregulation is in the relationship between alexithymia and emotional eating. To answer this, a cross-sectional study was designed. At the time of designing the study, it was uncertain when return to in-person research would be feasible. This meant the study needed to be designed with this in mind, and with consideration to minimising any potential future disruption. It was decided that it would be safer and less vulnerable to disruption to design this cross-sectional study to take place entirely online via Qualtrics. Inclusion criteria were set within Prolific, the participant recruitment platform, so the study was only visible to those meeting these criteria based on demographic information they had previously provided to Prolific.

### **4.3.2 Participants**

One hundred and fifty-eight participants were recruited through opportunity sampling using adverts on social media and Prolific. Individuals with a history of eating, mood, addictive, or substance use disorders were excluded from taking part. Based on Fritz and MacKinnon's (2007) estimates for mediation analyses, a sample size of 148 would be required to detect small-medium effect sizes, based on a statistical power 0.80 with the bias-corrected bootstrapping procedure.

### 4.3.3 Measures

**4.3.3.1 Demographics.** Participants provided their age, gender, relationship status, ethnicity and educational level. They also self-reported body measurements (height and weight) and indicated their dieting status.

**4.3.3.2 Alexithymia.** The TAS-20 was used to measure alexithymia (see Chapter 2). Internal consistency of the scale was found to be high in the present study ( $\alpha = 0.85$ ), as were the DIF ( $\alpha = 0.85$ ) and DDF ( $\alpha = 0.73$ ) subscales. Consistent with previous research (Larsen et al., 2006; Pinaquy et al., 2003; Pink et al., 2019), internal consistency of the EOT subscale was much lower ( $\alpha = 0.59$ ).

**4.3.3.3 Emotion dysregulation.** The Difficulties in Emotion Regulation Scale (DERS-SF; Kaufman et al., 2016) measures six facets of emotion dysregulation: non-acceptance of emotional responses, difficulties in directing goal-directed behaviour, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. Participants indicate how often each scale item (See Appendix B.2) happens using a five-point Likert scale (1 = Almost never; 5 = Almost always). These scores are summed, with higher scores reflecting greater relative difficulties with emotion regulation.

The short-form version maintains the excellent psychometric properties of the original 36-item version developed by Gratz and Roemer (2004), and the streamlined version is considered more appropriate to minimise fatigue. Given the use of a battery of self-report questionnaires, it was decided that employing the short-form version would be better suited. Internal consistency for the total score was high ( $\alpha =$



0.90), but as demonstrated in previous findings (Hallion et al., 2018), the DERS-SF is psychometrically stronger after removing the awareness subscale ( $\alpha = 0.91$ ).

**4.3.3.4 Emotional eating scale.** The Emotional Eating Scale (EES; Arnow et al., 1995) was used (see Appendix B.3). This scale assesses participants' reported urge to eat in response to 25 negative emotions. Participants indicate their urge to eat using a five-point Likert scale (0 = No desire to eat; 4 = An overwhelming urge to eat), with higher summed scores indicating a greater urge to eat in response to these emotions. The EES had high internal consistency in the present study ( $\alpha = 0.94$ ), with acceptable Cronbach's alpha values for each of the subscales ( $\alpha > 0.73$  for all).

The four subscales proposed by Goldbacher et al. (2012) were calculated: *depression*, *anxiety*, *anger/frustration*, and *somatic*. The *somatic* subscale was an addition compared to the initial three subscales proposed. During the publication process, a reviewer commented on the potential to use the *boredom* subscale brought in by Koball et al. (2012). However, this was refuted as the boredom subscale appears a separate construct from eating in response to other negative emotions and may possibly be more reflective of external rather than emotional eating. The EES has been validated within non-clinical populations (Waller & Osman, 1998).

**4.3.3.5 Salzburg Emotional Eating Scale.** The Salzburg Emotional Eating Scale (SEES; Meule et al., 2018) was also used (see Appendix B.4). This scale assesses reported emotional eating behaviour, rather than urges, in response to 20 positive and negative emotions. Four subscales measure the broader emotions of: happiness, sadness, anger, and anxiety. Participants respond using a five-point

Likert scale to indicate whether they eat more or less in response to each emotion (1 = I eat much less than usual; 5 = I eat much more than usual). Mean scores are computed for each subscale, which indicates whether individuals eat less when experiencing these emotions (scores < 3), eat the same amount (scores = 3), or eat more (scores > 3). Only subscale scores are used in analyses, as total scores are not validated for use with this measure.

The SEES is a relatively newer measure of emotional eating, but there is preliminary support for the validity of this scale (Meule et al., 2018). The limitations of the self-report nature are strongly acknowledged by authors, but these are applicable to all subjective measures of emotional eating and are not specific limitations of the SEES. The SEES had high internal consistency for each of the subscales: happy ( $\alpha = 0.87$ ), sad ( $\alpha = 0.83$ ), angry ( $\alpha = 0.84$ ), and anxious ( $\alpha = 0.92$ ).

**4.3.3.6 Covid-19 aims.** Participants also completed a set of questions related to the Covid-19 pandemic and the Depression, Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995). Results related to these measures are not presented in this thesis but can found within the associated article published in *Appetite* (McAtamney et al., 2021).

### 4.3.4 Procedure

The study comprised a questionnaire survey which was completed online via the survey hosting website Qualtrics. Data collection took place in mid-July 2020, during the gradual easing of the initial lockdown measures across devolved nations of the United Kingdom. Participants were presented with information about the study

before indicating their consent to take part (see Appendices K and L). A battery of measures was presented, with the order of scales randomised to control for order and fatigue effects. After completing the scales, participants completed questions pertaining to demographic information, which took place at the end of the questionnaire to minimise effects of fatigue on scale completion. The titles of each scale were omitted to reduce response bias. Upon completion, participants were presented with a debrief information page, outlining the purpose of the study (see Appendix M). Here, they were asked if they would be happy to be directly contacted about a later study. If yes, they were asked to leave their email addresses which were stored separately to study data to maintain anonymity (see Appendix N).

### **4.3.5 Data analysis**

Data were analysed using IBM SPSS Statistics 25.0 and PROCESS v3.5 (Hayes, 2017). Preliminary analyses examined for outliers and the assumptions of normality were met. Pearson correlations were used to investigate the associations between measured continuous variables. PROCESS was used to test theorised models, using a regression-based approach to mediation to explore the direct and indirect effects of alexithymia on emotional eating with emotion dysregulation a potential mediator (see Fig. 4.1). In this approach, effects are assessed with bias-corrected accelerated bootstrap confidence intervals (CI) that are considered significant when the upper and lower bound of the bias-corrected 95% CI do not span zero. Bootstrapping with 5,000 samples was used, a method which is effective with smaller samples and the least vulnerable to Type 1 errors (Preacher & Hayes, 2008).

Gender, age and BMI have previously been associated with alexithymia and emotional eating (Geliebter & Aversa, 2003; Larsen et al., 2006; Mattila et al., 2006) so these were controlled for in all models. Affective characteristics of alexithymia (DIF and DDF) were entered as predictor variables. Emotional eating urges as measured by EES total score, and emotional eating behaviours as measured by SEES subscales were entered as outcome variables. Emotion dysregulation was represented by DERS-SF total scores, omitting the awareness scale in all analyses.

### **4.3.6 Ethical considerations**

The codes of general and human research ethical conduct were adhered throughout. See Chapter 3 for discussion of these and potential risk and safeguarding issues which relate to all studies conducted as part of this PhD project. Ethical approval was obtained from the Birmingham City University's Faculty Academic Ethics Committee (see Appendix O), and this study was conducted in accordance with the Declaration of Helsinki.

Funding was awarded from the BCU Doctoral Research College to offer financial incentive for participation in this study. The BPS guidelines surrounding prize draws raise concern about collection of contact details, and there are other methods of offering financial incentives which enable complete anonymity without the need for any contact details, such as payment via participation platforms. In the present study, participants recruited via Prolific ( $n = 133$ ) received £2.15 remuneration, with no other financial or material incentives for any participants. In line with the BPS guidelines, this payment was not so large that it risked

compromising autonomy and the decision to participate but was proportionate to the burden of participation.

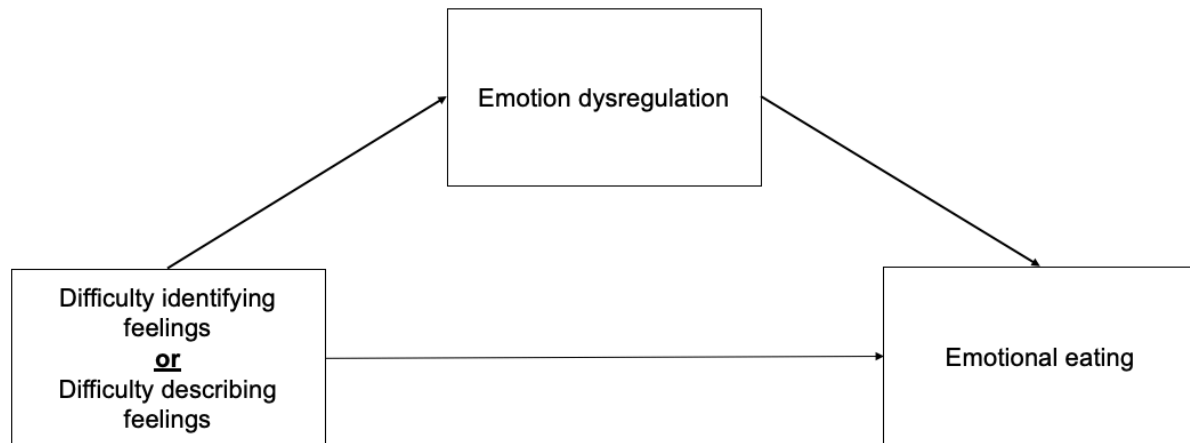


Fig. 4.1 A conceptual model of the mediation tested

## 4.4 Results

### 4.4.1 Participant characteristics

Twenty-two participants were discounted in the final analyses due to incomplete responses or self-reporting height and weight values which may indicate potential eating disorder history (exclusion of BMI outside of 18.5kg/m<sup>2</sup> to 50 kg/m<sup>2</sup> range). The final sample of 136 participants was 64.7% female (34.6% male, 0.7% preferred not to disclose), with a mean age of 32 years (SD = 11.88; range = 18 to 72 years). The sample was 83.1% White (5.1% mixed/multiple ethnic groups, 4.4% Asian, 3.7% Black, 3.7% other ethnic groups) with the majority of individuals having completed a minimum of an undergraduate-level degree (61%). The majority of participants reported not currently dieting (82.4%), and the sample had a mean BMI of 26.21kg/m<sup>2</sup> (SD = 5.39; range = 18.55 to 47.47).

### 4.4.2 Descriptive statistics

Mean total scores of continuous variables are presented in Table 4.1. Levels of alexithymia were consistent with previously reported rates in general population samples (Pink et al., 2019; Salminen et al., 1999) with 11.0% of participants ( $n = 15$ ) scoring above categorical cut-offs indicating the presence of alexithymic characteristics. The presence of alexithymic characteristics was borderline in 27.2% of participants ( $n = 37$ ) and there was an absence of these characteristics in 61.8% participants ( $n = 84$ ).

Mean levels of self-reported emotional eating urges as measured with the EES were lower than that reported in previous research with a similar sample (Pink et al., 2019), with total scores around 20 points lower (out of a maximum score of 100). Mean levels of self-reported emotional eating behaviours as measured with the SEES were comparable to general population samples used for the development and preliminary validation of the scale (Meule et al., 2018).

**Table 4.1 Means and standard deviations of continuous variables.**

Measure	M	SD
TAS-20	46.54	11.01
DIF	15.42	5.72
DDF	13.02	4.13
EOT	18.10	4.03
DERS-SF	36.38	11.05
EES	31.11	18.22
SEES		
Happiness	2.94	0.52
Sadness	3.60	0.77
Anxiety	2.52	0.92
Anger	2.76	0.76

*Note:* TAS-20 = Toronto Alexithymia Scale; DIF = Difficulty identifying feelings; DDF = Difficulty describing feelings; EOT = Externally-oriented thinking; DERS-SF = Difficulties in Emotion Regulation short-form omitting the ; EES = Emotional Eating Scale; SEES = Salzburg Emotional Eating Scale.

#### **4.4.3 Correlation analyses**

Pearson's correlations were conducted to explore the relationships between measured variables (see Table 4.2 for correlation matrix). Significant positive correlations were found between TAS-20 total and affective characteristic subscale scores and DERS-SF total and subscale scores. The EOT scale of the TAS was not found to be significantly correlated with the DERS-SF total score. Neither of these psychological variables (alexithymia or emotion dysregulation), nor any of their subscales, were significantly related to emotional eating behaviours as measured by subscales of the SEES. However, the EES total scores were found to be weakly correlated with the DERS-SF total score.

The negative scales of the SEES (sadness, anger, anxiety) positively correlated with the items of the EES, except for SEES anxiety and EES anger which did not correlate significantly. All items of the EES are negative, indicating there is a relationship between urges to eat in response to negative emotions, and self-reported negative emotional eating behaviours. The SEES happiness subscale negatively correlated with SEES sadness, indicating they may reflect opposing constructs with individuals eating more in response to sadness and less in response to happiness, and vice versa.

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**Table 4.2 Pearson's correlation matrix of the relationships between all measured variables: alexithymia, emotion dysregulation, self-reported emotional eating urges and emotional eating behaviours in response to positive and negative emotions. (N = 136)**

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1. TAS-20 Total	-																		
2. TAS-20 DIF	<b>.856***</b>	-																	
3. TAS-20 DDF	<b>.863***</b>	<b>.667***</b>	-																
4. TAS-20 EOT	<b>.634***</b>	<b>.236**</b>	<b>.387***</b>	-															
5. DERS-SF Total	<b>.616***</b>	<b>.687***</b>	<b>.553***</b>	.140	-														
6. DERS-SF Non-Accept	<b>.466***</b>	<b>.455***</b>	<b>.483***</b>	.133	<b>.752***</b>	-													
7. DERS-SF Strategies	<b>.483***</b>	<b>.582***</b>	<b>.425***</b>	.059	<b>.847***</b>	<b>.511***</b>	-												
8. DERS-SF Impulse	<b>.436***</b>	<b>.505***</b>	<b>.317***</b>	.149*	<b>.786***</b>	<b>.447***</b>	<b>.616***</b>	-											
9. DERS-SF Clarity	<b>.678***</b>	<b>.708***</b>	<b>.652***</b>	<b>.180*</b>	<b>.706***</b>	<b>.490***</b>	<b>.502***</b>	<b>.371***</b>	-										
10. DERS-SF Goals	<b>.347***</b>	<b>.438***</b>	<b>.288***</b>	.031	<b>.791***</b>	<b>.428***</b>	<b>.649***</b>	<b>.532***</b>	<b>.425***</b>	-									
11. EES Total	.123	.124	.072	.086	<b>.259**</b>	<b>.248**</b>	<b>.240**</b>	<b>.292***</b>	.087	.127	-								
12. EES Depression	.114	<b>.146*</b>	.043	.060	<b>.238**</b>	<b>.242**</b>	<b>.224**</b>	<b>.274**</b>	.039	.126	<b>.934***</b>	-							
13. EES Anxiety	.017	.037	.028	-.033	<b>.191*</b>	<b>.184*</b>	<b>.194*</b>	<b>.251**</b>	.018	.084	<b>.902**</b>	<b>.851***</b>	-						
14. EES Anger	<b>.149*</b>	.101	.108	<b>.153*</b>	<b>.243**</b>	<b>.211**</b>	<b>.215**</b>	<b>.257**</b>	.133	.120	<b>.878***</b>	<b>.707***</b>	<b>.733***</b>	-					
15. EES Somatic	<b>.142*</b>	.128	.087	.117	<b>.248**</b>	<b>.233**</b>	<b>.219**</b>	<b>.254**</b>	.138	.113	<b>.845***</b>	<b>.687***</b>	<b>.652***</b>	<b>.734***</b>	-				
16. SEES Sadness	-.032	-.004	-.113	.033	.008	.074	-.014	-.034	-.066	.054	<b>.453***</b>	<b>.549***</b>	<b>.448***</b>	<b>.260**</b>	<b>.282***</b>	-			
17. SEES Happiness	.094	.032	.134	.073	-.036	.008	-.072	-.044	.068	-.089	-.039	-.094	-.090	.037	.037	<b>-.379***</b>	-		
18. SEES Anger	-.019	-.007	-.063	.021	-.002	-.028	-.027	.032	.030	-.009	<b>.425***</b>	<b>.359***</b>	<b>.494***</b>	<b>.389***</b>	<b>.312***</b>	<b>.511***</b>	-.117	-	
19. SEES Anxiety	-.022	-.020	-.059	.027	-.026	.010	-.046	.004	.006	-.071	<b>.275**</b>	<b>.256**</b>	<b>.414***</b>	.114	<b>.230**</b>	<b>.431***</b>	<b>-.191*</b>	<b>.604***</b>	-

*Note:* EES = TAS-20 = Toronto Alexithymia Scale; DIF = Difficulty identifying feelings; DDF = Difficulty describing feelings; EOT = Externally oriented thinking; DERS-SF = Difficulties in Emotion Regulation Short Form; DERS-SF Total = Total score omitting the awareness subscale; Emotional Eating Scale; SEES = Salzburg Emotional Eating Scale.

\* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$  (one-tailed)



#### 4.4.5 Mediation analyses

There were no overall significant associations between emotional eating measures and DIF or DDF, but at present, there is consensus that mediation may exist in the absence of an overall significant association (Hayes, 2017). The PROCESS macro (Model 4) was used to examine the direct and indirect effects of alexithymia on emotional eating, via emotion dysregulation.

**4.4.5.1 EES total scores.** First, DIF was entered as the predictor variable and emotional eating urges as measured by the EES as the outcome variable. Emotion dysregulation as the DERS-SF total score (omitting the awareness subscale) was entered as a potential mediating variable. There was no significant direct effect of DIF on EES total scores. Findings indicate that DIF was indirectly related to EES total scores through its relationship with emotion dysregulation. As seen in Figure 5.2, greater difficulty identifying feelings related to greater reported emotion dysregulation ( $\beta = 1.3000$ ,  $se = 0.1258$ ,  $p < .001$ ), which was subsequently related to more emotional eating urges in response to negative emotions ( $\beta = 0.5419$ ,  $se = 0.1879$ ,  $p = .005$ ). A 95% bias-corrected confidence interval based on 5,000 bootstrap samples indicated that the indirect effect ( $\beta = 0.7044$ , boot SE = 0.2968) was entirely above zero (CI = 0.0745-1.2433), with 11.5% of the variance in emotional eating urges accounted for by DIF and emotion dysregulation.

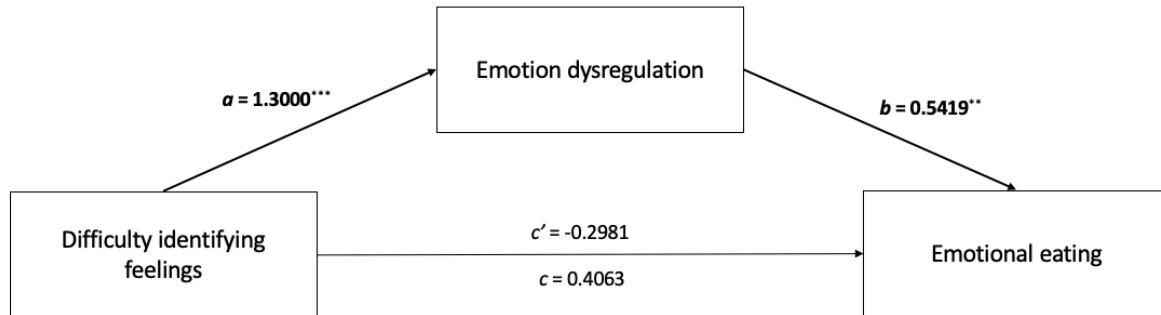


Fig. 4.2 The mediating effect of emotion dysregulation in the relationship between difficulty identifying feelings and emotional eating.

All presented effects are unstandardised;  $a$  is the effect of difficulty identifying feelings on emotion dysregulation;  $b$  is the effect of emotion dysregulation on emotional eating;  $c'$  is the direct effect of difficulty identifying feelings on emotional eating;  $c$  is the total effect of difficulty identifying feelings on emotional eating. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

Next, DDF was entered as the predictor variable with emotional eating urges as measured by the EES as the outcome variable. Emotion dysregulation was again entered as the potential mediating variable. There was no significant direct effect of DDF on EES total scores. Findings indicate that DDF was indirectly related to EES total scores through its relationship with emotion dysregulation. As seen in Figure 5.3, greater difficulty describing feelings related to greater reported emotion dysregulation ( $\beta = 1.4472$ ,  $se = 0.1977$ ,  $p < .001$ ), which was subsequently related to more emotion eating urges in response to negative emotions ( $\beta = 0.4967$ ,  $se = 0.1657$ ,  $p = .003$ ). A 95% bias-corrected confidence interval based on 5,000 bootstrap samples indicated that the indirect effect ( $\beta = 0.7188$ , boot SE = 0.2899) was entirely above zero (CI = 0.1690-1.3172), with 11.3% of the variance in emotional eating urges accounted for by DDF and emotion dysregulation.

Testing these above models with the mediator and outcome variables in the reverse order did not find any significant indirect effects. These findings indicate that emotion dysregulation had a mediating effect on the relationship between affective

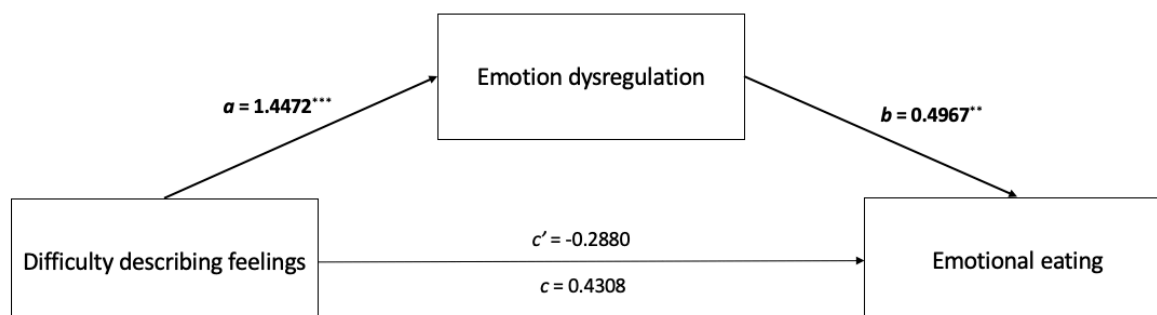


Fig. 4.3 The mediating effect of emotion dysregulation in the relationship between difficulty describing feelings and emotional eating.

All presented effects are unstandardised;  $a$  is the effect of difficulty describing feelings on emotion dysregulation;  $b$  is the effect of emotion dysregulation on emotional eating;  $c'$  is the direct effect of difficulty describing feelings on emotional eating;  $c$  is the total effect of difficulty describing feelings on emotional eating. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

characteristics of alexithymia and emotional eating urges as measured by the EES total scores in this order only.

**4.4.5.2 EES subscales.** Specific subscales of the EES were explored with each predictor variable, identifying different significant models for each predictor (see Table 5.3). There were no direct effects for either predictor (DIF or DDF) for any of the EES subscales, but some indirect effects were identified via emotion dysregulation.

**4.4.5.3 SEES.** There were no direct or indirect effects observed when self-reported negative emotional eating behaviour as measured by SEES subscales were entered as the outcome variables, with either DIF or DDF entered as the predictor variable (see Table 4.4). These models were tested with the mediator and outcome variables reversed, but no significant effects were reported.

**Table 4.3 Indirect effects of DIF and DDF on EES subscales via DERS-SF. (N = 136)**

Predictor	Mediator	Outcome	b	BOOT SE	BOOT LLCI	BOOT UCLI
DIF	DERS-SF	Depression	.2212	.1132	-.0210	.4169
		Anxiety	.1370	.0597	.0070	.2456
		Anger	.1898	.0802	.0248	.3365
		Somatic	.1566	.0645	.0203	.2729
DDF	DERS-SF	Depression	.2677	.1117	.0594	.4979
		Anxiety	.1152	.0597	.0037	.2352
		Anger	.1715	.0793	.0248	.3360
		Somatic	.1643	.0683	.0360	.3073

**Table 4.4 Indirect effects of DIF and DDF on SEES subscales via DERS-SF. (N = 136)**

Predictor	Mediator	Outcome	b	BOOT SE	BOOT LLCI	BOOT UCLI
DIF	DERS-SF	Happiness	-.0080	.0078	-.0248	.0059
		Sadness	.0014	.0094	-.0162	.0209
		Anger	.0007	.0118	-.0198	.0268
		Anxiety	-.0006	.0129	-.0237	.0268
DDF	DERS-SF	Happiness	-.0121	.0076	-.0281	.0012
		Sadness	.0077	.0091	-.0093	.0268
		Anger	.0050	.0100	-.0138	.0257
		Anxiety	.0041	.0127	-.0202	.0293

*Note for Table 4.3 and Table 4.4:* Number of bootstrap samples for bias corrected bootstrap confidence intervals = 5000. b: unstandardised coefficient; SE = standard error; LLCI: Lower level confidence interval; ULCI: Upper level confidence interval. Conditional indirect effect confidence intervals in bold do not encompass zero.

## 4.5 Discussion

The present study aimed to examine direct and indirect relationships between alexithymia and self-reported emotional eating. Previous pathways do not examine the mechanisms by which the alexithymic characteristics of impaired abilities to recognise and describe one's emotions result in greater eating in response to emotions. The findings of the mediation analyses indicate the indirect effects of DIF and DDF on emotional eating via emotion dysregulation. There is no direct effect observed by either predictor (DIF or DDF) on emotional eating; these models explain emotional eating through indirect effects of difficulty identifying feelings and difficulty describing feelings, which in turn predict emotion dysregulation, which in turn predicts greater emotional eating urges as measured by the EES. There were no direct or indirect effects when factors of the SEES were entered as outcome variables with either predictor, which suggests the affective characteristics of alexithymia only exert indirect effects on self-reported emotional eating urges (as measured by EES) and not on self-reported emotional eating behaviours (as measured by SEES).

The correlation analyses did not identify associations between alexithymia and emotional eating. Whilst previous research is limited, there is a general trend towards a positive relationship between the constructs whereby greater levels of alexithymic characteristics is associated with greater levels of subjective emotional eating. However, as discussed above in the systematic review, much of the previous research employed the DEBQ-EE whereas this study aimed to utilise other self-report measures of emotional eating. Therefore, it may be concluded that the DEBQ-EE, EES and SEES capture different aspects of emotional eating.

The correlation analyses also highlighted that the EES total score and subscales positively correlated with SEES negative subscale scores. This indicates that urges to eat in response to negative emotions are related to greater self-reported negative emotional eating behaviours. However, the mediation regression analyses predicted only urges and not behaviours. This suggests that the mechanisms that influence self-reported behaviours differ from those that predict urges to eat in response to negative emotions. There may be barriers to eating behaviours, such as the accessibility and availability of foods creating a gap between desired eating and self-reported actual eating. The EES and SEES refer only to the amount of food which an individual self-reports how much they feel a desire to eat, or have eaten, in response to these emotions; these scales do not consider type of food, so the mechanisms involved in predicting the type of food eaten in response to emotions should be examined in future research.

The ‘apt’ response to negative affect or stress is to reduce eating (Schachter et al., 1968), with the biologically ‘inapt’ response of eating food in response reflecting the definition of emotional eating. Recent literature (Meule et al., 2018) posits that ‘unhappy overeating’ and ‘happy undereating’ may represent two sides of the same coin as behaviours exhibited by an individual, and this is considered less favourable than the opposing coin of ‘happy overeating’ and ‘unhappy undereating’ due to the association of poorer outcomes from negative emotional overeating (Braden et al., 2018). The present findings demonstrated a weak negative correlation between the happiness and sadness subscales of the SEES, which suggests that individuals who report eating more in response to sadness, also report eating less in response to happiness, and vice versa.

There are limitations to the present study. By definition, a mediator occurs after that which it mediates and before the outcome (Kraemer et al., 2001), and the timing of alexithymia in the explored models is assumed based on theory, i.e. being a relatively stable personality trait, and therefore must precede behaviours (i.e. emotional eating) and learned skills (i.e. emotion dysregulation). However, the cross-sectional design does not allow for confirmation of causation in the mediation models. To address this limitation, the mediating and outcome variables were tested in a model in reverse order to test alternative causal models, as recommended by Fiedler et al. (2018). When EES preceded DERS, there were no significant direct or indirect effects identified, which is incompatible with mediation taking place; this was demonstrated with both DIF and DDF as predictors with both measures of emotional eating. Therefore, it is not the case that DIF or DDF predict emotional eating which in turn predicts emotion dysregulation. Limitations stemming from data collection include the self-report of perceived changes in how much individuals are eating and how healthful they perceive their diet to be, which are subject to bias and inaccurate recall. Similarly, self-report measures of alexithymia have been criticised due to the level of introspection required to respond to the items (Lane et al., 2015). Nonetheless, it is proposed that individuals with alexithymia are able to respond to related items on self-report measures (Bagby et al., 2020). Whilst other research designs are suited to mixed assessments of alexithymia via observer-reported alongside self-reported measures, online questionnaires can only make use of self-report measures. Furthermore, the emotional eating construct is multifaceted and influenced by context meaning it is not fully captured by questionnaire measures (Lattimore, 2020). The present study utilised the EES and SEES which measure self-

reported emotional eating urges and behaviours respectively, to garner a wider measurement of the emotional eating construct.

The present study found that emotion dysregulation accounted for some of the variance between alexithymia and emotional eating, meaning there are other constructs involved, which may vary for each specific negative emotion. The present study found DIF and DDF had indirect effects on different subscales of the EES; greater DIF predicted greater emotion dysregulation which in turn predicted the anxiety, anger and somatic subscales of the EES, whilst greater DDF predicted greater emotion dysregulation which in turn predicted the depression, anger and somatic subscales of the EES. This suggests that different mechanisms may underpin the relationships with specific emotions and their subsequent impact on eating behaviours, and echoes previous research, which found self-reported depression and anxiety had differing relationships with alexithymia (Pink et al., 2019). Specific emotions may have varying influences on individuals' eating behaviours, dependent on factors including their ability to identify broader and more specific emotions. It is thought that interoceptive reliance, which describes how much an individual trusts their bodily signals and determines how they respond, may underpin how an individual responds behaviourally to negative affect regardless of how well they identify and regulate it. It is suggested (Willem et al., 2020) that a lack of interoceptive reliance predicts greater emotion dysregulation and in turn a greater risk of emotional eating. Therefore, individuals may need to have the ability to first identify their emotions and also to trust them in order to adaptively regulate and respond to emotions.



Eating in response to emotions can be positive for some individuals, as it is context-dependent (Lattimore, 2020). It has been found to buffer the association between adverse life events and perceived stress, but only in individuals without elevated levels of depressive symptoms (Finch & Tomiyama, 2015). Therefore, eating in response to stressors may protect some individuals, highlighting the nuances of eating behaviours in relation to informing interventions. Rather than targeting emotional eating itself, psychological predictor variables could be the focus to support individuals in their response to and regulation of emotions. The current study identified the role of emotion dysregulation for individuals with greater difficulty identifying their feelings, which may be a potential target for emotional eating interventions during both pandemics and similar situations for this population. Psychotherapies for emotional eating such as compassion-based and dialectical behaviour therapies (Roosen et al., 2012) are rooted in emotion regulation and acceptance, with identifying emotions key to promoting efficacy as a prerequisite to developing adaptive regulation skills (Vine & Aldao, 2014). Implications may involve psychoeducation for those delivering emotion regulation-based therapeutic interventions for eating behaviours, to inform about the importance of initial successful identification and description of feelings and identify individuals who need greater support to minimise poorer therapeutic outcomes. This could extend transdiagnostically across clinical and subclinical populations, particularly for interventions across the spectrum of emotional and binge eating behaviours.

The results of the current study should be interpreted within the context of the study's limitations and of the Covid-19 pandemic, as data was collected for this study in July 2020. Whilst not a laboratory study, the contemporary global pandemic and

the impact on individual wellbeing and eating behaviours in the United Kingdom (Fancourt et al., 2020a, 2020b) has provided an opportunity for examining emotional eating in the general population during a widely shared atypical situation. Future research should also seek to examine these mechanisms under conditions in which emotional eating can be observed. Deficits in emotion regulation and how they predict subsequent behaviour are likely to be better understood by assessing these difficulties in situations that approximate real-life situations with the use of state emotion dysregulation measures such as the S-DERS, which measures in the moment difficulties in emotion regulation, thus is better suited to laboratory-based research studies. Future research should seek to test the proposed model once the pandemic has abated and in-person research is feasible.

### **4.5.1 Conclusions**

To our knowledge based on scoping published literature, this was the first study to examine the indirect effects of alexithymia on emotional eating within the general population. The study identifies the indirect effects of both difficulty identifying and describing feelings on emotional eating urges, via emotion dysregulation.

### **4.6 Chapter Summary**

This study aimed to answer the research question asking what the role of emotion dysregulation is in the relationship between alexithymia and emotional eating. In this sample, support was found for a significant indirect effect of alexithymia on self-reported emotional eating through difficulties in emotion

regulation, aligning with previous research. The study employed less frequently used measures of subjective emotional eating, the EES and SEES, rather than the more commonly used DEBQ-EE. Significant findings of the indirect relationship via emotion dysregulation were found only for subjective emotional eating as measured by the EES. This indicates that these measures capture different aspects of the emotional eating construct, which are not necessarily underpinned by the same mechanisms.

Whilst this offers support for the role of emotion dysregulation, this does not offer a fruitful target for intervention for individuals characterised by difficulties identifying and describing feelings, due to the prerequisite of identifying/describing the feelings before promoting adaptive regulation strategies (Vine & Aldao, 2014). Given that alexithymia is a trait, with limited evidence for its amenability to modification during longer-term therapeutic interventions in eating disorders, identifying other mechanisms which may be better suited as intervention targets for the general population is important. The next study will examine the role of self-compassion in this relationship, to consider its potential as an intervention target.

## **CHAPTER 5: SELF-COMPASSION**

### **5.1 Chapter Introduction**

This empirical study built upon the findings of Chapter 4, by examining the role of self-compassion in the indirect relationship between alexithymia and emotional eating via emotion dysregulation, to identify whether it may be a suitable as a target for future emotional eating interventions. It was hypothesised that greater levels of self-compassion would attenuate the relationship between greater levels of alexithymia and emotion dysregulation with emotional eating. Participants comprised 122 adults recruited from the United Kingdom general population who completed the TAS-20, SCS, DERS-SF, EES and SEES as part of an online questionnaire. The study first checks if the indirect effect of alexithymia on emotional eating via emotion dysregulation is significant in this sample (Model 4), and then examines self-compassion as a moderator in the relationship (Model 14). As in the previous study, two measures of emotional eating were used.

### **5.2 Literature review and rationale**

Emotion dysregulation is integral to understanding emotional eating because it may be the lack of adaptive emotion regulation strategies for addressing negative emotions, and not the experience of negative emotions itself that influences eating behaviours (Evers et al., 2010). Therefore, the concept of emotional eating may not refer simply to eating when feeling negative, but rather to eating when negative emotions are regulated in maladaptive ways (Evers et al., 2010). Individuals with heightened levels of alexithymia experience difficulties processing their emotions

and subsequently regulating them, which logically increase the likelihood of conditions and behaviours underpinned by emotion dysregulation (Goerlich, 2018; Pandey et al., 2011), including emotional eating. The findings of the previous study (Chapter 4) support a potential indirect effect of alexithymia on emotional eating through emotion dysregulation, in which greater affective characteristics of alexithymia (i.e., difficulties identifying and describing feelings) predicted greater difficulties in emotion regulation, which in turn predicted greater self-reported emotional eating.

The identification of the role of emotion dysregulation may help to understand emotional eating in alexithymic populations, but it does not necessarily provide useful targets for intervention. Focusing on emotion dysregulation may not be helpful, as the ability to first identify emotions is considered a pre-requisite for the acquisition of adaptive regulation skills (Vine & Aldao, 2014). However, focusing on the trait of alexithymia may not be helpful, as it is typically conceptualised relatively stable over time (Norman et al., 2019) and only ‘partly modifiable’ by therapeutic intervention (Cameron et al., 2014). Therefore, it is pertinent to explore other mechanisms – beyond identifying, describing, and regulating emotions – to target when supporting individuals with emotional eating behaviours.

As outlined in the general introduction, self-compassion is a construct relevant to alexithymia, emotion dysregulation and emotional eating. It is negatively related to both difficulties with emotion regulation (Finlay-Jones et al., 2015) and alexithymia (Lyvers et al., 2020), particularly the alexithymic characteristic of difficulty identifying feelings (Duarte & Pinto-Gouveia, 2017). It has been proposed that self-compassion may impact upon emotion regulation in eating disorders (Turk & Waller, 2020), and

may disrupt common cognitive-affective precipitants of emotional eating specifically through engaging adaptive emotion regulation skills (e.g. tolerating aversive emotions) and accepting (versus attempting to suppress or escape) unwanted/distressing aspects of the self (Neff, 2003).

There have been calls for an examination of the role of self-compassion in the relationship between alexithymia and risky or problematic behaviours (Lyvers et al., 2020), and emotional eating may constitute such a behaviour for some individuals. As self-compassion can be conceptualised as a modifiable trait (Leary et al., 2007), it makes it a potentially feasible intervention target. Understanding the roles self-compassion and emotion dysregulation may play a part in the relationship between alexithymia and emotional eating may offer a potential focus for psychological intervention and contribute to our understanding of the construct of emotional eating. To our knowledge based on scoping published literature, this is the first study exploring self-compassion in relation to alexithymia and eating behaviours.

### **5.2.1 Aims**

The present study aimed to examine the roles of self-compassion and emotion dysregulation in the relationship between alexithymia and emotional eating. It was expected that for individuals with greater levels of alexithymia and emotion dysregulation, higher levels of self-compassion would attenuate the relationship and result in lower reported emotional eating.

## **5.3 Methods**

### **5.3.1 Research design**

The fourth research question of the thesis asked what the role of self-compassion was in the relationship between alexithymia and emotional eating, via emotion dysregulation. To answer this, a further cross-sectional study was designed. As with the first cross-sectional study, it was designed at a time where in-person research remained uncertain and as such the study was designed to minimise potential disruption. Participants from the first cross-sectional study, presented in Chapter 4, were asked if they would be interested in taking part in a later study. Those who responded in the affirmative provided their email addresses, which were kept securely and separately from the study datasets. Advertisements for the second cross-sectional study were then emailed to those who earlier indicated they were happy to be contacted, shared on social media, and on the university's internal research participation scheme (RPS) page. The RPS platform is used internally at Birmingham City University, to recruit and participate in studies. Students receive credits for their participation, which they require to subsequently advertise their own studies. The use of such online recruitment platforms (i.e. Prolific and RPS) was beneficial during the Covid-19 pandemic to facilitate data collection.

### **5.3.2 Participants**

Participants were recruited through opportunity sampling using social media advertisements, a university-based participant recruitment platform, and via email to individuals who had participated in an earlier study (Chapter 4; see Appendix P). Individuals with a history of eating, mood, addictive, or substance use disorders were not eligible to participate.

### 5.3.3 Measures

**5.3.3.1 Alexithymia.** The TAS-20 was used (see Chapter 2). Internal consistency with the sample was good for the total score ( $\alpha = .860$ ), as for the DIF ( $\alpha = .874$ ) and DDF ( $\alpha = .801$ ) subscales. Unlike the results reported in Chapter 4 but consistent with previous research in general population samples (Pink et al., 2019; Pink et al.; 2021), the internal consistency of the EOT was relatively low ( $\alpha = .542$ ). In this sample, the internal consistency of the EOT would have been slightly improved by deleting the items 5 and 16 ( $\alpha = .604$  and  $\alpha = .598$ , respectively).

**5.3.3.2 Self-compassion.** The Self-Compassion Scale (SCS; Neff, 2003) was used (See Appendix B.5). It is a 26-item scale comprising six subscales, three positive (self-kindness, common humanity, and mindfulness) and three negative (self-judgement, isolation, and over-identification) which are reverse-scored. A five-point Likert scale allows participants to indicate how often they behave in the manner stated in the items (1 = Almost never; 5 = Almost always). The individual elements of self-compassion interact with each other to create a self-compassionate frame of mind (Neff & Costigan, 2014), with a higher-order factor for self-compassion calculated as a grand mean of all subscales.

There is ongoing debate within the literature regarding measurement of self-compassion with this scale, and whether there is validity for the factors of compassionate and uncompassionate self-responding. López et al. (2015) conducted confirmatory factor analysis which supported a two-factor model distinguishing between compassionate self-responding (the three positive



components) and uncompassionate self-responding (the three negative components). Muris and Otgaar (2022) also argue for this two-factor use of the scale, suggesting that total scores may obscure the potential reflection of the negative components of symptoms of psychopathology (Muris & Otgaar, 2020). However, the developers of the scale argue that all six components of the SCS interact, meaning only either individual subscales or a total score should be used (Neff, 2016; 2020; Neff & Tóth-Király, 2022). They conducted one study which looked at the factor structure across 20 samples ( $N = 11,685$ ) and found support only for the total SCS score or individuals subscales, not the two-factor model (Neff et al., 2019). Therefore, this is how the SCS will be used in the present study. The SCS total scores were used, with internal consistency within the present sample being good ( $\alpha = .935$ ).

**5.3.3.3 Emotion dysregulation.** The DERS-SF was used (see Chapter 4). To note, at the time of the first cross-sectional study (presented in Chapter 4), the DERS-SF was psychometrically stronger after removing the awareness subscale and therefore findings were published as such. When conducting data analysis for the present study, the awareness scale was included in the reported DERS-SF scores as it was not found to impact the total scale scores in this sample. All subscales, including the awareness scale, were combined to provide a total score used for analyses in this study. This scale showed good internal consistency with this sample ( $\alpha = .904$ ).

**5.3.3.4 Emotional eating.** The EES and SEES measures of emotional eating were both employed in this study (see Chapter 4). The EES measures perceived

urges to eat in response to various emotions. Internal consistency for the total score was good ( $\alpha = .906$ ), as well as the subscales of anxiety ( $\alpha = .760$ ), anger ( $\alpha = .836$ ), and depression ( $\alpha = .832$ ). The internal consistency was lower for the somatic subscale ( $\alpha = .637$ ), and would have been only slightly improved if the items 'worn out' and 'excited' were deleted ( $\alpha = .652$  and  $\alpha = .690$ , respectively).

The SEES measures perceived changes in eating behaviour in response to emotions. Internal consistency was good for all subscales: happy ( $\alpha = .821$ ), sad ( $\alpha = .849$ ), angry ( $\alpha = .803$ ), and anxiety ( $\alpha = .906$ ).

### 5.3.4 Procedure

The study comprised a single questionnaire, which was completed online via the survey hosting site Qualtrics. Data collection took place between November 2020 and April 2021. Participants were presented with information about the study before indicating their informed consent to take part (see Appendices Q and R). A battery of measures, as outlined above, was presented with the order of scales randomised to control for order and fatigue effects. Participants were then asked to provide demographic information and self-report their height and weight. The titles of each scale were omitted to reduce response bias. Upon completion, participants were presented with a debrief information page, outlining the purpose of the study (see Appendix S).

### 5.3.5 Data analysis

Analyses were conducted using SPSS version 25.0. First, data were screened to check assumptions associated with the statistical analyses (normality, homoscedasticity, and linearity), and used to calculate means, standard deviations, and bivariate correlations. A significant correlation was reported when  $p < .05$ , with a moderate correlation referring to  $r > .40$  (Schober et al., 2018). The PROCESS macro version 3.5 (Hayes, 2017) was employed to test simple mediation (Model 4) and moderated mediation (Model 14). This latter model tests whether the path between the mediation and dependent variable is moderated by a fourth variable through its interaction with the mediator. In this approach, a significant effect was supported when the upper and lower bound of the bias-corrected accelerated bootstrap 95% confidence intervals did not span zero. Bootstrapping with 5,000 samples was used, a method which is effective with smaller sample sizes and the least vulnerable to Type 1 errors (Preacher & Hayes, 2008).

As age, sex and body mass index have been previously associated with the measured variables (Geliebter & Aversa, 2003; Larsen et al., 2006; Mattila et al., 2006), these were controlled for in all models tested. In each model, alexithymic affective characteristics were entered as a predictor variable, emotional eating was entered as the outcome variable, and emotion dysregulation was entered as the mediating variable. First, a simple mediation model was tested with these variables to assess similarity with the findings of Chapter 4. Then, the SCS total score was entered as a moderating variable on the b-path (see Figure 5.1).

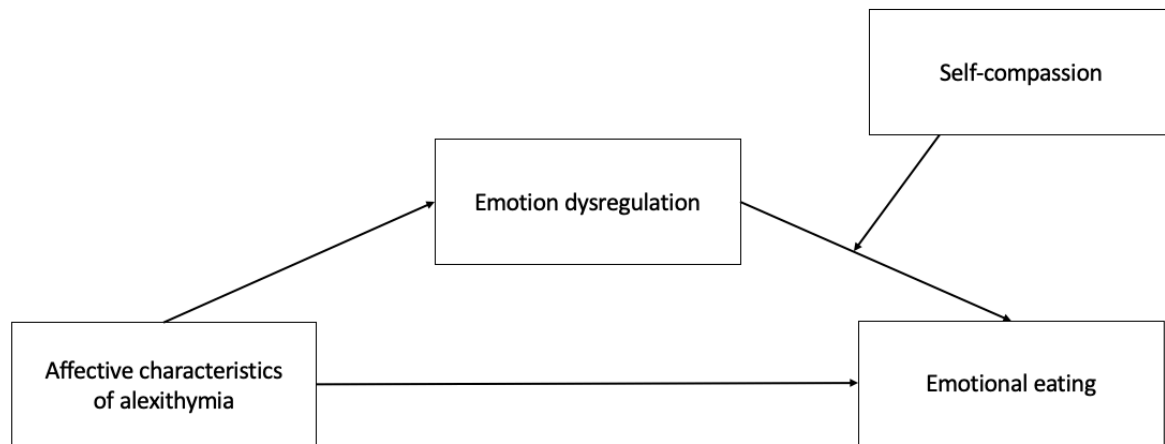


Fig. 5.1 A conceptual model of the moderated mediation tested

### 5.3.6 Ethical considerations

The codes of general and human research ethical conduct were adhered throughout. See Chapter 3 for discussion of these and potential risk and safeguarding issues which relate to all studies conducted as part of this PhD project. Ethical approval was obtained from the Birmingham City University's Faculty Academic Ethics Committee (see Appendix T), and this study was conducted in accordance with the Declaration of Helsinki. Participants were not remunerated for their time, but university students who participated via the university's recruitment platform were awarded study credits (2 credits = 20 minutes). Expected time to complete each study was estimated by host site, Qualtrics, and rounded up to the nearest multiple of 10 minutes (1 credit).

## 5.4 Results

### 5.4.1 Participant characteristics

Twenty-two participants were excluded from the final analyses due to the provision of incomplete data. The final sample of 122 adults were 80.3% female (19.7% male), with a mean age of 27.8 years ( $SD = 11.94$ ; range = 18 to 73 years). The sample was 75.4% White (13.1% Asian, 6.6% mixed/multiple ethnic groups, 3.3% Black, 1.6% other ethnic group) with 51.4% having completed a minimum of an undergraduate-level degree. The majority of participants reported not currently dieting (77.9%).

### 5.4.2 Descriptives statistics and correlation analyses

Descriptive statistics and correlations between alexithymia and its affective characteristics, emotion dysregulation, self-compassion and emotional eating measures are displayed in Table 5.1. Prevalence of alexithymia scores deemed high by the categorical cut-off of  $>60$  are higher here than typically reported in the general population (Honkalampi et al., 2017; Mattila et al., 2006; McGillivray et al., 2017) with 19.7% of the sample scoring above this cut-off. There was a moderate positive correlation between alexithymia and emotion dysregulation ( $r = .615, p < .001$ ), both of which had moderate negative correlations with self-compassion in this sample ( $r = -.504, p < .001$ ;  $r = -.677, p < .001$ ). This was also true when examining the subscales of DIF and DDF (see Table 5.2). There were no significant correlations between these variables and EES total scores, nor SEES subscale scores. There were also no significant correlations between these variables and EES subscale

**Table 5.1 Means, standard deviations, and bivariate correlations of alexithymia and its affective characteristics, emotion dysregulation, self-compassion, and emotional eating. (N = 122)**

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	M	SD
1. TAS-20	-														48.82	12.03
2. DIF	<b>.865***</b>	-													16.95	6.20
3. DDF	<b>.872***</b>	<b>.671***</b>	-												13.65	4.51
4. DERS-SF	<b>.615***</b>	<b>.725***</b>	<b>.514***</b>	-											46.21	12.75
5. SCS	<b>-.504***</b>	<b>-.527***</b>	<b>-.501***</b>	<b>-.677***</b>	-										2.75	0.68
6. EES Total	.053	.080	-.017	.171	-.052	-									34.39	15.68
7. EES Dep	.019	.039	-.022	.112	-.028	<b>.878***</b>	-								15.46	6.90
8. EES Anx	-.021	-.009	-.080	.042	.013	<b>.842***</b>	<b>.725***</b>	-							5.02	3.58
9. EES Ang	.108	.128	.035	<b>.217*</b>	-.048	<b>.777***</b>	<b>.497***</b>	<b>.531***</b>	-						6.89	4.85
10. EES Som	.064	.102	-.001	.182*	-.115	<b>.741***</b>	<b>.484***</b>	<b>.534***</b>	<b>.522***</b>	-					7.03	3.84
11. SEES Hap	.122	.175	.123	.129	-.029	-.100	<b>-.187*</b>	<b>-.196*</b>	.054	.041	-				3.04	0.50
12. SEES Sad	-.045	-.052	-.013	-.073	.048	<b>.498***</b>	<b>.630***</b>	<b>.576***</b>	.121	<b>.212*</b>	<b>-.287***</b>	-			3.48	0.90
13. SEES Ang	.022	.041	-.012	-.002	.004	<b>.520***</b>	<b>.452***</b>	<b>.523***</b>	<b>.441***</b>	<b>.265**</b>	-.170	<b>.574***</b>	-		2.62	0.75
14. SEES Anx	-.031	-.062	-.073	-.018	-.014	<b>.504***</b>	<b>.388***</b>	<b>.620***</b>	<b>.266**</b>	<b>.448***</b>	<b>-.271**</b>	<b>.508***</b>	<b>.570***</b>	-	2.29	0.89

Note: TAS-20 = Toronto Alexithymia Scale total score; DIF = Difficulty Identifying Feelings subscale; DDF = Difficulty Describing Feelings subscale; DERS-SF = Difficulties in Emotion Regulation short-form; SCS = Self-Compassion Scale; EES = Emotional Eating Scale, Dep = Depression; Anx = Anxiety; Ang = Anger; Som = Somatic; SEES = Salzburg Emotional Eating Scale; Hap = Happiness. One-tailed correlations. Bold font indicates statistical significance.

\* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

scores, with the exception of a weak correlation between the EES anger subscale and emotion dysregulation ( $r = .217, p = .017$ ).

### 5.4.3 Simple mediation analysis

A series of simple mediation analyses were conducted to examine whether the indirect effect of the affective characteristics of alexithymia on emotional eating via emotion dysregulation found in Chapter 4 was significant also in this sample. In Chapter 4, the significant indirect effect was found only for emotional eating as measured by the EES, and not the SEES. Both measures will be entered as outcome variables in the present study, and DIF and DDF will remain as predictor variables in the respective models.

**5.4.3.1 EES.** Using PROCESS Model 4, DIF was entered as the predictor variable and EES as the outcome variable, with DERS-SF entered as a potential mediating variable. There was no significant direct effect of DIF on EES scores. Findings indicate that DIF was indirectly related to EES through its relationship with DERS-SF. As seen in Figure 5.2, greater difficulty identifying feelings was related to greater reported emotion dysregulation ( $\beta = 1.4928, SE = 0.1318, p < .001$ ), although this was not quite significantly related to more emotional eating urges in response to negative emotions ( $\beta = 0.3293, SE = 0.1670, p = .051$ ). Nonetheless, a 95% bias-corrected confidence interval based on 5,000 bootstrap samples indicated that the indirect effect ( $\beta = 0.4916, boot SE = 0.2455$ ) was entirely above zero (CI = 0.0233 – 0.9813.), with 5.9% of the variance in emotional eating urges accounted for by DIF and emotion dysregulation.

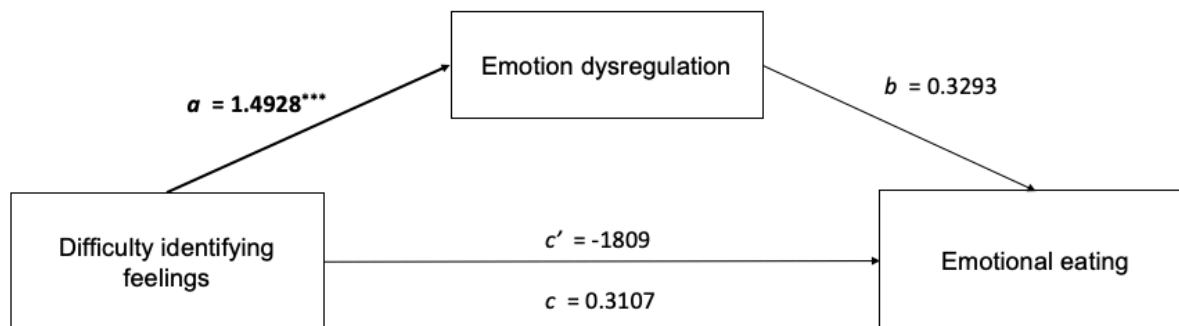


Fig. 5.2 The mediating effect of emotion dysregulation in the relationship between difficulty identifying feelings and emotional eating.

All presented effects are unstandardised;  $a$  is the effect of alexithymia on emotion dysregulation;  $b$  is the effect of emotion dysregulation on emotional eating;  $c'$  is the direct effect of alexithymia on emotional eating;  $c$  is the total effect of alexithymia on emotional eating. \*\*\* =  $p < .001$

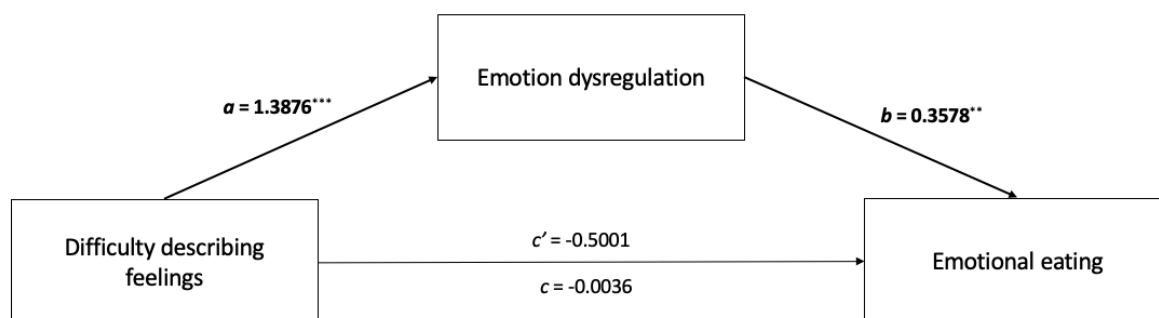


Fig. 5.3 The mediating effect of emotion dysregulation in the relationship between difficulty describing feelings and emotional eating.

All presented effects are unstandardised;  $a$  is the effect of alexithymia on emotion dysregulation;  $b$  is the effect of emotion dysregulation on emotional eating;  $c'$  is the direct effect of alexithymia on emotional eating;  $c$  is the total effect of alexithymia on emotional eating. \*\* =  $p < .01$ , \*\*\* =  $p < .001$

Next, DDF was entered as the predictor variable. There was no significant direct effect of DDF on EES scores. Findings indicate that DDF was indirectly related to EES through its relationship with DERS-SF. As seen in Figure 5.3, greater difficulty describing feelings related to greater reported emotion dysregulation ( $\beta = 1.3876$ ,  $SE = 0.2194$ ,  $p < .001$ ), which was subsequently related to more emotional eating urges in response to negative emotions ( $\beta = 0.3578$ ,  $SE = 0.1327$ ,  $p = .008$ ). A 95% bias-corrected confidence interval based on 5,000 bootstrap samples indicated that the indirect effect ( $\beta = 0.4964$ , boot  $SE = 0.1828$ ) was entirely above



zero (CI = 0.1525 – 0.8646), with 7.2% of the variance in emotional eating urges accounted for by DDF and emotion dysregulation.

**5.4.3.2 SEES.** There were no significant indirect effects with either DIF nor DDF input as predictors, for any of the four subscales of the SEES measure of emotional eating (see Table 5.2).

**Table 5.2 Indirect effects of DIF and DDF on SEES subscales via DERS-SF. (N = 122)**

Predictor	Mediator	Outcome	b	BOOT SE	BOOT LLCI	BOOT UCLI
DIF	DERS-SF	Happiness	-.0034	.0089	-.0206	.0280
		Sadness	-.0009	.0139	-.0284	.0273
		Anger	-.0044	.0145	-.0302	.0255
		Anxiety	.0174	.0156	-.0111	.0511
DDF	DERS-SF	Happiness	.0014	.0070	-.0114	.0162
		Sadness	-.0026	.0092	-.0221	.0146
		Anger	.0013	.0095	-.0164	.0217
		Anxiety	.0075	.0106	-.0131	.0299

Notes. Number of bootstrap samples for bias corrected bootstrap confidence intervals = 5000. *b*: unstandardised coefficient; *SE* = standard error; *LLCI*: Lower level confidence interval; *ULCI*: Upper level confidence interval. Conditional indirect effect confidence intervals in bold do not encompass zero.

#### 5.4.4 Moderated mediation analysis

To explore the indirect effects of emotion dysregulation in the relationship between DIF/DDF and EES and the potential conditional role of self-compassion, we

continued with analyses to conduct moderated mediation using this outcome variable. Two models were tested with each of the affective characteristics of alexithymia entered as predictor variables. In both models, emotion dysregulation as the mediating variable, emotional eating as measured by the EES was entered as the outcome variable and self-compassion was inserted as the moderating variable on the b-path (Model 14).

**5.4.4.1 DIF.** Greater levels of DIF predicted greater emotion dysregulation ( $\beta = 1.4928$ ,  $SE = 0.1318$ ,  $p < .001$ ). Neither emotion dysregulation nor self-compassion independently predicted emotional eating. However, the interaction between DERS-SF and SCS total scores was significant ( $\beta = 0.3308$ ,  $SE = 0.1538$ ,  $p = .034$ ), demonstrating a positive conditional indirect effect.

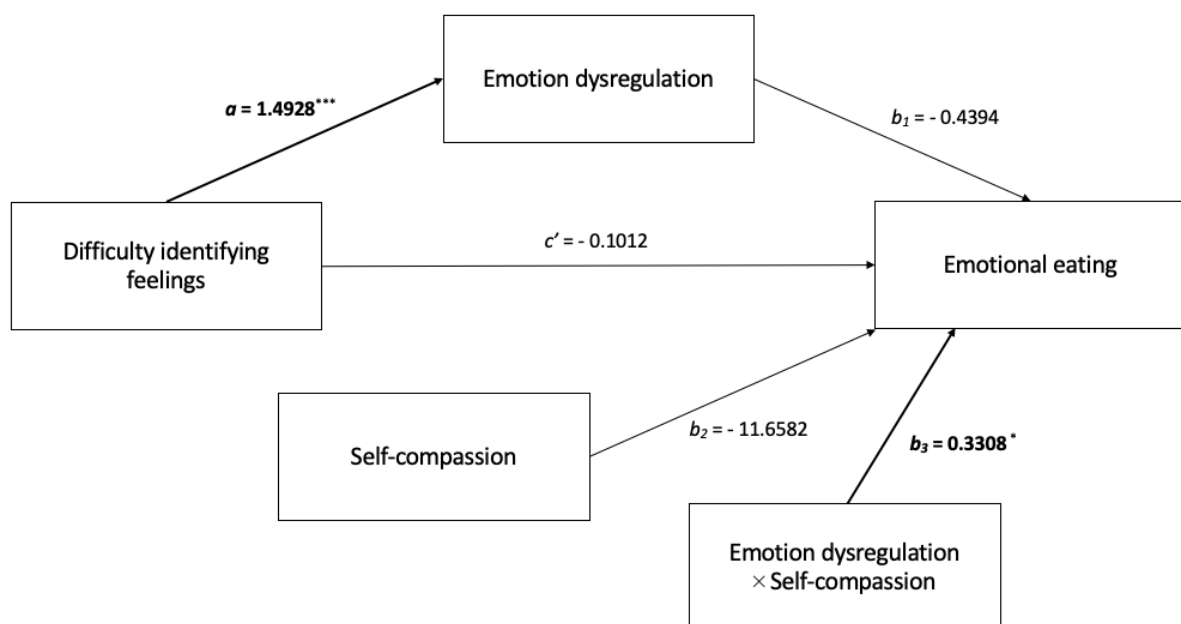


Fig. 5.4 The conditional indirect effect self-compassion and emotion dysregulation in the relationship between DIF and emotional eating as measured by the EES. All presented effects are unstandardised;  $a$  is the effect of DIF on emotion dysregulation;  $b_1$  is the effect of emotion dysregulation on emotional eating;  $b_2$  is the effect of self-compassion on emotional eating,  $b_3$  is the interaction between emotion dysregulation and self-compassion,  $c'$  is the direct effect of DIF on emotional eating. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

**Table 5.3 Conditional indirect effects of DIF on emotional eating. (N = 122)**

Outcome: DERS-SF					
<i>Predictors</i>	<i>b</i>	<i>SE</i>	<i>t</i>	LLCI	ULCI
<b>DIF</b>	<b>1.4928</b>	<b>0.1318</b>	<b>11.3235</b>	<b>1.2318</b>	<b>1.7539</b>
Outcome: EES					
<i>Predictors</i>	<i>b</i>	<i>SE</i>	<i>t</i>	LLCI	ULCI
TAS-20	-0.1012	0.3413	-0.2966	-0.7775	0.5750
DERS-SF	-0.4394	0.4483	-0.9800	-1.3275	0.4488
SCS	-11.6582	7.4569	-1.5634	-26.4303	3.1139
<b>DERS-SF x SCS</b>	<b>0.3308</b>	<b>0.1538</b>	<b>2.1508</b>	<b>0.0261</b>	<b>0.6355</b>
Conditional indirect effects of difficulty identifying feelings on emotional eating					
SCS (percentile)	<i>b</i>	<i>Boot SE</i>	LLCI	ULCI	
16 <sup>th</sup>	0.3498	0.2880	-0.1837	0.9621	
<b>50<sup>th</sup></b>	<b>0.6981</b>	<b>0.2762</b>	<b>0.1965</b>	<b>1.2911</b>	
<b>84<sup>th</sup></b>	<b>1.1014</b>	<b>0.3570</b>	<b>0.4221</b>	<b>1.8598</b>	
Index of moderated mediation					
	Index	<i>SE</i>	LLCI	UCLI	
<b>Self-compassion</b>	<b>0.4938</b>	<b>0.2176</b>	<b>0.0699</b>	<b>0.9280</b>	

Notes.  $R^2 = 0.0363$ ,  $F(1, 114) = 4.6261$ ,  $p = .037$ . Number of bootstrap samples for bias corrected bootstrap confidence intervals = 5000. *b*: unstandardised coefficient; *SE* = standard error; LLCI: Lower level confidence interval; ULCI: Upper level confidence interval. Conditional indirect effect confidence intervals in bold do not encompass zero.

The index of moderated mediation was positive and significant ( $\beta = 0.4938$ , *boot SE* = 0.2176, 95% *CI* = 0.0699, 0.9280), with 10.6% of the variance in emotional eating accounted for by this model. Probing the interaction at the 16<sup>th</sup>, 64<sup>th</sup> and 84<sup>th</sup> percentiles, we found that as self-compassion increased among individuals reporting higher emotion dysregulation, self-reported emotional eating urges increased (see Table 5.3). Unexpectedly, those with greater levels of emotion dysregulation and moderate to high levels of self-compassion demonstrated significantly greater urges to eat in response to emotions.

**5.4.4.1 DDF.** Greater levels of DDF predicted greater emotion dysregulation ( $\beta = 1.3876$ , *SE* = 0.2194,  $p < .001$ ). Neither emotion dysregulation nor self-compassion independently predicted emotional eating. However, the interaction between DERS-SF and SCS total scores was significant ( $\beta = 0.3238$ , *SE* = 0.1533,  $p = .037$ ), demonstrating a positive conditional indirect effect.

The index of moderated mediation was positive and significant ( $\beta = 0.4493$ , *boot SE* = 0.2070, 95% *CI* = 0.0506, 0.8709), with 11.1% of the variance in emotional eating accounted for by this model. As with the previous model, at the interaction at the 16<sup>th</sup>, 64<sup>th</sup> and 84<sup>th</sup> percentiles, self-reported emotional eating urges increased with greater levels of self-compassion amongst those with higher levels of emotion dysregulation (see Table 5.4). Again, those with greater levels of emotion dysregulation and moderate to high levels of self-compassion demonstrated significantly greater urges to eat in response to emotions. This was an unexpected finding.

**Table 5.4 Conditional indirect effects of DDF on emotional eating. ( $n = 122$ )**

Outcome: DERS-SF					
<i>Predictors</i>	<i>b</i>	<i>SE</i>	<i>t</i>	LLCI	ULCI
<b>DDF</b>	<b>1.3876</b>	<b>0.2194</b>	<b>6.3242</b>	<b>0.9531</b>	<b>1.8222</b>
Outcome: EES					
<i>Predictors</i>	<i>b</i>	<i>SE</i>	<i>t</i>	LLCI	ULCI
TAS-20	-.0862	.1511	-.5708	-.3855	.2131
DERS-SF	-0.4119	0.4326	-0.9522	-1.2689	0.4451
SCS	-11.9634	7.4328	-1.6095	-26.6878	2.7610
<b>DERS-SF x SCS</b>	<b>0.3238</b>	<b>0.1533</b>	<b>2.1124</b>	<b>0.0201</b>	<b>0.6274</b>
Conditional indirect effects of difficulty describing feelings on emotional eating					
SCS (percentile)	<i>b</i>	<i>Boot SE</i>	LLCI	ULCI	
16 <sup>th</sup>	0.3433	0.2447	-0.0800	0.8828	
<b>50<sup>th</sup></b>	<b>0.6602</b>	<b>0.2442</b>	<b>0.2452</b>	<b>1.2011</b>	
<b>84<sup>th</sup></b>	<b>1.0272</b>	<b>0.3355</b>	<b>0.4426</b>	<b>1.7585</b>	
Index of moderated mediation					
	Index	<i>SE</i>	LLCI	UCLI	
<b>Self-compassion</b>	<b>0.4493</b>	<b>0.2070</b>	<b>0.0506</b>	<b>0.8709</b>	

Notes.  $R^2 = 0.0347$ ,  $F(1, 114) = 4.4621$ ,  $p = .037$ . Number of bootstrap samples for bias corrected bootstrap confidence intervals = 5000. *b*: unstandardised coefficient; *SE* = standard error; LLCI: Lower level confidence interval; ULCI: Upper level confidence interval. Conditional indirect effect confidence intervals in bold do not encompass zero.

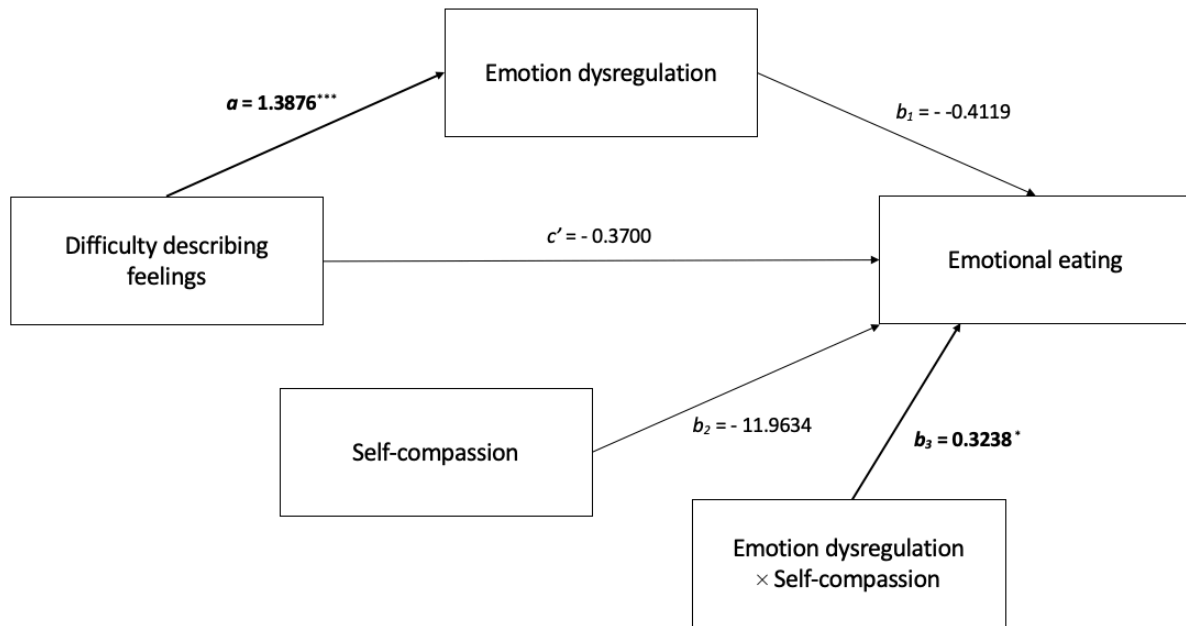


Fig. 5.5 The conditional indirect effect self-compassion and emotion dysregulation in the relationship between DDF and emotional eating as measured by the EES. All presented effects are unstandardised;  $a$  is the effect of DDF on emotion dysregulation;  $b_1$  is the effect of emotion dysregulation on emotional eating;  $b_2$  is the effect of self-compassion on emotional eating,  $b_3$  is the interaction between emotion dysregulation and self-compassion,  $c'$  is the direct effect of DDF on emotional eating. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

## 5.5 Discussion

This study aimed to understand the roles of self-compassion and emotion dysregulation in the relationship between alexithymia and emotional eating. First, a simple mediation analysis was conducted which found support for the role of emotion dysregulation in the indirect relationship between alexithymia and emotional eating as measured by the EES, supporting previous findings (McAtamney et al., 2021). Next, a moderated mediation analysis was conducted which found support for the conditional indirect effect whereby self-compassion interacts with emotion dysregulation. At greater levels of emotion dysregulation, which were predicted by greater levels of alexithymia, higher levels of self-compassion predicted *greater*

reported emotional eating urges. This effect was not significant at low levels of self-compassion.

This positive conditional indirect effect, whereby greater levels of self-compassion and emotion dysregulation interacted to predict greater levels of emotional eating, was not an expected finding. Existing literature suggests that increasing self-compassion may be beneficial for reducing emotional eating behaviours (Neff, 2003; Wolever & Best, 2009), potentially impacting upon emotion regulation as with disordered eating (Turk & Waller, 2020). However, at moderate and high levels of self-compassion, interactions with increased emotion dysregulation in fact resulted in greater emotional eating urges in this sample. These findings therefore indicate that increasing self-compassion may not be a viable mechanism for reducing emotional eating in individuals experiencing alexithymic characteristics and difficulty regulating their emotions, and therefore not an appropriate target for psychological intervention.

Only a small amount of variance was explained by this model, so there is a need to explore other mechanisms involved as to how self-compassion is conceptualised and what constitutes acts of being compassionate to oneself. For example, Carbonneau et al. (2021) found self-compassion to be a protective factor against increased emotional eating as measured by the TFEQ-R18-EE, positing that increased self-compassion may reflect alternative self-care tools allowing less reliance on eating as a coping strategy. Other research has proposed individual differences in demonstrating compassion or kindness to one's mind vs body, and a failure in maintaining a balance of self-care behaviours when considering self-care for both physiological and emotional health (Egan & Mantzios, 2018; Mantzios &

Egan, 2017). Similarly, self-compassion may involve employing various alternative coping strategies to regulate negative affect for some, whilst others demonstrate self-compassion in emotion regulation by 'treating' themselves. In a qualitative exploration of gay men's experiences of eating and mindfulness-based concepts, Regan et al. (2021) described individuals' experiences of 'treating' themselves by enjoying foods that are unhealthful (high in fat and sugars), to relieve feelings of stress. Emotional eating may be a helpful tool for alleviating negative affect, but effects may not be sustained (Heatherton & Baumeister, 1991). Regan et al. (2021) reported that for these men, short-term positive effects on mood did not prevent negative feelings as a result of their eating choices, but the potential link and causation between self-compassion and emotional eating may need further investigation and an emphasis on individual differences and potentially compensatory reactions to distress.

There are specific limitations surrounding use of the SCS. Whilst Neff (2016) argues that self-compassion as measured by the SCS is best understood as a synergistic system whereby all six components interact, López et al. (2015) identified that the scale operates with two factors of self-compassion (the three positive components) and self-criticism (the three negative components). Muris and Otgaar (2022) also argue for a two-factor use of the scale and propose that the total SCS score may inflate associations between self-compassion (as a total score) and mental health constructs, due to negative components potentially reflecting symptoms of psychopathology (Muris & Otgaar, 2020). However, Neff (2020) and Neff and Tóth-Király (2022) provided support for the use of the SCS as a total score. Such difference in opinion and interpretation in data may raise issues for analysing



SCS alongside constructs such as alexithymia and emotion dysregulation, and support future use of psychometric tools that are separately investigating self-criticism, and potential ways of enhancement through self-correction (see Gilbert et al., 2004) whereby individuals are encouraged to view weaknesses and mistakes as opportunities for growth and improvement (Gilbert, 2009). Whilst “compassionate self-correction” may be considered a positive reframing of self-criticism (Rowson, 2019), further research and clarification is required to accurately distinguish the two constructs (Austin et al., 2021).

Criticisms of the self-report nature of the TAS-20 relate to the level of introspection required to respond to items (Lane et al., 2015). Nonetheless, developers of the scale propose that individuals exhibiting high degree of alexithymic characteristics are able to report accurately (Bagby et al., 2020). Whilst other measures of alexithymia exist (i.e. observer-reported), this is not feasible for incorporation into an online questionnaire study. The emotional eating construct is also influenced by context, meaning it is not fully captured by questionnaire measures (Lattimore, 2020), so current findings are to be interpreted within the understanding that the EES measures self-reported urges to eat. The cross-sectional research design meant input of variables in the tested models are assumed based on theory, i.e. alexithymia is a relatively stable personality trait (Norman et al., 2019) and therefore must precede skills (emotion regulation, self-compassion) and behaviours (emotional eating). However, the cross-sectional design does not allow for confirmation of causation in the tested models. Future research should consider the use of objective and ecologically valid assessments of eating behaviour, such as ecological momentary analysis (EMA) which would facilitate the capturing of causal

processes with actual eating behaviour and changes in affect, and further elucidate the idea of *treating* oneself.

### 5.5.1 Conclusions

The present study hypothesised that greater levels of self-compassion would attenuate the indirect relationship between alexithymia and emotional eating urges via emotion dysregulation, identifying it as a potentially suitable target for future interventions to reduce levels of emotional eating. However, the opposite was found within the present sample – at heightened levels of emotion dysregulation, moderate and high levels of self-compassion led to greater emotional eating urges. These findings indicate that promoting self-compassion may not be a suitable target for psychological intervention of emotional eating, and that further research is required to understanding the complex interactions between these constructs.

## 5.6 Chapter summary

So far, this thesis has identified a relationship between alexithymia and emotional eating as reported in previous research, explored this relationship empirically and identified the mediating role of emotion dysregulation and the strengthening influence of moderate to high levels of self-compassion on this relationship. Drawing upon these findings and conclusions from earlier research, it may be suggested that none of the mechanisms are useful targets for intervention, so other avenues must be explored in order to support individuals in the general population with aspects which are predictors of exacerbating eating behaviours before they develop into disordered eating. Through these two cross-sectional

studies and previous literature, it can be concluded that self-compassion is not appropriate as a target for intervention, nor emotion regulation strategies, in those with heightened levels of alexithymia. An alternative route for intervention would be facilitating identifying and describing feelings (i.e. affective characteristics of alexithymia). Due to Covid-19 and barriers to in-person research, the initial aim of the PhD to develop an eating intervention was not feasible due to difficulties with accurately measuring this via online research. One such construct which is related to the constructs already explored in this thesis is 'feeling fat', this will be explored in the next study as a potential target for modifying eating. Feeling fat is able to be measured as a state experience, and as such is a suitable target when developing a testing a brief online intervention

## **CHAPTER 6: FEELING FAT**

### **6.1 Chapter introduction**

The previous studies conducted as part of this thesis have focused on emotional eating. However, they have not yet identified a suitable intervention target for emotional eating for individuals with heightened levels of alexithymia. The role of emotion dysregulation was identified in Chapter 4, but previous theory indicates that identifying and describing emotional states is required for improving emotion regulation skills to be successful (Vine & Aldao, 2014). Self-compassion was then examined in Chapter 5, but increased levels were found to lead to greater emotional eating, indicating that it would not be an appropriate intervention target either. Due to Covid-19 there were also barriers to conducting lab-based research projects at the time of designing this study. Considering both previous chapter findings and situational barriers, it was decided to shift the focus from emotional eating interventions, and instead explore ways to promote the identification and description of feelings to influence favourable outcomes. As alexithymia is a relatively stable trait, with limited evidence for its amenability to modification in the general population (Cameron et al., 2014; Norman et al., 2019), it may not be feasible to decrease levels of alexithymia via intervention. However, promoting momentary identification and description of feelings may be beneficial for individuals who engage with emotional eating, as well as other behaviours underpinned by difficulties in emotion processing. The present study examines whether promoting identification and description of feelings during a brief writing intervention reduces levels of state

feeling fat in the general population, and the roles of individual differences in trait feeling fat, alexithymia and self-compassion.

## **6.2 Literature review and rationale**

Feeling fat is approached as a cognitive attribution error, whereby fluctuating negative emotional states and somatic sensations are inaccurately labelled as feeling fat (Fairburn, 2008). This inaccurate labelling may represent state difficulties identifying and describing feelings and distinguishing them from other bodily sensations, i.e. the affective characteristics of alexithymia (Taylor et al., 1997). Experimental research found that an anxiety induction led to greater experiences of perceived weight gain for non-clinical restrained eaters, and imagined food consumption led to greater experiences of feeling fat for those with eating disorders (Coelho et al., 2008). Whilst this sensation of feeling fat is widely prevalent amongst those with and without eating disorders (Cooper et al., 2007), and associated with adverse emotional outcomes and wellbeing, empirical research is limited, particularly amongst those without eating disorders (Mehak & Racine, 2021). It is important to research feeling fat and ways to reduce it, as across clinical and non-clinical groups, feeling fat predicts eating pathology (Linardon et al., 2018; Mehak & Racine, 2021) and is associated with binge eating and emotional eating in undergraduate student samples (Striegel-Moore et al., 1986; Mehak & Racine, 2021). It has been suggested that improving emotion regulation and reducing negative emotions may be appropriate targets to reduce feeling fat (Anderson et al., 2022), however, identifying emotions is necessary to make progress with feeling fat interventions (Andersen, 2000).

As the sensation of feeling fat is considered a *type* of alexithymia (Andersen, 2000) in that it reflects an inaccurate identification and description of emotions, which fluctuates across the day (Fairburn, 2008), it may act as a proxy measurement for momentary affective characteristics of alexithymia. Recent research provides support for a relationship between alexithymia and feeling fat (Pink et al., 2021; Morales et al., 2022). However, research examining these constructs is limited, so further examination within other samples will help elucidate the relationship. Widely used therapeutic approaches for eating disorders target the sensation of feeling fat (i.e. CBT-E, Module 5; Fairburn, 2008) by identifying the underlying negative emotions (Andersen, 2000). As a result, the experience of feeling fat is found to decrease over the course of intervention (Calugi et al., 2018). Finding ways to replicate this in non-clinical populations, who also experience the sensation, may help to reduce feeling fat and the associated risk of the onset of eating disorders (Pink et al., 2021). There is evidence for the amenability of state feeling fat, with a recent experimental study manipulating the sensation of feeling fat within a general population sample, finding the manipulation was successful for those reporting higher levels of alexithymia (Pink et al., 2021). To date, no research has examined ways to reduce the sensation of feeling fat within a general population sample.

Elucidating the relationship between feeling fat and self-compassion may also inform further potential interventions. It has been proposed that self-compassion may be a protective factor, buffering risk for eating and body concerns (e.g. Ferreira et al., 2014; Braun et al., 2016) and reduce existing eating and body image problems (e.g. Breines et al., 2015; Linardon et al., 2017; Linardon et al., 2018). For example, writing compassionately towards one's body reduced body dissatisfaction more

successfully than focusing on self-esteem (Moffitt et al., 2018). Whilst a review detailed support for the inverse relationship between self-compassion and many aspects of body image (Braun et al., 2016), there has not yet been any research examining the relationship between self-compassion and feeling fat.

### **6.2.1 Aims and hypotheses**

The first aim of the present study was to further understand the trait correlates of feeling fat, specifically by examining the association with self-compassion and alexithymia. It was hypothesised that there would be a negative correlation between feeling fat and self-compassion, and a positive correlation with alexithymia in the current sample. The second aim was to explore the efficacy of a brief emotion identification and description intervention for state changes in feeling fat, as informed by the CBT-E module frequently used within clinical treatment of disorders associated with the experience of feeling fat. It was hypothesised that the intervention conditions would elicit greater reductions in the state sensation of feeling fat, and specifically the intervention condition accompanied by a visual prompt would elicit the greatest reduction. The third aim was to test whether trait levels of feeling fat, self-compassion and alexithymia moderated the intervention efficacy.

## **6.3 Methods**

### **6.3.1 Preregistration**

The study design and planned analyses were preregistered on Open Science Framework (<https://osf.io/6xske>) prior to commencement of data collection.

### 6.3.2 Research design

The fifth research question of the thesis asked “*What is the relationship between self-compassion and feeling fat?*”. To answer this, trait measures of the variables were measured prior to the experimental elements of the study. The sixth research question asked “*Can we reduce feeling fat through identifying and describing feelings?*” and was answered using a manipulation and intervention targeting the state sensation of feeling fat, with state measures at various timepoints before and after the experimental elements of the study.

### 6.3.3 Participants

The population of the present study comprised adult women from the United Kingdom. Individuals who were currently pregnant or breastfeeding, had a history of eating disorders, or felt they may become distressed by participating in a study about eating behaviours and body image were excluded from participation. A priori analyses using G\*Power (Faul et al., 2009) for the highest order analysis, indicated that a sample size of 158 was required to detect a medium effect size. This was the target number of participants to be recruited, with an additional 20% to account for any missing or unusable data. Therefore, 190 participants were recruited for the final study via Prolific or the university RPS recruitment platform.

### 6.3.4 Measures

**6.3.4.1 Trait feeling fat.** The Body Attitudes Questionnaire Feeling Fat subscale (BAQ-FF; Ben-Tovim & Walker, 1991) is a trait scale measuring the extent



to which individuals experience the sensations of feeling fat (see Appendix B.6).

There are 13 items, which participants respond to using a five-point Likert scale (1 = Strongly disagree; 5 = Strongly agree). Scores are summed, with greater total scores indicating greater sensations of feeling fat. The scale has been previously used in research with general population samples (Pink et al., 2021). Internal consistency was good within this sample ( $\alpha = .809$ ).

**6.3.4.2 Trait alexithymia.** The TAS-20 (Bagby et al., 1994; see Chapter 2) was used. Internal consistency was good within this sample ( $\alpha = .767$ ), but upon further investigation it was revealed that internal consistency was good for the DIF and DDF subscales (both  $\alpha > .801$ ), but the EOT subscale had low internal consistency ( $\alpha = .542$ ).

**6.3.4.3 Trait self-compassion.** The SCS (Neff, 2003; see Chapter 5) was used. Internal consistency for the sample reporting total scores was excellent ( $\alpha = .958$ ).

**6.3.4.4 State feeling fat.** To measure the state sensation of feeling fat, a visual analogue scale (0 = Not at all; 100 = Extremely) was used for participants to indicate how fat they felt “right now in this moment”. This was used at baseline, post-manipulation and post-intervention, with change scores calculated for changes pre- to post-manipulation, and pre- to post-intervention. Five other items were presented as part of the visual analogue scale, as distractor variables which were not scored for use in the analyses (denoted in Table 6.1 with an asterisk). This visual analogue

**Table 6.1 Feeling Fat Visual Analogue Scale**

Please complete the below feelings as you feel right now in this moment, rating from 0 Not at all to 100 Extremely.											
Not at all						Extremely					
0	10	20	30	40	50	60	70	80	90	100	
1. Fat 2. Aware of my bodily sensations* 3. Attractive* 4. Confident* 5. Tired* 6. Comfortable*											

scale was developed by Pink et al. (2021) as part of their research testing a feeling fat manipulation design. Higher change scores indicate a greater change in feeling fat, with negative scores indicating a reduction in feeling fat and positive scores indicating an increase in feeling fat.

**6.3.4.5 State mood.** Five common mood states were presented as items on a visual analogue scale (see Table 6.2). Participants were asked how much they felt each item “right now” on a scale of 0-100 (0 = not at all, 100 = extremely). These were measured at baseline, post-manipulation, and post-intervention. Change scores were calculated and used to assess for general changes in mood.

**6.3.4.6 Body mass index.** BMI was calculated from self-reported height and weight measurements and was used as a covariate in the analyses.

**Table 6.2 Common mood state visual analogue scale**

Please complete the below feelings as you feel right now in this moment, rating from 0 Not at all to 100 Extremely.											
Not at all											Extremely
0	10	20	30	40	50	60	70	80	90	100	
1. Happy 2. Calm 3. Sad 4. Anxious 5. Stressed											

### 6.3.5 Materials

**6.3.5.1 Manipulation vignette.** One condition of the vignette developed by Pink et al. (2021) was utilised in the present study to induce the sensation of feeling fat. The vignette aimed to induce negative social comparison by presenting a situation about going out for food, but with negative comments and unfavourable social comparisons made (see Table 6.3). A free text box was presented and participants were asked to write a few sentences about how the social situation would make them feel. There were no minimum or maximum time limits to engage with this aspect of the study. All participants were presented with this same vignette.

**Table 6.3 Feeling fat manipulation vignette wording.**

**“Take a few minutes to read the scenario and try to imagine yourself as experiencing the scenario. Write in the text box a few sentences on how you might feel or what you might think in this situation.”**

You are eating out with a group of close friends. You decide to order a burger and fries. You are very hungry and looking forward to a nice meal. When the food arrives your friend makes a comment, “that’s really unhealthy, should you really be eating such fatty foods?” You look around and feel everyone’s eyes on you. You notice they have ordered salads. Looking around the table you realise you are the biggest person there and your clothes look much tighter. You go bright red and feel embarrassed.

**6.3.5.2 Intervention conditions.** The intervention conditions were developed for the purpose of this research. Three conditions were available for participants to be randomly allocated to. Informed by the methodologies of Breines and Chen (2012) and Moffitt et al. (2018), participants were asked to spend a short period of time writing a paragraph to themselves according to the instructions provided with/without a visual prompt accompanying these instructions (see Table 6.4). The wording of the intervention conditions was informed by the CBT-E module targeting feeling fat. As part of a broader a longer-term approach to feeling fat, recipients of the intervention are asked to consider “*What am I really feeling right now, and why?*” (Fairburn, 2008). The control condition was to control for mood and the possibility that engaging in a writing task could elicit more favourable outcomes, irrespective of the nature and purpose of the writing task itself.

Previously, participants have been asked to write for 3 minutes (Breines & Chen, 2012; Moffitt et al., 2018). However, the present study was piloted, and feedback advised that the 3-minute timer felt too long, and this may impact engagement with the task. After discussion amongst authors, it was decided that participants would be permitted to proceed after 1 minute (at which time the button to move onto next page would be displayed) and the page would auto-proceed after 2 minutes. Written responses were inspected, with the intention of removing participants if it appeared they had not engaged with the task (each instance discussed amongst authors).

**Table 6.4 Conditions of the intervention.**

Condition	Instructions	Visual prompt
1. Emotion identification and description with visual prompt	<p>For the next 2 minutes, write a paragraph to yourself (as if you are addressing yourself) answering the question "What am I really feeling right now, and why?".</p> <p>Use the feelings wheel below to help you identify <b>what</b> you are feeling right now, and then describe <b>why</b> you might be feeling that way.</p> <p>The button to move onto the next page will show after 1 minute has passed, and the study will automatically continue onto the next page after 2 minutes have passed</p>	Feelings wheel (see Figure 6.1)
2. Emotion identification and description	<p>For the next 2 minutes, write a paragraph to yourself (as if you are addressing yourself) answering the question <b>"What am I really feeling right now, and why?"</b></p> <p>Try to describe <b>why</b> you might be feeling this way.</p> <p>The button to move onto the next page will show after 1 minute has passed, and the study will automatically continue onto the next page after 2 minutes have passed.</p>	None
3. Control task	<p>For the next 2 minutes, write a paragraph to yourself (as if you are addressing yourself) describing a hobby that you enjoy.</p> <p>The button to move onto the next page will show after 1 minute has passed, and the study will automatically continue onto the next page after 2 minutes have passed.</p>	None

**6.3.5.3 The Feelings Wheel.** The feelings wheel (see Figure 6.1) was first developed by Willcox (1982) as a visual tool to assist individuals with identifying and expressing their feelings. There are many versions of the feelings wheel, but they generally contain an inner circle with primary human experiences and two outer circles comprising variants of these feelings. Willcox's original version comprised

three primary feelings of positive valance and three of negative valence. The version of the feelings wheel used in the present study was designed by Roberts (2015), who focused largely on negative emotions for use with individuals who experience adverse outcomes as a result of difficulties identifying them, making it appropriate for use in the context of the present study. The feelings wheel has been used to assist with identification and expression of feelings in other research (Jordan et al., 2020; Rutherford et al., 2020)

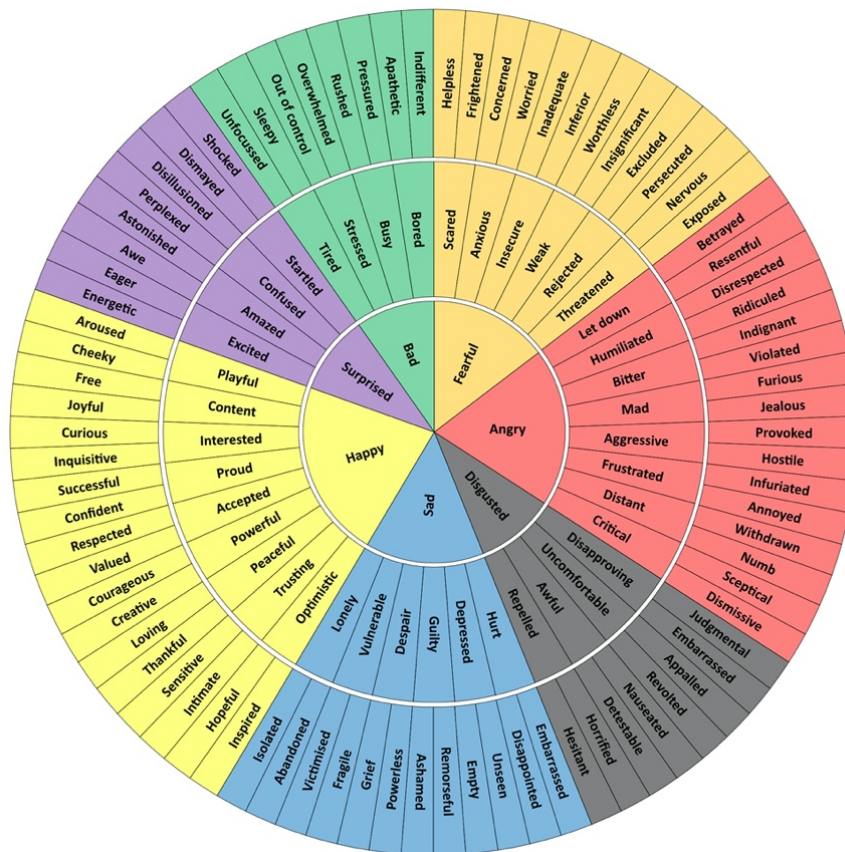


Fig. 6.1 The feelings wheel.  
Permission given by G. Roberts.

### **6.3.6 Procedure**

The study was hosted via Qualtrics and was completed at one time point. Due to online recruitment of participants and associated issues, a reCAPTCHA check was integrated at the start of the study to ensure human-responses. Data collection took place between January 2023 and February 2023. Participants were presented with information about the study before indicating their informed consent to take part (see Appendices U and V). A battery of trait measures (BAQ-FF, TAS-20, SCS) was then presented to participants in a randomised order. Participants completed the state visual analogue scales, before being presented with the feeling fat manipulation – the expected amount of time to engage with this for was not specified. Participants completed the state measures again, and were then randomised to one of the three intervention conditions. After the allocated time, participants progressed onto the final state measures. Following this, participants were asked to provide demographic information and were then able to engage with up to three mood repair videos as part of the debrief information (see Appendix W), which marked the end of the study.

### **6.3.7 Pilot study**

The ethics application outlined plans to pilot the study, by snowballing pilot participants within the university's PhD community and colleagues of the research team. Eight people took part in the pilot study, and the feedback was largely affirmative that the study was clear and there were no major issues impacting participation in or understanding of the study. There was some constructive feedback which provided clear actions to improve the study, for example revising the

intervention time (from 3 minutes to 1-2 minutes) and placing greater emphasis on the intervention instructions to ask why they were feeling that way to clarify what was expected from their writing. There was some feedback which was interesting for consideration in the write-up of the study but was not able to be incorporated into changes of the study design, so it was instead discussed within the limitations of the study.

### **6.3.8 Data analysis**

All analyses were conducted using SPSS v.28 and PROCESS v3.5. First, Pearson's correlations were conducted between trait measures. A series of paired-sample t-tests and one-way ANOVA were conducted to check whether the manipulation and intervention resulted in the changes in common mood states. A further paired-sample t-test was conducted to check if the manipulation resulted in increased state levels of feeling fat. A one-way ANCOVA controlling for BMI was then conducted with the change in state sensation of feeling fat as the outcome, to detect any differences in change scores between the three conditions. Results were considered significant if  $p < .05$ .

Moderation analysis (Model 1) was conducted with feeling fat change scores as the outcome (y), with condition (0 control, 1 = emotion description, 2 = emotion description with visual prompt) entered as the predictor variable (x). Trait feeling fat was entered as a moderator (w), as were trait alexithymia and self-compassion in subsequent models if they were found to significantly correlate with feeling fat during the correlation analysis (see Fig. 6.2). BMI was entered as a covariate. The 16<sup>th</sup>, 50<sup>th</sup>



and 84<sup>th</sup> percentiles were used to test the interactions. Confidence intervals that did not span zero were considered significant.



Fig. 6.2 A conceptual model of the moderation analyses to be tested

### 6.3.9 Ethical considerations

The codes of general and human research ethical conduct were adhered throughout. See Chapter 3 for discussion of these and potential risk and safeguarding issues which relate to all studies conducted as part of this PhD project. Ethical approval was obtained from the Birmingham City University's Faculty Academic Ethics Committee (see Appendix X), and this study was conducted in accordance with the Declaration of Helsinki.

Participants were recruited via opportunity sampling through Prolific and RPS. Funding was awarded from the BCU Doctoral Research College to offer financial incentives for participation. Those who took part via Prolific received £2 for their time, and those who took part via RPS received 2 study credits for their time.

The present study included a 'feeling fat manipulation' which detailed a social situation designed to induce this sensation, expected to be negative. Therefore, this

study involved greater risk to the wellbeing of participants which was detailed in the ethics application. Participants were presented with an optional mood repair activity, a choice of three different positive videos, at the end of the debrief intervention. It was not mandatory to engage with this, but one participant fed back via Prolific messages that they were grateful for this addition.

## **6.4 Results**

### **6.4.1 Participant characteristics**

Two participants were excluded because they reported being men, despite agreeing with the inclusion criteria of identifying as a woman at the start of the study. The final sample comprised 188 women, aged 19 to 75 years ( $M = 38.18$ ;  $SD = 13.69$ ). The present sample was 89.9% white, and 55.9% of participants had a least an undergraduate degree. Almost one third of the sample reported currently dieting (29.3%).

### **6.4.2 Correlation analyses**

Correlations between trait variables and mean values are presented in Table 7.5. Trait levels of feeling fat positively correlated with levels of alexithymia ( $r(186) = .208$ ,  $p = .002$ ). Levels of self-compassion negatively correlated with both levels of trait feeling fat ( $r(186) = -.348$ ,  $p < .001$ ) and alexithymia ( $r(186) = -.634$ ,  $p < .001$ ). Only trait levels of feeling fat significantly correlated with BMI ( $r(178) = .671$ ,  $p < .001$ ).

**Table 6.5 Means, standard deviations, and bivariate correlations of trait feeling fat, alexithymia and its subscales, self-compassion and its subscales, and body mass index.**

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	M	SD
BAQ_FF	-													43.86	13.48
TAS-20	.208** <i>N</i> = 188	-												47.78	12.12
DIF	.215** <i>N</i> = 188	.904*** <i>N</i> = 188	-											16.39	6.27
DDF	.157* <i>N</i> = 188	.859*** <i>N</i> = 188	.720*** <i>N</i> = 188	-										12.75	4.35
EOT	.121* <i>N</i> = 188	.669*** <i>N</i> = 188	.382*** <i>N</i> = 188	.380*** <i>N</i> = 188	-									18.63	4.07
SCS	-.348*** <i>N</i> = 188	-.634*** <i>N</i> = 188	-.638*** <i>N</i> = 188	-.531*** <i>N</i> = 188	-.340*** <i>N</i> = 188	-								2.87	0.80

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SelfKind	-	-	-	-	-	.866***	-							2.96	0.89
	.311***	.530***	.509***	.445***	.320***	N=	N=								
	N=	N=	N=	N=	N=	188	188								
ComHum	-.188**	-.494***	-.475***	-.402***	-.309***	.789***	.722***	-						3.20	0.90
	N=	N=	N=	N=	N=	N=	N=								
	188	188	188	188	188	188	188								
Mindful	-	-	-	-	-	.790***	.744***	.682***	-					3.21	0.79
	.254***	.510***	.463***	.404***	.373***	N=	N=	N=	N=						
	N=	N=	N=	N=	N=	188	188	188	188						
SelfJudge	-	-	-	-	-	.895***	.731***	.593***	.553***	-				2.61	0.99
	.380***	.583***	.617***	.476***	.278***	N=	N=	N=	N=						
	N=	N=	N=	N=	N=	188	188	188	188						
Isolate	-	-	-	-	-.172**	.850***	.612***	.544***	.494***	.804***	-			2.59	1.03
	.273***	.494***	.539***	.437***	N=	N=	N=	N=	N=	N=					
	N=	N=	N=	N=	188	188	188	188	188	188					
Overident	-	-	-	-	-.299***	.862***	.618***	.508***	.614***	.793***	.767***	-		2.65	1.04
	.339***	.594***	.601***	.509***	N=	N=	N=	N=	N=	N=	N=				
	N=	N=	N=	N=	188	188	188	188	188	188	188				
BMI	.671***	-.054	.004	-.084	-.075	-.095	-.081	-.029	-.112	-.113	-.096	-.055	-	26.15	6.18
	N=	N=	N=	N=	N=	N=	N=	N=	N=	N=	N=	N=			
	170	170	170	170	170	170	170	170	170	170	170	170			

*Note:* BAQ-FF = Body Attitudes Questionnaire Feeling Fat Subscale; TAS-20 = Toronto Alexithymia Scale; DIF = Difficulty Identifying Feelings Subscale; DDF = Difficulty Describing Feelings Subscale; EOT = Externally Oriented Thinking Subscale; SCS = Self-Compassion Scale; SelfKind = Self-Kindness Subscale; ComHum = Common Humanity Subscale; Mindful = Mindfulness Subscale; SelfJudge = Self-Judgement Subscale; Isolate = Isolation Subscale; OverIdent = Overidentification Subscale; BMI = Body Mass Index. One-tailed correlations. Bold font indicates statistical significance. \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

### 6.4.3 Manipulation and intervention effects on common mood states

A series of paired samples t-tests revealed significant differences in baseline and post-manipulation levels of common mood states, but not feeling fat. Positive mood states significantly increased, whilst negative mood states significantly decreased. See Table 6.6 for means, standard deviations and t-test statistics.

**Table 6.6 Mean changes in common mood states and feeling fat from baseline to post-manipulation. (N = 188)**

Common Mood State	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Happy	-6.50	17.59	5.050	186	< .001
Calm	-8.75	20.84	5.743	186	< .001
Sad	6.18	19.31	-4.385	187	< .001
Anxious	4.15	18.07	-3.149	187	< .001
Stressed	5.24	16.97	-4.218	186	< .001
Fat	1.40	12.95	-1.487	187	.139

A series of one-way ANOVA revealed significant differences in post-manipulation to post-intervention levels of common mood states between conditions: including happy ( $F(2,185) = 7.78$ ,  $p < .001$ ,  $\eta_p^2 = .078$ ), calm ( $F(2,185) = 16.56$ ,  $p < .001$ ,  $\eta_p^2 = .152$ ), sad ( $F(2,185) = 9.44$ ,  $p < .001$ ,  $\eta_p^2 = .093$ ), anxious ( $F(2,185) = 10.35$ ,  $p < .001$ ,  $\eta_p^2 = .101$ ), and stressed ( $F(2,185) = 6.42$ ,  $p = .002$ ,  $\eta_p^2 = .065$ ). The greatest increases in positive mood states and decreases in negative mood states were seen in the control condition, means and standard deviations are presented in Table 6.7.

**Table 6.7 Mean changes in common mood states from post-manipulation to post-intervention. (N = 188)**

Common Mood State	<i>Condition 1</i>		<i>Condition 2</i>		<i>Condition 3</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Happy	0.73	13.40	-1.07	20.97	11.27	21.86
Calm	-0.02	11.89	-3.97	18.44	13.55	22.06
Sad	0.42	11.97	2.42	20.89	-10.19	19.03
Anxious	-1.26	14.47	3.73	16.51	-9.42	18.01
Stressed	-1.73	10.42	2.37	18.30	-8.07	19.28

#### 6.4.4 Analysis of covariance

The mean scores of the dependent and covariate variables are presented in Table 6.8. The assumptions of normality were checked with Q-Q plots which showed the residuals were normally distributed. Levene's test of equality of error variance was significant ( $F(47,122) = 2.12, p < .001$ ) indicating assumptions of homoscedasticity were violated. Nonetheless, analyses were conducted as planned due to ANCOVA's robustness when faced with violations of normality (Olejnik & Algina, 1984).

**Table 6.8 Means and standard deviations for dependent variable of feeling fat change score for each condition, and covariate variable of body mass index. (n = 170)**

Variable	<i>M</i>	<i>SD</i>
Condition 1 (Visual prompt)	-2.29	11.14
Condition 2 (No visual prompt)	-2.46	11.44
Condition 3 (Control)	-7.45	17.09
BMI	26.15	6.18

No significant effects of condition or BMI on feeling fat change scores were identified. The interaction between condition and BMI was also non-significant. These results indicate that there was no significant difference in feeling fat change scores across the intervention conditions, after controlling for the covariate ( $F(2,164) = .847, p = .738, \eta_p^2 = .248$ ). Change scores for each condition are displayed in Figure 6.3.

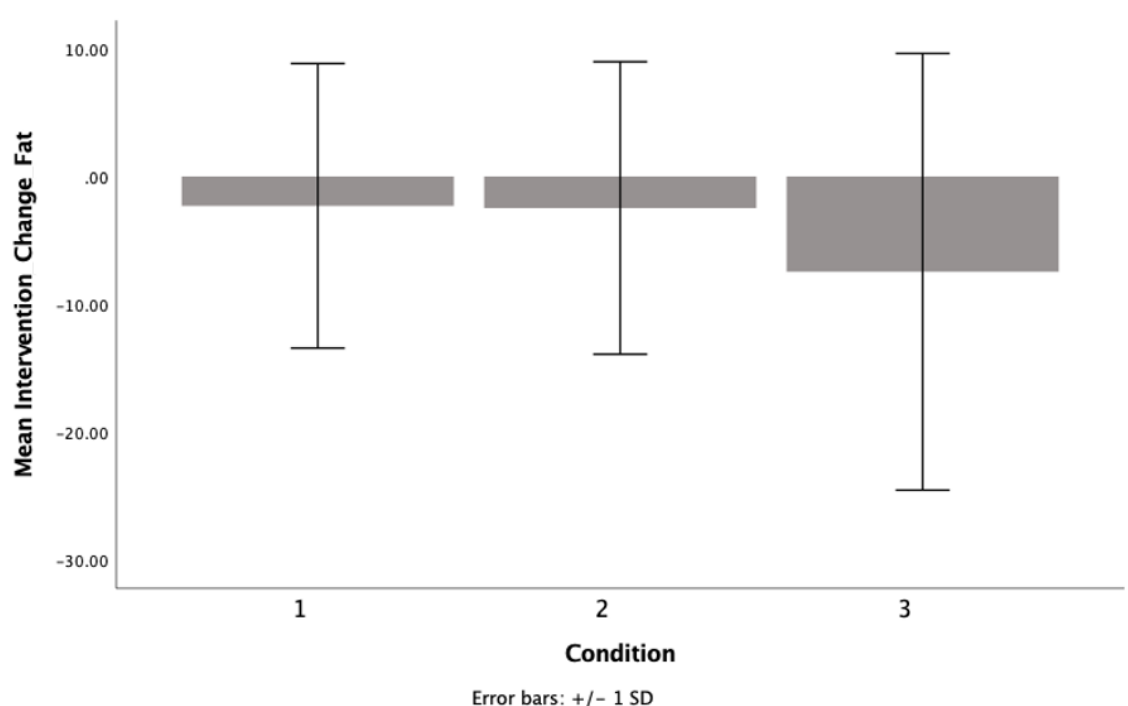


Fig 6.3. Feeling fat change scores for each of the three intervention conditions.

*Note:* Condition 1 = Emotion identification and description with visual prompt, Condition 2 = Emotion identification and description, Condition 3 = Control task.

#### 6.4.5 Moderation analyses

Moderation analyses were then conducted to examine whether the trait variables moderated the relationship between intervention conditions and feeling fat change scores, to identify any individual differences. As outlined in the planned analyses, trait feeling fat along with any other correlating trait variable would be

explored as potential moderators. Alexithymia and self-compassion were both identified to correlate with trait feeling fat. 16<sup>th</sup>, 50<sup>th</sup> and 84<sup>th</sup> percentiles were used to test the interactions. None of the variables significantly moderated the effect of intervention condition on feeling fat change scores: trait feeling fat ( $R^2 = .03$ ,  $F(4,165) = 1.44$ ,  $p = .224$ ), alexithymia total score ( $R^2 = .03$ ,  $F(4,165) = 1.46$ ,  $p = .216$ ), nor self-compassion total score ( $R^2 = .04$ ,  $F(4,165) = 1.76$ ,  $p = .139$ ).

**6.4.5.1 Exploratory analyses TAS-20 subscales.** Due to low internal reliability of the EOT subscale of the TAS-20 as indicated by the Cronbach's alpha values, further moderation analyses were conducted using the remaining two affective characteristic subscales, DIF and DDF, each as moderators in the model. These each had acceptable alpha values (both  $> .80$ ). However, these analyses indicated that neither DIF ( $R^2 = .03$ ,  $F(4,165) = 1.47$ ,  $p = .215$ ) nor DDF ( $R^2 = .04$ ,  $F(4,165) = 1.54$ ,  $p = .194$ ) moderated intervention efficacy.

## 6.5 Discussion

There were three aims of the present study. First, was to further understand the trait correlates of feeling fat, specifically by examining if it was associated with self-compassion. As hypothesised, there was a negative correlation between trait levels of feeling fat and self-compassion, and positive correlation between trait levels of feeling fat and alexithymia. The finding of a positive relationship between feeling fat and alexithymia aligns with previous research (Morales et al., 2022; Pink et al., 2021). The finding of a negative correlation between trait levels of feeling fat and self-compassion contribute to existing literature as this has not been previously



examined in published literature. Toole and Craighead (2016) alluded towards an association between the two but did not specifically measure feeling fat and instead captured it under a wider measure of body dissatisfaction. Braun et al. (2016) conducted a review which identified inverse relationships between feeling fat and many other aspects of body image dissatisfaction, under which feeling fat sits as a specific component. The present finding aligns with this and specifically provides support for an association between greater levels of self-compassion and lower levels of feeling fat. This relationship provides a foundation to build upon to further elucidate the relationship and examine feasibility as an intervention target, given suggestions that self-compassion may protect against other aspects of negative body image. It may be possible to support individuals to approach negative emotional states and somatic sensations with compassion, to provide strategies to manage the sensation of feeling fat.

The second aim was to explore the efficacy of a brief emotion identification and description intervention for state changes in feeling fat. Contrary to hypotheses, there were no differences between intervention conditions in reducing state feeling fat. It was expected that the intervention conditions would elicit greater reductions in state feeling fat than the control condition. Whilst there were no significant differences across the conditions, the greatest mean reduction in feeling fat was reported in the control condition, where participants were instructed to write to themselves about a hobby as a distraction. It was also found that the control condition elicited the greatest favourable changes across the common mood states, which were significantly greater than in the intervention conditions. These counterintuitive findings may be understood by way of the control condition reflecting

an intervention of self-affirmation. Self-affirmation involves the strengthening of one's self-image (Steele, 1988) and is used to increase body satisfaction in individuals at risk of developing eating disorders (Stice & Presnell, 2007). Interventions promoting self-affirmation involve participants writing about a personally important value (see McQueen & Klein, 2006), and are posited to work through individuals self-affirming in one domain (e.g. one's kindness) to minimise a threat in another domain (e.g. body shape and weight). Self-affirmation may have a significant positive effect on body satisfaction (of which feeling fat comes under the umbrella of), with participants in a study of self-affirmation intervention deriving more self-esteem from competence in areas of their life than their body shape and weight (Armitage et al., 2012). The control condition in the present study encouraged participants to spend time writing about a hobby they enjoy. It is possible that participants found this to be self-affirming, explaining the increase in positive states and reduction in negative states and feeling fat.

The third aim was to test whether trait levels of feeling fat, self-compassion and alexithymia moderated the intervention efficacy. These trait variables had no significant effects on the relationship between intervention condition and feeling fat change scores. Due to low internal reliability of the EOT subscale of the TAS-20, individual subscales were entered as moderating variables, but no significant effects were found. There may be other individual differences influencing the intervention efficacy, such as the individual's trait levels of body positivity or acceptance, or their mental health or wellbeing.

Feedback provided during the pilot phase of this study offered insight into individuals for whom feeling fat was not an issue they have experienced, in part due

to dissatisfaction with their smaller than average body size. This indicates that whilst feeling fat exists independently of objective body measurements (Fairburn, 2008), not all individuals experience feeling fat. Whilst baseline disposition towards the experience of feeling fat did not significantly moderate the effect of the intervention on feeling fat change scores, there are criticisms of the trait measure (BAQ-FF) and its validity. Fuller-Tyszkiewicz et al. (2012) proposed that the trait would be better measured as a bidimensional construct, with factors of general and clothing-specific sensations of feeling fat found within their samples of pregnant and non-pregnant women. Further, the items are subjective, and expect respondents to perceive feeling fat as a negative sensation. For example, one item refers to attempts to avoid clothes which make the respondent aware of their shape. Without further detail, participants who experience feeling fat may score the same as participants who avoid shape due to dissatisfaction with being underweight. Whilst there are limitations of the BAQ-FF, it is conceivably a more appropriate measure of trait feeling fat than the singular feeling fat item from the Eating Disorders Examination Questionnaire (Fairburn & Beglin, 1994), which is commonly used (Calugi et al., 2018; Goldschmidt et al., 2018; Linardon et al., 2018; Mehak & Racine, 2021; Messer & Linardon, 2021; Morales et al., 2022) and only asks respondents to report frequency of feeling fat over the previous 28 days. The BAQ-FF has also demonstrated high convergent validity with the Body Shape Questionnaire (Evans & Dolan, 1993) which measures body attitudes (Ben-Tovim & Walker, 1991).

There are also limitations of the state measure of feeling fat. Existing research, including the present study, relies on single-item visual analogue scales (Pink et al., 2021) and pictorial scales (Wilson et al., 2021). Single-item scales are

insufficient for measuring complex constructs, such as feeling fat, affecting validity and reliability (Wanous et al., 1997). Future research should focus on the development of more comprehensive state measures, that attempt to capture different mechanisms of feeling fat to elicit whether state feeling fat is reflective of inaccurate labelling of negative emotional states or somatic sensations (or both). Interventions aiming to identify and describe feelings may be successful at targeting feeling fat underpinned by inaccurate labelling of negative emotional states, but not reduce feeling fat underpinned by mislabelling of somatic sensations, e.g. abdominal bloating.

The present study recruited a sample of women from the general population in the United Kingdom. It is suggested that feeling fat may be underpinned by different mechanisms in individuals with and without clinical eating disorders. Whilst much of previous research focuses only on women, the sensation of feeling fat is still experienced by men with and without eating disorders (Mehak & Racine, 2021). The mechanisms underpinning this relationship may be different across genders, and as such our findings cannot be generalised beyond samples of women. There are also specific cultural contextual factors related to feeling fat, and the present study recruited only women from the United Kingdom of whom 89.9% were white and 55.9% were educated to at least university-level. This further limits the generalisability of the results.

Presenting the trait measures ahead of the intervention may have framed engagement with the intervention, given the nature of the measures of alexithymia, self-compassion and feeling fat. However, it was determined that measuring traits first was preferable, compared to the manipulation and intervention influencing the

trait measures. It should also be considered that the online writing task taking place at only one time point may have strengths and limitations. The nature of the online writing task does not allow researchers to control for any other distractions drawing away participants attention from the task, but it does permit participants to participate in environments of their choosing which may allow them to write more freely and without feelings of being observed by researchers. It may also be that engagement with writing tasks becomes more natural and easier for participants when they are part of a longer-term intervention which enables them to practice this skill. This study was merely a brief test to assess whether it was feasible.

Analyses revealed that whilst there were significant differences between baseline and post-manipulation levels of common mood states, the small increase in state level of feeling fat was not significant. This indicates that the manipulation did not significantly increase levels of feeling fat. The manipulation used in the present study was informed by previous research by Pink et al. (2021) that compared four different vignettes. Whilst the negative social comparison manipulation was the most effective, resulting in the greatest increase in feeling fat, this was only when participants reported higher levels of alexithymia or socially prescribed perfectionism. Their study was the first to explore how a novel social comparison manipulation can induce the state sensation of feeling fat, and the area would benefit from further research to better elucidate the manipulation of this state. In regard to the brief writing intervention, writing and engagement with this type of task may be something that improves over time. As such, future research testing these interventions should consider ecological momentary assessment and longer testing periods to consider changes as participants become more accustomed to writing to themselves and

practicing identifying their feelings. This would also allow for tracking the state sensation and changes in feeling fat as it fluctuates across the day.

### **6.5.1 Conclusions**

The findings of the present study identify a negative relationship between trait feeling fat and self-compassion, and positive relationship between trait feeling fat and alexithymia, adding to extant literature. The changes in state feeling fat following the intervention were not as hypothesised, but directions for future research have been highlighted including examination of the role of self-affirmation.

## **6.6 Chapter Summary**

This study concluded the empirical research of this thesis. As concluded above, it provides preliminary support for a relationship between trait feeling fat and self-compassion which aligns with previous research into similar constructs. The intervention findings were not as expected, with no significant differences in changes in state feeling fat across the groups and the observation of the mean scores indicated that the control condition (writing about hobbies) may be most successful at reducing feeling fat. Individual differences explored did not influence the efficacy of the intervention in the present sample, and future directions for research into this topic are discussed.

## **CHAPTER 7: GENERAL DISCUSSION**

### **7.1 Research aims and questions**

The overarching aim of this thesis was to further elucidate the relationship between processing, regulating, and responding to experiences of negative emotion and subsequent perceived changes in eating behaviour. To achieve this aim, the following research questions were explored:

1. What is the relationship between alexithymia and emotional eating?
2. What do subjective emotional eating questionnaires measure?
3. What is the role of emotion dysregulation in the relationship between alexithymia and emotional eating?
4. What is the role of self-compassion in the indirect relationship between alexithymia and emotional eating?
5. What is the relationship between self-compassion and feeling fat?
6. Can we reduce feeling fat through identifying and describing feelings?

### **7.2 Key findings**

To attempt to answer the above research questions, a series of five studies were conducted. First, a systematic review of existing literature identified preliminary support for a relationship between alexithymia (as measured by the TAS-20) and subjective emotional eating (most frequently measured with the DEBQ-EE). Although there were only nine studies eligible for inclusion in the review, the DEBQ-EE was the most commonly used, appearing across five of the included studies. The second

study then employed the think aloud method to explore what individuals, with varying levels of alexithymic characteristics, think whilst completing the DEBQ-EE to further elucidate what the questionnaire measures and how individuals perceive the scale. This study tested an innovative way of conducting of think aloud research, via online data collection without concurrent researcher presence. This study found a range of problems associated with (a) participants engaging sufficiently with the think aloud process and provision of rich audio data that could be analysed, and (b) their generation of responses and interpretation of scale items, particularly those concerning situations rather than discrete emotions. Participants also expressed difficulty thinking about eating in response to specific isolated emotions, as they often feel multiple at the same time. The findings of this study offered insight into the challenges of operationalising subjective emotional eating.

The third and fourth studies employed cross-sectional designs to examine the roles of emotion dysregulation and self-compassion in the relationship between alexithymia and subjective emotional eating, to further elucidate the relationship that the systematic review offered preliminary evidence for. These studies used the EES and the SEES measures of subjective emotional eating, to contribute to the literature utilising other validated measures beyond the DEBQ-EE. The EES captures perceived urges to eat in response to various emotions, whilst the SEES captures perceived changes in food consumption in response to similar emotions. Significant indirect and conditional indirect effects, via emotion dysregulation and self-compassion respectively, were identified. This was true only for the relationship between alexithymia, specifically affective characteristics, and emotional eating only as measured by the EES. The findings of these studies lend no support to a



relationship between alexithymia and emotional eating as measured by the SEES.

This further supports the proposition that the EES and SEES capture different aspects of emotional eating, and are not interchangeable measures of the construct.

The role of emotion dysregulation identified in the third study was as expected:

increased levels of alexithymia led to increased difficulties in emotion regulation, which led to increased emotional eating. Conversely, the role of self-compassion

examined in the fourth study was not as expected: at greater levels of self-

compassion the indirect effect via emotion dysregulation is stronger, resulting in

increased emotional eating. The conclusion drawn from this single study was that

promoting self-compassion is not a feasible target for intervention to reduce

emotional eating, considering that designing an intervention to decrease self-

compassion poses ethical issues due to the typical research findings of increased

self-compassion being favourable for many aspects of health and wellbeing. Further

examination is required to better understand the role of self-compassion and confirm these findings.

The final study employed an experimental design to test a brief intervention to reduce state sensations of feeling fat by promoting identification and description of

feelings. Considering existing literature and findings of the earlier studies of this PhD,

it was determined that mechanisms of emotion regulation and self-compassion were

not appropriate intervention targets and therefore tapping into the difficulties

identifying and describing feelings associated with alexithymia may be more feasible.

As discussed, alexithymia is considered a relatively stable trait, but feeling fat

reflects a type of alexithymia which fluctuates momentarily and therefore was better

suited as an outcome variable for this brief intervention. Targeting this outcome

variable was considered to be more appropriate and feasible than designing an online intervention for emotional eating, particularly when considering the issues with self-reported emotional eating which were consolidated by earlier studies of this PhD. The final study involved a feeling fat manipulation task followed by a brief 1-2 minute writing intervention, comparing the condition of identifying and describing feelings, with and without a visual prompt (i.e. the feelings wheel) and a control task. Based on theory of feeling fat being an expression of negative emotional states, it was expected that prompts to identifying and describe these underpinning states would reduce the state sensation of feeling fat more effectively than a control task. However, it was found that the change in feeling fat scores did not significantly differ across groups, and when examining the mean change scores it was evident that the control condition elicited the greatest mean reduction in feeling fat compared to the intervention conditions, although this was not statistically significant. The findings indicate that positive writing tasks, perhaps reflective of self-affirmation, may be a promising avenue to explore in future feeling fat intervention research for the general population. This final study also addressed the literature gap examining the relationship between self-compassion and feeling fat, providing preliminary support for an inverse relationship between the two traits which reflects the relationship between self-compassion and other constructs under the umbrella of body dissatisfaction. This indicates that the feasibility of promoting self-compassion may be worth exploring in future research. Identifying ways to target feeling fat may hopefully minimise adverse outcomes, e.g. overeating in response to this feeling. It is hoped that the findings of these studies will inform future research related to

emotional eating and feeling fat, particularly designing and testing of associated interventions, which are beyond the scope of this thesis.

The findings of the studies conducted as part of this thesis contributed to existing knowledge about the relationships between the constructs of alexithymia, emotion dysregulation, self-compassion, emotional eating, and feeling fat. It was important to further elucidate the roles of psychological mechanisms related to emotional eating and the experience of feeling fat, as these both negatively influence wellbeing and disordered eating (Braden et al., 2018; Geliebter & Aversa, 2003; Linardon et al., 2018; Mehak & Racine, 2021; Meule et al., 2018; Nolan et al., 2010). Increased knowledge surrounding the mechanisms and how they affect emotional eating and feeling fat may help to inform future research and interventions designed to intervene and support individuals who have difficulties with these. The systematic review provided preliminary support for the relationship between alexithymia and subjective emotional eating, highlighting that exploration of the relationship and underpinning mechanisms may be helpful. The models proposed in Chapters 4 and 5 indicated that promoting identification and description of feelings and subsequent adaptive regulation may reduce levels of subjective emotional eating, whilst promoting self-compassion may not be beneficial. Further, the findings of Chapter 6 offered novel insight into the inverse relationship between trait feeling fat and self-compassion and indicated that interventions promoting identification and description of feelings may not be sufficient to reduce state sensations of feeling fat.

### 7.3 General limitations

There are general limitations of the studies included in this thesis which need to be acknowledged. The ongoing presence of the Covid-19 pandemic in varying levels of severity may have influenced several aspects of this PhD including research design and findings. All studies conducted data collection from July 2020 onwards and therefore the findings should be considered in the context of potential changes to emotions and eating behaviours as a result of the circumstances. The process of designing the studies was influenced by the barriers imposed and anticipated at times, leading to a focus on online data collection and changes from the original research proposals at the time this PhD commenced in February 2020. This meant participant recruitment platforms were utilised for several studies, including Prolific and the university's online recruitment platform, RPS. These platforms may pose risks for the quality of data collected, particularly Prolific. This was considered during study design and analysis to mitigate these risks, including incorporating reCAPTCHA checks and examining free-text responses and scale responses for any outliers or evidence of poor engagement with the study. When checking responses, the quality of the data appeared consistent regardless of recruitment platform. There is support for the consistently high quality of data collected from Prolific, with particular regards to participant attention, meaningful answers, unique IP addresses and geolocation, and time taken to complete studies (Douglas et al., 2023; Peer et al., 2022). It has even been suggested that Prolific was superior in these domains compared to undergraduate students recruited via RPS (Douglas et al., 2023), although it must be noted that no significant issues were identified with the data collected via RPS during this PhD.

As discussed throughout this thesis, there are limitations surrounding the operationalisation of emotional eating which are applicable to all studies of this thesis which examine this construct. Different ways of measuring emotional eating and their general problems have been identified, and particular problems with the DEBQ-EE (capturing desire to eat) were explored as part of the think aloud study in Chapter 3, albeit with a small sample size. A strength of the subsequent cross-sectional studies was then employing two measures of emotional eating, capturing subjective urges (EES) and changes to eating behaviours (SEES), with significant results only found with the EES measure. This further demonstrates that the different aspects of the emotional eating construct are not interchangeable, and whilst differences between objective and subjective emotional eating are well-documented in previous research, there needs to be further exploration of differences across subjective measures. There is scope for further think aloud studies to be conducted to explore each measure individually, and Chapter 3 discusses advantages and disadvantages of conducting innovative methods of this research type.

Limitations with the operationalisation of other constructs, including alexithymia, self-compassion, and feeling fat have also been discussed within this thesis. There is a general limitation of using self-report measures, which relates to the philosophical underpinning of the research design and researcher perceptions surrounding the construction of the knowledge and existence of reality. Self-report measures were the considered the most appropriate methods to collect data on these psychological constructs considering the chosen research design and online nature of data collection, but their general limitations remain surrounding potential biases and likely variance in respondent interpretation as demonstrated by the

findings of the think aloud study. Multi-method collection of data (e.g. as suggested with the TAS-20 and the observer-rated TSIA) is preferred, but not always feasible.

## **7.4 Future directions**

The findings of these studies have informed future potential avenues of research within the contexts of alexithymia, emotional eating, and feeling fat. Whilst each chapter has proposed potential future directions based on the respective findings, these are summarised here. Research should seek to elucidate why findings indicate a relationship between alexithymia and subjective urges and desire to eat in response to emotions, but not perceived actual changes in food intake, as well as establish the relationship between alexithymia and objective emotional eating. There is scope to examine different self-report measures of emotional eating, and measures of other psychological constructs, using the think aloud methods and further examine optimal methods for conducting this research. Considering the unexpected finding that heightened levels of self-compassion were related to unfavourable emotional eating outcomes, exploring the subjective reporting of self-compassion may help further understand what individuals are reporting with these measures, and whether it is indicative of other constructs such as compassionate self-correction, which reflects a desire to improve and grow as a function of self-criticism (Gilbert, 2009). When looking at developing interventions for reducing state sensations of feeling fat, future research could explore the role of self-affirmation in light of the findings that the control group exhibiting the greatest mean reduction in feeling fat, and consider the inverse relationship between self-compassion and feeling fat which was identified and how to utilise this for favourable outcomes.

## 7.5 General conclusions

This present body of research explored the relationships between processing, regulating, and responding to experiences of negative emotion and subjective emotional eating behaviours. It specifically aimed to elucidate these relationships, further understand what subjective emotional eating scales may measure, and reduce feeling fat through via a brief emotion identification and description intervention. Five studies were conducted, and the findings of these indicate that: (a) increased levels of alexithymic characteristics may be related to a perceived increase in eating in response to negative emotions; (b) there are an array of potential problems when completing self-report measures of emotional eating, and thinking aloud about responses; (c) difficulties identifying and describing feelings may be indirectly related to negative emotional eating via increased difficulties regulating emotions, particularly when this interacts with greater compassion towards the self; (d) promoting the identification and description of feelings may not result in significantly different changes in state sensations of feeling fat compared to writing about hobbies; and (e) the traits of self-compassion and feeling fat may be inversely related. Future research should aim to elucidate why greater levels of self-compassion interact with emotion dysregulation to result in increased emotional eating, and mechanisms or constructs this may be reflecting, as well as explore the effects of positive writing tasks on state sensations of feeling fat in the general population. Overall, the findings from the thesis contribute to extant literature examining eating in response to, and the processing of, negative emotions.

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## Appendices

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**Appendix A – PRISMA 2020 Checklist and PRISMA 2020 for Abstracts Checklist**

Section and Topic	Item #	Checklist item	Location where item is reported
<b>TITLE</b>			
Title	1	Identify the report as a systematic review.	Title page
<b>ABSTRACT</b>			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Appendix B
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Pages 1-2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 2
<b>METHODS</b>			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 3
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 3, Page 4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Pages 2-3
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Pages 2-3



## EATING IN RESPONSE TO EMOTIONS

Section and Topic	Item #	Checklist item	Location where item is reported
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 4
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 4
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page 4
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 4
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	N/A
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	N/A
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	N/A
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	N/A
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 4
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g.	N/A

Section and Topic	Item #	Checklist item	Location where item is reported
		subgroup analysis, meta-regression).	
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	N/A
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	N/A
<b>RESULTS</b>			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Figure 1, Page 5
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Table 2
Study characteristics	17	Cite each included study and present its characteristics.	Table 3, Pages 6-7
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Table 3
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	N/A
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 7
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical	N/A

## EATING IN RESPONSE TO EMOTIONS

Section and Topic	Item #	Checklist item	Location where item is reported
		heterogeneity. If comparing groups, describe the direction of the effect.	
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	N/A
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	N/A
<b>DISCUSSION</b>			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 13
	23b	Discuss any limitations of the evidence included in the review.	Page 14-16
	23c	Discuss any limitations of the review processes used.	Page 15
	23d	Discuss implications of the results for practice, policy, and future research.	Page 15
<b>OTHER INFORMATION</b>			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 18
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 18
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 18
Competing interests	26	Declare any competing interests of review authors.	Page 18

## EATING IN RESPONSE TO EMOTIONS

Section and Topic	Item #	Checklist item	Location where item is reported
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Page 18

Section and Topic	Item #	Checklist item	Reported (Yes/No)
<b>TITLE</b>			
Title	1	Identify the report as a systematic review.	Yes
<b>BACKGROUND</b>			
Objectives	2	Provide an explicit statement of the main objective(s) or question(s) the review addresses.	Yes
<b>METHODS</b>			
Eligibility criteria	3	Specify the inclusion and exclusion criteria for the review.	Yes
Information sources	4	Specify the information sources (e.g. databases, registers) used to identify studies and the date when each was last searched.	Yes
Risk of bias	5	Specify the methods used to assess risk of bias in the included studies.	Yes
Synthesis of results	6	Specify the methods used to present and synthesise results.	Yes
<b>RESULTS</b>			
Included studies	7	Give the total number of included studies and participants and summarise relevant characteristics of studies.	Yes
Synthesis of results	8	Present results for main outcomes, preferably indicating the number of included studies and participants for each. If meta-analysis was done, report the summary estimate and	Yes

## EATING IN RESPONSE TO EMOTIONS

Section and Topic	Item #	Checklist item	Reported (Yes/No)
		confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e. which group is favoured).	
<b>DISCUSSION</b>			
Limitations of evidence	9	Provide a brief summary of the limitations of the evidence included in the review (e.g. study risk of bias, inconsistency and imprecision).	No
Interpretation	10	Provide a general interpretation of the results and important implications.	Yes
<b>OTHER</b>			
Funding	11	Specify the primary source of funding for the review.	N/A
Registration	12	Provide the register name and registration number.	N/A

**Appendix B – Included measures and scoring****Appendix B.1 Toronto Alexithymia Scale**

(TAS-20; Bagby et al., 1994)

Using the scale provided as a guide, indicate how much you agree or disagree with each of the following statements by selecting the corresponding number. Give only one answer for each statement.

Strongly disagree	Moderately agree	Neither disagree nor agree	Moderately agree	Strongly agree
1	2	3	4	5

1. I am often confused about what I feel exactly.
2. It is difficult for me to find the appropriate words for my feelings.
3. I have sensations in my body that even doctors do not understand.
4. I am able to describe my feelings easily.
5. I would rather solve problems that just describe them.
6. When I am upset, I do not know if I am sad, scared or angry.
7. I am often confused by sensations in my body.
8. I would rather let things happen than to understand the reason why they happened that way.
9. I have feelings that I am unable to define completely.
10. It is essential for people to know about their feelings.
11. I find it hard to describe how I feel about people.
12. People demand to talk about my feelings more.
13. I do not know what is going on inside me.
14. I do not know most of the time why I am angry.
15. I would rather talk to people about their daily routines than their feelings.
16. I would rather watch light entertainment shows than dramatic shows.
17. I find it hard to disclose my innermost feelings, even to my close friends.
18. I can feel close to someone, even in moments of silence.
19. I find it useful to explore my feelings in solving my personal problems.
20. Seeking for hidden meanings in movies or plays kills their enjoyment.

*Scoring instructions*

Difficulty Identifying Feeling subscale is used to measure difficulty identifying emotions. 7 items – 1, 3, 6, 7, 9, 13, 14.

## EATING IN RESPONSE TO EMOTIONS

Difficulty Describing Feelings subscale is used to measure difficulty describing emotions. 5 items – 2, 4\*, 11, 12, 17.

Externally-Oriented Thinking subscale is used to measure the tendency of individuals to focus their attention externally. 8 items – 5\*, 8, 10\*, 15, 16, 18\*, 19\*, 20.

Total alexithymia score is the sum of responses to all 20 items. The TAS-20 uses cut-off scoring: equal to or less than 51 = non-alexithymia, equal to or greater than 61 = alexithymia. Scores of 52 to 60 = possible alexithymia.

Reverse-scored item = 4, 5, 10, 18, 19.

**Appendix B.2 Difficulties in Emotion Regulation Scale**

(DERS-SF; Kaufman et al., 2016)

Please indicate how often the following happen to you:				
Almost never 0-10%	Sometimes 11-35%	About half of the time 36-65%	Most of the time 66-90%	Almost always 91-100%
1	2	3	4	5
1. I pay attention to how I feel 2. I have no idea how I am feeling 3. I have difficulty making sense out of my feelings 4. I care about what I am feeling 5. I am confused about how I feel 6. When I'm upset, I acknowledge my emotions 7. When I'm upset, I become embarrassed for feeling that way 8. When I'm upset, I have difficulty getting work done 9. When I'm upset, I become out of control 10. When I'm upset, I believe that I will end up feeling very depressed 11. When I'm upset, I have difficulty focusing on other things 12. When I'm upset, I feel guilty for feeling that way 13. When I'm upset, I have difficulty concentrating 14. When I'm upset, I have difficulty controlling my behaviours 15. When I'm upset, I believe there is nothing I can do to make myself feel better 16. When I'm upset, I become irritated with myself for feeling that way 17. When I'm upset, I lose control over my behaviour 18. When I'm upset, it takes me a long time to feel better				

*Scoring instructions*

## Strategies

- 10. When I'm upset, I believe that I will end up feeling very depressed.
- 15. When I'm upset, I believe there is nothing I can do to make myself feel better.
- 18. When I'm upset, it takes me a long time to feel better.

## Non-acceptance

- 7. When I'm upset, I become embarrassed for feeling that way.
- 12. When I'm upset, I feel guilty for feeling that way.



## EATING IN RESPONSE TO EMOTIONS

16. When I'm upset, I become irritated at myself for feeling that way.

### Impulse

9. When I'm upset, I become out of control.

14. When I'm upset, I have difficulty controlling my behavior.

17. When I'm upset, I lose control over my behavior.

### Goals

8. When I'm upset, I have difficulty getting work done.

11. When I'm upset, I have difficulty focusing on other things.

13. When I'm upset, I have difficulty concentrating.

### Awareness

1. I pay attention to how I feel. [reverse code]

4. I care about what I am feeling. [reverse code]

6. When I'm upset, I acknowledge my emotions. [reverse code]

### Clarity

2. I have no idea how I am feeling.

3. I have difficulty making sense out of my feelings.

5. I am confused about how I feel.

Participants respond using a five-point Likert scale to indicate how often the described item happens (1 = Almost never [0-10%]; 5 = Almost always [91-100%]). Responses are summed, with higher scores reflecting greater difficulties in emotion regulation, used continuously.

**Appendix B.3 Emotional Eating Scale**

(EES; Arnow et al., 1995)

We all respond to different emotions in different ways. Some types of feelings lead people to experience an urge to eat. Please indicate the extent to which the following leads you to feel an urge to eat by checking the appropriate box

No desire to eat	A small desire to eat	A moderate desire to eat	A strong urge to eat	A overwhelming urge to eat
0	1	2	3	4

1. Resentful
2. Discouraged
3. Shaky
4. Worn out
5. Inadequate
6. Excited
7. Rebellious
8. Blue
9. Jittery
10. Sad
11. Uneasy
12. Irritated
13. Jealous
14. Worried
15. Frustrated
16. Lonely
17. Furious
18. On edge
19. Confused
20. Nervous
21. Angry
22. Guilty
23. Bored
24. Helpless
25. Upset

*Scoring instructions*

## EATING IN RESPONSE TO EMOTIONS

Participants indicate their urge to eat using a five-point scale (0 = No desire to eat; 4 = An overwhelming urge to eat), with higher summed scores indicating a greater urge to eat in response to emotions.

**Appendix B.4 Salzburg Emotional Eating Scale**

(SEES; Meule et al., 2018)

Please indicate the answer that applies to you by selecting the appropriate response box from the 5 options.				
I eat much less than usual	I eat less than usual	I eat just as much as usual	I eat more than usual	I eat much more than usual
1	2	3	4	5
1. When I feel optimistic 2. When I am happy 3. When I am cheerful 4. When I am proud 5. When I feel confident 6. When I feel lonely 7. When I am depressed 8. When I am sad 9. When I am bored 10. When I am frustrated 11. When I am furious 12. When I am angry 13. When I am irritated 14. When I am upset 15. When I am jealous 16. When I am tense 17. When I am anxious 18. When I am worried 19. When I am nervous 20. When I feel uneasy				

*Scoring instructions*

Four subscales measure happiness (e.g. “When I am cheerful”), sadness (e.g. “When I feel lonely”), anger (e.g. “When I am irritated”), and anxiety (e.g. “When I am nervous”). Participants respond using a five-point scale to indicate whether they eat more or less in response to each emotion (1 = I eat much less than usual; 5 = I eat much more than usual). Mean scores are computed for each subscale which indicate whether individuals eat less when experiencing these emotions (scores < 3), eat the same amount (scores = 3), or eat more (scores > 3).

**Appendix B.5 Self Compassion Scale**

(SCS; Neff et al., 2003)

How I typically act towards myself in difficult times.

Please read each statement carefully before answering. Indicate how often you behave in the stated manner, using the following scale:

Almost Never				Almost Always
1	2	3	4	5

1. I'm disapproving and judgemental about my own flaws and inadequacies.
2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.
3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.
4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.
5. I try to be loving towards myself when I'm feeling emotional pain.
6. When I fail at something important to me, I become consumed by feelings of inadequacy.
7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.
8. When times are really difficult, I tend to be tough on myself.
9. When something upsets me, I try to keep my emotions in balance.
10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.
11. I'm intolerant and impatient towards those aspects of my personality I don't like.
12. When I'm going through a very hard time, I give myself the caring and tenderness I need.
13. When I'm feeling down, I tend to feel like most other people are probably happier than I am.
14. When something painful happens, I try to take a balanced view of the situation.
15. I try to see my failings as part of the human condition.
16. When I see aspects of myself that I don't like, I get down on myself.
17. When I fail at something important to me, I try to keep things in perspective.
18. When I'm really struggling, I tend to feel like other people must be having an easier time of it.
19. I'm kind to myself when I'm experiencing suffering.
20. When something upsets me, I get carried away with my feelings.
21. I can be a bit cold-hearted towards myself when I'm experiencing suffering.
22. When I'm feeling down I try to approach my feelings with curiosity and openness.

- 23. I'm tolerant of my own flaws and inadequacies.
- 24. When something painful happens I tend to blow the incident out of proportion.
- 25. When I fail at something that's important to me, I tend to feel alone in my failure.
- 26. I try to be understanding and patient towards those aspects of my personality I don't like.

## SCS

### *Scoring instructions*

Six subscales, three positive (self-kindness, common humanity, and mindfulness) and three negative (self-judgement, isolation, and over-identification) which are reverse-scored.

A five-point Likert scale allows participants to indicate how often they behave in the manner stated in the items (1 = Almost never; 5 = Almost always). A higher-order factor for self-compassion is calculated as a grand mean of all subscales.

**Appendix B.6 Body Attitudes Questionnaire – Feeling Fat subscale**  
(BAQ-FF; Ben-Tovim & Walker, 1991)

This questionnaire contains a number of statements. Please read each one and tick the box that shows how much you agree or disagree with the statement.				
Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5
1. I get so worried about my shape that I feel I ought to diet. 2. I feel fat when I can't get clothes over my hips. 3. I worry that other people can see rolls of fat around my waist and stomach. 4. I hardly ever feel fat. 5. I feel fat when I wear clothes that are tight around the waist. 6. I have a slim waist. 7. Wearing loose clothing makes me feel thin. 8. Eating sweets, cakes or other high calorie food, makes me feel fat. 9. I feel fat when I have my photo taken. 10. I often feel fat. 11. I feel fat when I am lonely. 12. I feel fat when I can no longer get into clothes that used to fit me. 13. I try to avoid clothes which make me especially aware of my shape.				

*Scoring instructions*

The extent to which individuals experience the sensations of feeling fat is captured across the 14-item FF subscale. Items are rated on a five-point scale (1=strongly disagree to 5=strongly agree), with raw scores summed to create a total FF score.

**Appendix C – Ethical approval for think aloud study**



Faculty of Business, Law & Social Sciences Research Office Curzon Building, 4  
Cardigan Street  
Birmingham  
B4 7BD

BLSSethics@bcu.ac.uk;

27/Sep/2021

Miss Katherine McAtamney katherine.mcatamney@mail.bcu.ac.uk

Dear Katherine ,

**Re:**McAtamney/#9550/sub2/R(A)/2021/Sep/BLSSFAEC -  
Howdoindividualswithalexithymiareporteatinginresponsetoemotions?Athinkaloud  
methodology

Thank you for your application and documentation regarding the above activity. I am  
pleased to take Chair's Action and approve this activity.

Provided that you are granted Permission of Access by relevant parties (meeting  
requirements as laid out by them), you may begin your activity.

I can also confirm that any person participating in the project is covered under the  
University's insurance arrangements.

Please note that ethics approval only covers your activity as it has been detailed in  
your ethics application. If you wish to make any changes to the activity, then you  
must submit an Amendment application for approval of the proposed changes.

Examples of changes include (but are not limited to) adding a new study site, a new  
method of participant recruitment, adding a new method of data collection and/or  
change of Project Lead.

Pleasealso notethattheBusiness, LawandSocialSciencesFacultyAcademicEthicsCom  
mittee shouldbenotifiedofanyseriousadverseeffectsarisingasaresultof this activity.

If for any reason the Committee feels that the activity is no longer ethically sound, it  
reserves the right to withdraw its approval. In the unlikely event of issues arising  
which would lead to this, you will be consulted.



**Keep a copy of this letter along with the corresponding application for your records as evidence of approval.**

If you have any queries, please contact [BLSSethics@bcu.ac.uk](mailto:BLSSethics@bcu.ac.uk); I wish you every success with your activity.

Yours Sincerely,  
Dr Natalie Kelly

On behalf of the Business, Law and Social Sciences Faculty Academic Ethics Committee

Appendix D – Recruitment posters for think aloud study

## ARE YOU AN EMOTIONAL EATER? DO YOU HAVE ALEXITHYMIA? PARTICIPANTS NEEDED FOR AN ONLINE STUDY

- Do you experience characteristics of alexithymia?
- Do you consider yourself to be an emotional eater?
- Are you over 18 years old and in the United Kingdom?
- Can you speak, read, hear and write in English?
- Do you have access to a phone or computer with a working microphone?
- Do you have access to a quiet space without loud background noise?

If yes, then please consider taking part in our study exploring the experience of emotional eating in people with alexithymia. It will take approximately 20 minutes, and will require you to speak aloud as you answer some questions about eating. This will be audio-recorded.

To take part: Visit [www.tinyurl.com/alxeestudy](http://www.tinyurl.com/alxeestudy) or scan the QR code

For more information contact the lead researcher: [Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk)

Please do not take part if you have a history of eating disorders, or would feel distressed discussing your eating behaviours.





This study has ethical approval from Birmingham City University  
Approval reference: #9550 /sub2 /R(A) /2021 /Sep /BLSS FAEC  
Ethics queries or issues: [BLSSEthics@bcu.ac.uk](mailto:BLSSEthics@bcu.ac.uk)



## ARE YOU AN EMOTIONAL EATER? PARTICIPANTS NEEDED FOR AN ONLINE STUDY

- Do you consider yourself to be an emotional eater?
- Are you over 18 years old and in the United Kingdom?
- Can you speak, read, hear and write in English?
- Do you have access to a phone or computer with a working microphone?
- Do you have access to a quiet space without loud background noise?



If yes, then please consider taking part in our study exploring the experience of emotional eating. It will take approximately 20 minutes, and will require you to speak aloud as you answer some questions. This will be audio-recorded.

To take part: Visit [www.tinyurl.com/eeatingstudy](http://www.tinyurl.com/eeatingstudy) or scan the QR code

For more information contact the lead researcher: [Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk)

Please do not take part if you have a history of eating disorders, or would feel distressed discussing your eating behaviours.



This study has ethical approval from Birmingham City University  
Approval reference: #9550 /sub2 /R(A) /2021 /Sep /BLSS FAEC  
Ethics queries or issues: [BLSSEthics@bcu.ac.uk](mailto:BLSSEthics@bcu.ac.uk)



## **Appendix E – Fora access requests and approval for think aloud study**

### **Alexithymia social media groups/pages:**

Facebook – Alexithymia Support, Alexithymia Knowledge Support & Understanding

Reddit – r/alexithymia

### **Forum Gatekeeper Message – to moderators/administrators of private alexithymia fora**

Dear Moderator(s),

My name is Katherine McAtamney and I'm currently recruiting for a research study as part of my PhD at Birmingham City University, United Kingdom. The general aim of the study is to explore the experience of alexithymia and emotional eating behaviours.

I'm writing to ask for your permission to post an advert to your group, [insert name], to seek research participants to take part in a 20-minute questionnaire where they will be asked to share their thoughts as they complete some questions about their eating behaviours. I am seeking only participants with alexithymia, so your group will be a helpful platform for reaching this population as many members may identify with having alexithymia. I have attached the study information sheet.

All answers and results from the research are kept strictly confidential and the results will be reported in a research paper which I will share in this group once published. This study has received ethical approval by the Division of Psychology Research Ethics Committee at Birmingham City University (Approval Reference /#9550 /sub2 /R(A) /2021 /Sep /BLSS FAEC).

If this is possible, please could you confirm that you are willing to allow access to your page for the purpose of recruiting participants who are willing to take part. You can do so by replying to this message or emailing me at

Katherine.McAtamney@mail.bcu.ac.uk.

Please ask me any questions you may have about this study.

Thank you for your time,  
Katherine McAtamney

## EATING IN RESPONSE TO EMOTIONS

### Facebook: Alexithymia Support

15:13

Hi Katie,

I'm more than happy to give you access to the group, please request that and I'll approve. I know a number of group members have complained about the lack of scientific study around alexithymia, so I would hope you'd get a good take up.

Note that we've got members all over the world (though heavily UK & US centric) so you may need to consider that in terms of cultural differences.

### Reddit: r/alexithymia

[r/Alexithymia](#)

Request for alexithymia research advertisement:

[expand all](#) [collapse all](#)

[\[-\]](#) to [/r/Alexithymia](#) sent 19 hours ago

Dear Moderator(s),

My name is Katherine McAtamney and I'm currently recruiting for a research study as part of my PhD at Birmingham City University, United Kingdom. The general aim of the study is to explore the experience of alexithymia and emotional eating behaviours.

I'm writing to ask for your permission to post an advert to your subreddit thread, [r/alexithymia](#), to seek research participants to take part in a 20-minute questionnaire where they will be asked to share their thoughts as they complete some questions about their eating behaviours. I am seeking only participants with alexithymia, so your group will be a helpful platform for reaching this population as many members may identify with having alexithymia. I am unable to attach the information sheet using the reddit 'message moderator' function – if you would like a copy of the information sheet, please email me at [Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk).

All answers and results from the research are kept strictly confidential and the results will be reported in a research paper which I will share in this group once published. This study has received ethical approval by the Division of Psychology Research Ethics Committee at Birmingham City University (Approval Reference /#9550 /sub2 /R(A) / /Sep /BLSS FAEC).

If this is possible, please could you confirm that you are willing to allow access to your page for the purpose of recruiting participants who are willing to take part. You can do so by replying to this message or emailing me at [Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk). Please ask me any questions you may have about this study.

Thank you for your time, Katherine McAtamney

[Perma-Link](#) [Reply](#)

[\[-\]](#) subreddit message via [/r/Alexithymia](#) [\[M\]](#) sent 16 hours ago

That sounds great, go ahead!

[Perma-Link](#) [Delete](#) [Report](#) [Block Subreddit](#) [Mark Unread](#) [Reply](#)

## **Appendix F – Information sheet for think aloud study**

### **Participant Information Page**

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve for you. Please read the following information carefully and contact the researchers if you have any further questions, or something is not clear.

#### **Research background**

This research aims to understand how people who experience characteristics of alexithymia think about their eating behaviours in relation to emotions. Characteristics of alexithymia include difficulties identifying and describing feelings. The findings from this research will contribute to the knowledge we have about the relationship between alexithymia and eating behaviours, and how we think about emotional eating and its measurement across different populations.

Due to the nature of this study, it is recommended that you do not take part in this study if you have a history of eating disorders or would likely feel distressed or upset after thinking about your eating behaviour.

#### **What will you need to do?**

If you decide to take part in this research, you will be asked to indicate your consent on the next page. Please use the researcher contact details provided if you have any questions after reading this information page. You will also be asked to create a personalised anonymous code which will enable you to withdraw your data at a later date should you wish to do so.

To take part in this study, you will need to be on a device (e.g. phone or computer) with a working microphone and have access to a quiet place without loud background noises. There will be an opportunity to test your microphone before you begin the task. You will be asked to answer some question about your eating behaviours, and as you do so 'think aloud'. This involves saying out loud everything thought that comes into your head as you answer the questions. You will have the opportunity to practice this before completing the questions.

At the end of the study you will be asked to complete some questions about yourself, such as your age, gender and ethnicity. You will not be asked for your name, as all data you provide will be anonymous and confidential.

You will then be presented with a debrief page to mark the end of the study. There will be the opportunity to leave a contact email address if you would like to be entered into the prize draw – this email address will not be associated with any information you provide during the study.

It is expected that it will take you approximately 20 minutes to complete the study.

### **Are there any risks of taking part?**

There are no specific risks to participating in this research over and above those experienced in everyday life. However, it is recommended that you do not take part in this study if you have a history of eating disorders or would likely feel distressed or upset after thinking about your eating behaviour.

Should any issues arise during the study, you have the right to withdraw at any time and relevant helpline contact details will be provided on the participant debrief page.

### **Are there any benefits of taking part?**

You may choose to enter into a prize draw to win one of three £10 Love2Shop vouchers. Winners of these vouchers will be contacted via email by 30th April 2022.

By taking part in this research, you will also be contributing to a greater understanding of the complex relationship between emotions and eating behaviours.

### **Your right to withdraw and withhold information**

In line with the regulations outlined by the British Psychological Society, you can stop being a part of the research at any time without explanation. You may simply close the web page or skip through to the end of the study.

During the study, you have the right to omit or refuse to answer or respond to any question that is asked of you. You will still be eligible to enter the prize draw at the end of the study.

If you wish to withdraw your data after completing the questionnaire, you can do so using your personalised anonymous code, anytime up until 30th April 2022. Please use the researcher contact details below should you wish to withdraw in this timeframe.

### **Your right to confidentiality**

This research will not involve the collection of any identifiable information about you, with the exception of your email address should you choose to be entered into the Love2Shop voucher prize draw – your email address will not be associated with the data you provide during the study. In line with GDPR regulations, data will be stored confidentially on password-protected university servers, accessible only by the researcher and supervisory team.

Any personal information given will be unidentifiable to an external party – your data will be kept safely and securely using a personalised anonymous code. You will be given instructions on how to produce this after indicating your consent to take part. This code will be required should you wish to withdraw your data at a later date.

## EATING IN RESPONSE TO EMOTIONS

If you wish to raise any concerns about how your personal data is used, you can contact the Birmingham City University Data Protection Officer – [informationmanagement@bcu.ac.uk](mailto:informationmanagement@bcu.ac.uk) or +44 (0)121 331-5288.

Alternatively, you can complain directly to the Information Commissioner at Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF, further information available at [www.ico.org.uk](http://www.ico.org.uk)

### **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk) If you need to talk to someone following the research: Beat Eating Disorders | Helpline: 0808 801 0677 | Studentline: 0808 801 0811 <https://www.beateatingdisorders.org.uk/support-services> Samaritans | Helpline: 116 123 | Email: [jo@samaritans.org](mailto:jo@samaritans.org) <https://www.samaritans.org>

### **Who is organising the research?**

This research being organised by Katherine McAtamney as part of a PhD in Psychology of the Health and Wellbeing Research Cluster at Birmingham City University. It is supervised by Dr Deborah Wallis, Dr Helen Egan, and Dr Michael Mantzios.

This research has been approved by the Business, Law & Social Sciences Faculty Ethics Committee, approval reference /#9550 /sub2 /R(A) /2021 /Sep /BLSS FAEC.

If you have any queries relating to the research prior to, or after taking part, you can contact:

Katherine McAtamney (Researcher) – [Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk)

Dr Deborah Wallis (Supervisor) – [Deborah.Wallis@bcu.ac.uk](mailto:Deborah.Wallis@bcu.ac.uk)

If you are unhappy at any point during the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly – [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)



**Appendix G – Consent form for think aloud study**

**Participant Consent Form**

**In order to participate in this study, we need to ensure that you understand the nature of the research, as outlined on the previous Participant Information Page [Version 2 / 13th December 2021]. Please tick the boxes to indicate that you understand and agree to the following:**

- ☐ I confirm that I have fully read and understood the Participant Information Page for this research. I have had the opportunity to consider the information and ask questions. Any questions have been answered in a satisfactory manner.
- ☐ I understand that in order to take part in this research, I must: live in the United Kingdom; be aged over 18 years; be able to read, write, hear and speak English; and have no history of eating disorders
- ☐ I understand that any personal data I provide, including my age, sex, ethnicity and body measurements will be processed confidentially.
- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time without having to give a reason, and without penalty.
- ☐ I understand that my data is confidential and will be stored securely on Birmingham City University servers. I understand that it will only be used by the researchers for purposes pertaining to the present research.
- ☐ I understand that the data I provide in this study may be used in further research and presented in academic publications (e.g. journals or conferences) and that if it is used will be fully anonymised.
- ☐ I understand that this study involves completion of standardised tests but the results are not sufficient for any diagnostic purposes and that researchers cannot discuss individual test scores.
- ☐ I agree to take part in this study.

## **Appendix H – Task instructions and practice for think aloud study**

### **Task Instructions**

We are interested in what you think as you complete a short questionnaire during this study. In order to do this, we ask that you talk out loud as you complete the questionnaire – saying every thought that comes into your head as you answer the questions. We would like you to begin thinking aloud and continue continuously from the moment you begin the task, until you complete the task.

Please don't try and plan what you would like to say or explain why you are thinking that, just simply say your exact thoughts as they come to you. To remind you, the data collected is anonymous and confidential and we will not know who you are so please just act as though you are alone and speaking to yourself. It is important that you continue to speak, please do not stay silent for any period of time!

Please ensure that you are in a quiet space with no loud background noises that will prevent your recording from being heard clearly.

Press 'Record' as soon as you begin the task, and then press it again to stop the recording. You will have to press 'Submit' in order to move onto the next page.

You will have the option to hear the recording back, and re-record if necessary. We ask that you avoid re-recording where possible, to ensure your authentic first thoughts when completing the questionnaire.

### **Practice task**

We will begin with a practice task. Firstly, a demonstration, and then a chance for you to practice.

This task consists of inventing improvements for a mode of transport. You will be given the name of a mode of transport and some suggested improvements. Your task is to indicate how much you agree with the improvement by selecting the appropriate response from the 5 options. Please remember to think out loud for the entire time.

Mode of transport: Train

## EATING IN RESPONSE TO EMOTIONS

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
There should be greater leg room for passengers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There should be free refreshments for long journeys.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There should be on board entertainment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There should be more regular stops.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There should be less toilets on board.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Here is an audio clip of someone thinking aloud whilst completing the practice task.



---

Now it is time for you to practice. When you move onto the next page, press 'Record' as soon as possible. Please begin speaking out loud immediately and continuously. When you have completed the practice task, please scroll to the top of the page press the red button again to stop the recording. You should then press 'Submit' to move onto the next page.

---

Practice task

[Insert microphone]

This task consists of inventing improvements for a mode of transport. You will be given the name of a mode of transport and some suggested improvements. Your task is to indicate how much you agree with the improvement by selecting the appropriate response from the 5 options.

Please remember to think out loud for the entire time. Your responses to this practice task will not be saved.

## EATING IN RESPONSE TO EMOTIONS

Mode of transport: **Car**

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
There should be more leg room for back-seat passengers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
All cars should have electric windows.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
All cars should automatically alert emergency services to an accident.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cars should be self-cleaning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cars should have less doors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you have finished the practice task, please scroll to the top of the page and press the red button to stop recording. Press 'Submit' to move onto the next page where you will see instructions for the study task.

---

Thank you for completing the practice task.

Please read out the following instructions to remain comfortable with thinking out loud:

When you reach the end of these instructions, please press the next arrow to begin the task. When the next page loads, please press 'Record' immediately and then begin the task, ensuring to speak out loud throughout the task until you reach the end of the page.

### **Appendix I – Task for think aloud study**

Please indicate the answer that applies to you by selecting the appropriate response box from the 5 options.

1. Do you have the desire to eat when you are irritated?
2. Do you have a desire to eat when you have nothing to do?
3. Do you have a desire to eat when you are depressed or discouraged?
4. Do you have a desire to eat when you are feeling lonely?
5. Do you have a desire to eat when somebody lets you down?
6. Do you have a desire to eat when you are cross?

**Please remember to think out loud for the entire time.**

7. Do you have a desire to eat when something unpleasant is about to happen?
8. Do you have a desire to eat when you are anxious, worried or tense?
9. Do you have a desire to eat when things are going against you or when things have gone wrong?
10. Do you have a desire to eat when you are frightened?
11. Do you have a desire to eat when you are disappointed?
12. Do you have a desire to eat when you are emotionally upset?
13. Do you have a desire to eat when you are bored or restless?

If you have completed the task, please scroll to the top of the page, stop the recording and press 'Submit' to move on to the next page.

## **Appendix J – Debrief page for think aloud study**

### **Participant Debrief Page**

#### **Summary of project**

Thank you for taking the time to participate in this research project. This research aimed to investigate how people think about their emotional eating behaviours, exploring the experiences of those recruited from alexithymia fora and those recruited from the general population.

Literature indicates that those scoring higher on alexithymia measures are more likely to experience emotional eating, which for some individuals can have adverse effects on physical and mental health. The purpose of this research is to explore how individuals cognitively respond to emotional eating measures, to try and understand further what these scales are measuring.

The findings from this study will help to inform literature around emotional eating and how we conceptualise it and identify potential differences between those with and without alexithymia when it comes to eating in response to emotions, how it is perceived and how it is self-reported.

#### **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

If you need to talk to someone following the research:

*Beat Eating Disorders* | Helpline: 0808 801 0677 | Studentline: 0808 801 0811  
<https://www.beateatingdisorders.org.uk/support-services>

*Samaritans* | Helpline: 116 123 | Email: [jo@samaritans.org](mailto:jo@samaritans.org)  
<https://www.samaritans.org>

#### **If you want to withdraw from the study**

Your data will be kept confidentially on a password-protected university server, accessible only by the researcher and research supervisors. You will be able to withdraw your data using the personalised anonymous code you created up until 30th April 2022.

To withdraw your data, please contact the researcher using the contact information

## EATING IN RESPONSE TO EMOTIONS

provided below.

### **Katherine McAtamney**

Researcher

PhD Candidate in Psychology

[Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk)

### **Dr Deborah Wallis**

Supervisor

Reader in Psychology

[Deborah.Wallis@bcu.ac.uk](mailto:Deborah.Wallis@bcu.ac.uk)

### **Any more questions?**

Thank you for taking part in this research project. If you have any further questions, please contact the researchers

**\*Please screenshot this page or alternatively contact the lead researcher, Katherine McAtamney, using the above information to be emailed a pdf copy\***

## **Appendix K – Information sheet for cross-sectional study 1**

### **Participant Information Page**

#### **Emotions and eating behaviours during the COVID-19 pandemic: exploring the roles of negative emotion and emotion regulation**

##### **Research background**

We are interested in the relationship between emotions and eating behaviours during and beyond the COVID-19 pandemic. This research aims to understand the different aspects of the emotions you experience and how they are regulated, the influence this has on eating behaviours, and how this may differ during the COVID-19 global pandemic.

Due to the nature of this study, it is asked that persons with a history of eating, mood, addictive, or substance use disorders do not take part in this study.

##### **What will you need to do?**

To take part in this research, you are asked to first read this information page and, if you are happy to continue, to complete the following consent form. After this, you will be asked to create a personalised anonymous code which will be used to confidentially match your responses and will be required at a later date should you wish to withdraw your data. You will then be asked to complete the following questionnaire which comprises questions about yourself, your thoughts and feelings and how you respond to these, and aspects of your eating behaviours. At the end of the research, you will be presented with a debrief page.

There will be a second phase of this questionnaire, commencing when the COVID-19 pandemic has been brought under control. You will be asked if you are happy to be contacted to take part in this second phase. You are not obligated to take part in the second phase.

##### **How long will the study last?**

This first phase comprises of one questionnaire, which is expected to take 15-20 minutes to complete. If you do not wish to take part in the second phase, this will be the only questionnaire you will be asked to complete.

If you indicate that you are happy to take part in the second phase of the questionnaire, the next questionnaire will be sent to you to complete in September 2020 or when COVID-19 has been brought under control, whichever is sooner. This will also take 15-20 minutes to complete.

##### **Are there any risks of taking part?**

There are no specific risks to participating in this research over and above those experienced in everyday life. However, if any issues arise you have the right to withdraw at any time, and relevant helpline contact details will be provided on the participant debrief page.



### **Are there any benefits of taking part?**

Although there are no direct benefits to you, by taking part in this research you will be contributing to a greater understanding of the complex relationship between emotions and eating behaviours, and the subsequent development of interventions to improve health and wellbeing. It is hoped this research will provide further understanding around the impacts of the COVID-19 pandemic.

### **Your right to withdraw and withhold information**

In line with the regulations outlined by the British Psychological Society, you can stop being a part of the research at any time without explanation. During the study, you have the right to omit or refuse to answer or respond to any question that is asked of you. You are still entitled to the same benefits as an individual who completes it.

To stop participating at any time during the questionnaire, please close the webpage and your responses will not be saved. If receiving RPS credits, this will not be affected (this applies to students of Birmingham City University only).

If you wish to withdraw your data after completing the questionnaire, you can do so using your personalised anonymous code, any time up until two weeks after completing the study. Please see the researcher contact details below should you wish to withdraw in this timeframe.

### **Your right to confidentiality**

This research will not involve the collection of any identifiable information about you, with the exception of your email address should you choose to take part in the second phase of the questionnaire or be notified of the research findings. In line with GDPR regulations, data will be stored confidentially on password-protected university servers, accessible only by the researcher and supervisory team.

Any personal information given will be unidentifiable to an external party – your data will be kept safely and securely using a personalised anonymous code. You will be given instructions on how to produce this during the questionnaire. This code will be required should you wish to withdraw your data at a later date, and allows researchers to match responses if you take part in both the first and second phases of this questionnaire.

If you wish to raise any concerns about how your personal data is used, you can contact the Birmingham City University Data Protection Officer – [informationmanagement@bcu.ac.uk](mailto:informationmanagement@bcu.ac.uk) or +44 (0)121 331-5288.

Alternatively, you can complain directly to the Information Commissioner at Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF, further information available at [www.ico.org.uk](http://www.ico.org.uk)

### **Who is organising the research?**

This research being organised by Katherine McAtamney as part of a PhD in Psychology of the Health and Wellbeing Research Centre at Birmingham City

## EATING IN RESPONSE TO EMOTIONS

University. It is supervised by Dr Deborah Wallis, Dr Helen Egan, and Dr Michael Mantzios.

If you have any queries relating to the research prior to, or after taking part, you can contact:

Katherine McAtamney (Researcher) – [Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk)

Dr Deborah Wallis (Supervisor) – [Deborah.Wallis@bcu.ac.uk](mailto:Deborah.Wallis@bcu.ac.uk)

If you are unhappy at any point during the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly – [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

### **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

If you need to talk to someone following the research:

Beat Eating Disorders | Helpline: 0808 801 0677 | Studentline: 0808 801

0811 <https://www.beateatingdisorders.org.uk/support-services>

Samaritans | Helpline: 116 123 | Email:

[jo@samaritans.org](mailto:jo@samaritans.org) <https://www.samaritans.org>

[Version 1 / 14 April 2020]

**Appendix L – Consent form for cross-sectional study 1**

**Participant Consent Form**

**In order to participate in this research, we need to ensure that you understand the nature of the research, as outlined on the previous Participant Information Page.**

**Please tick the boxes to indicate that you understand and agree to the following conditions.**

- ☐ I confirm that I have fully read and understood the participant information page for this research. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
- ☐ I understand that in order to take part in this research, I should be aged over 18 years, living in the United Kingdom, able to read and write English, and have no history of eating, mood, addictive, or substance use disorders.
- ☐ I understand that any personal data about me collected for the purpose of the research, including my age, sex, ethnicity and body measurements will be processed confidentially in accordance with the participant information page.
- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time without having to give a reason, and without penalty, by closing the web page.
- ☐ I understand that my data is confidential and will be stored on secure university servers, used by the researchers for purposes pertaining to the present research.
- ☐ I understand that the data I provide in this study may be used in further research and presented in academic publications (e.g. journals or conferences) and that if it is used will be fully anonymised.
- ☐ I understand that this study involves completion of standardised tests but the results are not sufficient for any diagnostic purposes and that researchers cannot discuss individual test scores.
- ☐ I agree to take part in this study.

## **Appendix M – Debrief page for cross-sectional study 1**

### **Participant Debrief Page**

#### **Emotions and eating behaviours during the COVID-19 pandemic: exploring the roles of negative emotion and emotion regulation**

##### **Summary of project**

Thank you for taking the time to participate in this research project. This research aimed to investigate the relationship between alexithymia and emotional eating, and the role of negative emotional states and how they are regulated.

Alexithymia is a personality trait characterised by difficulties in identifying and describing one's feelings, problems differentiating feelings from bodily sensations, and a tendency to focus on external experiences rather than internal states. It is present in roughly 10% of the general population. This factor has been associated with emotional eating and poor emotion regulation, so might have implications for physical and psychological health.

The study aims to identify the degree to which negative emotions and difficulties with emotion regulation might contribute to the relationship between alexithymia and emotional eating. Your participation will help us to further our understanding of these relationships, which might contribute to the future development of interventions.

We are particularly interested in the way this relationship exists during the COVID-19 global pandemic, and will be conducting a second phase of the questionnaire once it has abated. If you have indicated that you would be happy to take part in the second phase, you will be contacted by researchers when the pandemic has been brought under control.

##### **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

If you need to talk to someone following the research:

Beat Eating Disorders | Helpline: 0808 801 0677 | Studentline: 0808 801 0811  
<https://www.beateatingdisorders.org.uk/support-services>

Samaritans | Helpline: 116 123 | Email: [jo@samaritans.org](mailto:jo@samaritans.org)  
<https://www.samaritans.org>

##### **If you want to withdraw from the study**

Your data will be kept confidentially on a password-protected university server, accessible only by the researcher and research supervisors. You are able to

## EATING IN RESPONSE TO EMOTIONS

withdraw your data using your personalised anonymous code (the last two characters of your postcode and the last three digits of your mobile number) for up to two weeks after you have completed this research.

To withdraw your data, please contact the researcher using the contact information provided below.

**Katherine McAtamney**

Researcher

PhD Candidate in Psychology

[Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk)

**Dr Deborah Wallis**

Supervisor

Reader in Psychology

[Deborah.Wallis@bcu.ac.uk](mailto:Deborah.Wallis@bcu.ac.uk)

**Any more questions?**

Thank you for taking part in this research project. If you have any further questions, please contact the researchers.

**\*Please screenshot this page or alternatively you have the option to leave your email below to be emailed a copy\***

**Appendix N – Request to contact for cross-sectional study 2**

There will be a second phase of this questionnaire, commencing when the COVID-19 pandemic has been brought under control.

☐ I am happy to be contacted at a later date when the COVID-19 pandemic has been brought under control, to take part in a second phase of this research. I understand that this will comprise a second online questionnaire.

By answering yes now, you are not obliged to take to part when contacted in the future.

[If Yes] Please provide a suitable email address for the researchers to contact you regarding the second phase of the study. You will only be emailed once to be provided with the link to take part in the second phase. Your email will not be used for any other purposes or shared with any third parties.

**Appendix O – Ethical approval for cross-sectional study 1**



Faculty of Business, Law & Social Sciences Research Office Curzon Building, 4  
Cardigan Street  
Birmingham  
B4 7BD

BLSSethics@bcu.ac.uk;

11/Jun/2020

Miss Katherine McAtamney katherine.mcatamney@mail.bcu.ac.uk

Dear Katherine ,

**Re:**McAtamney/7327/R(A)/2020/May/BLSSFAEC -  
AlexithymiaandemotionaleatingduringtheCOVID-  
19pandemic:exploringthemediatingrolesof negative affect and emotion regulation

Thank you for your application and documentation regarding the above activity. I am pleased to take Chair's Action and approve this activity.

Provided that you are granted Permission of Access by relevant parties (meeting requirements as laid out by them), you may begin your activity.

I can also confirm that any person participating in the project is covered under the University's insurance arrangements.

Please note that ethics approval only covers your activity as it has been detailed in your ethics application. If you wish to make any changes to the activity, then you must submit an Amendment application for approval of the proposed changes.

Examples of changes include (but are not limited to) adding a new study site, a new method of participant recruitment, adding a new method of data collection and/or change of Project Lead.

Please also note that the Business, Law and Social Sciences Faculty Academic Ethics Committee should be notified of any serious adverse effects arising as a result of this activity.

If for any reason the Committee feels that the activity is no longer ethically sound, it reserves the right to withdraw its approval. In the unlikely event of issues arising which would lead to this, you will be consulted.

**Keep a copy of this letter along with the corresponding application for your records as evidence of approval.**

If you have any queries, please contact [BLSSethics@bcu.ac.uk](mailto:BLSSethics@bcu.ac.uk); I wish you every success with your activity.

Yours Sincerely,  
Dr Sophie Drennan

On behalf of the Business, Law and Social Sciences Faculty Academic Ethics Committee



**Appendix P – Email recruitment for cross-sectional study 2**

Subject: Research participation invitation - online questionnaire

Hello,

I hope this email finds you well.

In July 2020, you took part in an online questionnaire entitled “Emotions and eating behaviours during the COVID-19 pandemic: exploring the roles of negative emotion and emotion regulation”. This was organised by Katherine McAtamney as part of a PhD in Psychology of the Health and Wellbeing Research Cluster at Birmingham City University.

At the time of completion, you indicated that you would be happy to be contacted about taking part in a second part of this questionnaire at a later date.

If you are still happy to take part, please follow the link below where you will be presented with the second questionnaire.

**Link to study:** [https://blss.eu.qualtrics.com/jfe/form/SV\\_efGZJtEKMJBMOjH](https://blss.eu.qualtrics.com/jfe/form/SV_efGZJtEKMJBMOjH)

If you do not wish to take part, please ignore this email. You will not be contacted again about taking part.

If you have any questions about the research, please contact the researchers by replying to this email with any queries.

Thank you for your time,

Katherine McAtamney

**Katherine McAtamney (she/her)**

PhD candidate

Department of Psychology

Faculty of Business, Law and Social Sciences

Birmingham City University

[katherine.mcatamney@mail.bcu.ac.uk](mailto:katherine.mcatamney@mail.bcu.ac.uk) | [LinkedIn](#)

## **Appendix Q – Information sheet for cross-sectional study 2**

### **Participant Information Page**

#### **Emotions and eating behaviours: exploring the roles of emotion regulation and self-responding**

##### **Research background**

We are interested in the relationship between emotions and eating behaviours. This research aims to understand the different aspects of the emotions you experience and how they are regulated, and the influence this has on eating behaviours.

Due to the nature of this study, it is asked that persons with a history of eating, mood, addictive, or substance use disorders do not take part in this study.

##### **What will you need to do?**

To take part in this research, you are asked to first read this information page and, if you are happy to continue, to complete the following consent form. After this, you will be asked to create a personalised anonymous code which will be used to confidentially match your responses and will be required at a later date should you wish to withdraw your data. You will then be asked to complete the following questionnaire which comprises questions about yourself, your thoughts and feelings and how you respond to these, and aspects of your eating behaviours. At the end of the research, you will be presented with a debrief page.

##### **How long will the study last?**

This research study comprises one questionnaire, which is expected to take 15-20 minutes to complete.

You may have previously completed an earlier phase of this questionnaire during the COVID-19 pandemic. If so, we thank you for accepting the invitation to take part in the second questionnaire.

##### **Are there any risks of taking part?**

There are no specific risks to participating in this research over and above those experienced in everyday life. However, if any issues arise you have the right to withdraw at any time, and relevant helpline contact details will be provided on the participant debrief page.

##### **Are there any benefits of taking part?**

Although there are no direct benefits to you, by taking part in this research you will be contributing to a greater understanding of the complex relationship between emotions and eating behaviours, and the subsequent development of interventions to improve health and wellbeing.

##### **Your right to withdraw and withhold information**

## EATING IN RESPONSE TO EMOTIONS

In line with the regulations outlined by the British Psychological Society, you can stop being a part of the research at any time without explanation. During the study, you have the right to omit or refuse to answer or respond to any question that is asked of you. You are still entitled to the same benefits as an individual who completes it.

To stop participating at any time during the questionnaire, please close the webpage and your responses will not be saved. If receiving RPS credits, this will not be affected.

If you wish to withdraw your data after completing the questionnaire, you can do so using your personalised anonymous code, any time up until two weeks after completing the study. Please see the researcher contact details below should you wish to withdraw in this timeframe.

### **Your right to confidentiality**

This research will not involve the collection of any identifiable information about you, with the exception of your email address should you choose to be notified of the research findings. In line with GDPR regulations, data will be stored confidentially on password-protected university servers, accessible only by the researcher and supervisory team.

Any personal information given will be unidentifiable to an external party – your data will be kept safely and securely using a personalised anonymous code. You will be given instructions on how to produce this during the questionnaire. This code will be required should you wish to withdraw your data at a later date, and allows researchers to match responses if you take part in both the first and second phases of this questionnaire.

If you wish to raise any concerns about how your personal data is used, you can contact the Birmingham City University Data Protection Officer – [informationmanagement@bcu.ac.uk](mailto:informationmanagement@bcu.ac.uk) or +44 (0)121 331-5288.

Alternatively, you can complain directly to the Information Commissioner at Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF, further information available at [www.ico.org.uk](http://www.ico.org.uk)

### **Who is organising the research?**

This research is being organised by Katherine McAtamney as part of a PhD in Psychology of the Health and Wellbeing Research Cluster at Birmingham City University. It is supervised by Dr Deborah Wallis, Dr Helen Egan, and Dr Michael Mantzios.

If you have any queries relating to the research prior to, or after taking part, you can contact:

Katherine McAtamney (Researcher) – [Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk)

## EATING IN RESPONSE TO EMOTIONS

Dr Deborah Wallis (Supervisor) – [Deborah.Wallis@bcu.ac.uk](mailto:Deborah.Wallis@bcu.ac.uk)

If you are unhappy at any point during the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly – [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

### **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

If you need to talk to someone following the research:

Beat Eating Disorders | Helpline: 0808 801 0677 | Studentline: 0808 801 0811 <https://www.beateatingdisorders.org.uk/support-services>

Samaritans | Helpline: 116 123 | Email: [jo@samaritans.org](mailto:jo@samaritans.org) <https://www.samaritans.org>

[Version 2 / 30 October 2020]

## Appendix R – Consent form for cross-sectional study 2

### Participant Consent Form

**In order to participate in this research, we need to ensure that you understand the nature of the research, as outlined on the previous Participant Information Page.**

Please select all of the boxes to indicate that you understand and agree to the following conditions.

- ☐ I confirm that I have fully read and understood the participant information page for this research. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
- ☐ I understand that in order to take part in this research, I should be aged over 18 years, living in the United Kingdom, able to read and write English, and have no history of eating, mood, addictive, or substance use disorders.
- ☐ I understand that any personal data about me collected for the purpose of the research, including my age, sex, ethnicity and body measurements will be processed confidentially in accordance with the participant information page.
- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time without having to give a reason, and without penalty, by closing the web page.
- ☐ I understand that my data is confidential and will be stored on secure university servers, used by the researchers for purposes pertaining to the present research.
- ☐ I understand that the data I provide in this study may be used in further research and presented in academic publications (e.g. journals or conferences) and that if it is used will be fully anonymised.
- ☐ I understand that this study involves completion of standardised tests but the results are not sufficient for any diagnostic purposes and that researchers cannot discuss individual test scores.
- ☐ I agree to take part in this study.

## **Appendix S – Debrief page for cross-sectional study 2**

### **Participant Debrief Page**

**Emotions and eating behaviours: exploring the roles of emotion regulation and self-responding.**

#### **Summary of project**

Thank you for taking the time to participate in this research project. This research aimed to investigate the relationship between alexithymia and emotional eating, and the role of how individuals respond to and subsequently regulate their emotions.

Alexithymia is a personality trait characterised by difficulties in identifying and describing one's feelings, problems differentiating feelings from bodily sensations, and a tendency to focus on external experiences rather than internal states. It is present in roughly 10% of the general population. This factor has been associated with emotional eating and poor emotion regulation, so might have implications for physical and psychological health.

The study aims to identify the degree to which self-compassion and difficulties with emotion regulation might contribute to the relationship between alexithymia and emotional eating. Your participation will help us to further our understanding of these relationships, which might contribute to the future development of interventions.

#### **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

If you need to talk to someone following the research:

Beat Eating Disorders | Helpline: 0808 801 0677 | Studentline: 0808 801 0811  
<https://www.beateatingdisorders.org.uk/support-services>

Samaritans | Helpline: 116 123 | Email: [jo@samaritans.org](mailto:jo@samaritans.org)  
<https://www.samaritans.org>

#### **If you want to withdraw from the study**

Your data will be kept confidentially on a password-protected university server, accessible only by the researcher and research supervisors. You are able to withdraw your data using your personalised anonymous code (the last two characters of your postcode and the last three digits of your mobile number) up until two weeks after you have completed this research.

To withdraw your data, please contact the researcher using the contact information provided below.

**Katherine McAtamney**

## EATING IN RESPONSE TO EMOTIONS

Researcher

PhD Candidate in Psychology

Katherine.McAtamney@mail.bcu.ac.uk

**Dr Deborah Wallis**

Supervisor

Reader in Psychology

Deborah.Wallis@bcu.ac.uk

### **Any more questions?**

Thank you for taking part in this research project. If you have any further questions, please contact the researchers.

**\*Please screenshot this page or alternatively you have the option to leave your email below to be emailed a copy\***

**Appendix T – Ethical approval for cross-sectional study 2**



Faculty of Business, Law & Social Sciences Research Office Curzon Building, 4  
Cardigan Street  
Birmingham  
B4 7BD

BLSSethics@bcu.ac.uk;

10/Nov/2020

Miss Katherine McAtamney katherine.mcatamney@mail.bcu.ac.uk

Dear Katherine ,

**Re:**McAtamney/#7327/sub1/Am/2020/Nov/BLSSFAEC -  
AlexithymiaandemotionaleatingduringtheCOVID-  
19pandemic:exploringthemediatingrolesof negative affect and emotion regulation

Thank you for your application for approval of amendments regarding the above study. I am happy to take Chair's Action and approve these amendments.

Provided that you are granted Permission of Access by relevant parties (meeting requirements as laid out by them), you may continue your activity.

I can also confirm that any person participating in the project is covered under the University's insurance arrangements.

Please note that ethics approval only covers your activity as it has been detailed in your ethics application. If you wish to make any changes to the activity, then you must submit an Amendment application for approval of the proposed changes.

Examples of changes include (but are not limited to) adding a new study site, a new method of participant recruitment, adding a new method of data collection and/or change of Project Lead.

Please also note that the Committee should be notified of any serious adverse effects arising as a result of this activity.

If for any reason the Committee feels that the activity is no longer ethically sound, it reserves the right to withdraw its approval. In the unlikely event of issues arising which would lead to this, you will be consulted.



**Keep a copy of this letter along with the corresponding application for your records as evidence of approval.**

If you have any queries, please contact [BLSSethics@bcu.ac.uk](mailto:BLSSethics@bcu.ac.uk); I wish you every success with your activity.

Yours Sincerely,  
Dr Sophie Drennan

On behalf of the Business, Law and Social Sciences Faculty Academic Ethics Committee

## **Appendix U – Information sheets for experimental study**

### **Prolific**

#### **Participant Information Page**

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve for you. Please read the following information carefully and contact the researchers if you have any further questions, or something is not clear.

#### **Research background**

This research aims to explore whether a short writing task is able to improve aspects of our mood. The findings from this research will be useful for informing future research and contribute to the knowledge we have about the effects of writing tasks on our mood.

#### **Who can take part?**

You are able to take part in this study if you:

- Are over the age of 18
- Live in the United Kingdom
- Identify as a woman
- Can read and write in fluent English

You are not eligible to take part in this study if you:

- Are currently pregnant or breastfeeding
- Have a history of eating disorders
- Would likely feel distressed after thinking about your eating behaviour or body image

#### **What will you need to do?**

If you agree to take part in this study, you will be asked to complete some questions about yourself and then read about a situation where you imagine you are out for dinner with friends and think about how you would feel in this situation. You will then be asked to complete a 2-minute task, which may involve writing to yourself. This will be anonymous, and what you write here will not be used for research purposes.

You will then be asked to complete some final questions about yourself, including your age, gender, ethnicity, education level and body measurements. You will not

## EATING IN RESPONSE TO EMOTIONS

be asked for your name, as all data you provide will be anonymous and confidential.

At the end of the study, you will be presented with a debrief page with further study information.

It is expected that it will take you approximately 20 minutes to complete this study.

### **Are there any risks of taking part?**

There are no specific risks to participating in this study, over and above those experienced in everyday life. However, it is recommended that you do not take part in this study if you have a history of eating disorders or would likely feel distressed or upset after thinking about your eating behaviour or body image.

Should any issues arise during the study, you have the right to withdraw at any time and relevant helpline contact details will be provided on the participant debrief page.

### **Are there any benefits of taking part?**

If you are taking part through Prolific, you will be paid £2 for your participation. Please ensure you enter your correct Prolific ID when prompted.

By taking part in this research, you will also be contributing to a greater understanding of the psychological effects that writing tasks may have on us.

### **Your right to withdraw and withhold information**

In line with the regulations outlined by the British Psychological Society, you can stop being a part of the research at any time without explanation. You may simply close the web page.

During the study, you have the right to omit or refuse to answer or respond to any question that is asked of you. You will still be eligible for payment via Prolific.

If you wish to withdraw your data after completing the study, you can do so using your Prolific ID code, anytime up until 30th April 2023. Please use the researcher contact details below should you wish to withdraw in this timeframe.

## **Your right to confidentiality**

This research will not involve the collection of any identifiable information about you. In line with GDPR regulations, data will be stored confidentially on password-protected university servers, accessible only by the researcher and supervisory team.

Any personal information given will be unidentifiable to an external party – your data will be kept safely and securely. If you wish to raise any concerns about how your personal data is used, you can contact the Birmingham City University Data Protection Officer – [informationmanagement@bcu.ac.uk](mailto:informationmanagement@bcu.ac.uk) or +44 (0)121 331-5288.

Alternatively, you can complain directly to the Information Commissioner at Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF, further information available at [www.ico.org.uk](http://www.ico.org.uk)

## **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

## **If you need to talk to someone following the research:**

*Beat Eating Disorders* | Helpline: 0808 801 0677 | Studentline: 0808 801 0811 <https://www.beateatingdisorders.org.uk/support-services>

*Samaritans* | Helpline: 116 123 | Email: [jo@samaritans.org](mailto:jo@samaritans.org)  
<https://www.samaritans.org>

## **Who is organising the research?**

This research being organised by Katherine McAtamney as part of a PhD in Psychology at Birmingham City University. It is supervised by Dr Deborah Wallis, Professor Helen Egan, and Professor Michael Mantzios.

This research has been approved by the Business, Law & Social Sciences Faculty Ethics Committee at Birmingham City University, approval reference, [#11151 /sub1 /R(A) /2022 /Oct /BLSS FAEC].

If you have any queries relating to the research prior to, or after taking part, you can contact:

Katherine McAtamney (Lead Researcher) –  
Katherine.McAtamney@mail.bcu.ac.uk

Dr Deborah Wallis (Lead Supervisor) – Deborah.Wallis@bcu.ac.uk

If you are unhappy at any point during the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly – blssethics@bcu.ac.uk

[v1 / Prolific / 8th November 2022]

## **RPS**

### **Participant Information Page**

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve for you. Please read the following information carefully and contact the researchers if you have any further questions, or something is not clear.

### **Research background**

This research aims to explore whether a short writing task is able to improve aspects of our mood. The findings from this research will be useful for informing future research and contribute to the knowledge we have about the effects of writing tasks on our mood.

### **Who can take part?**

You are able to take part in this study if you:

- Are over the age of 18
- Live in the United Kingdom
- Identify as a woman
- Can read and write in fluent English

You are not eligible to take part in this study if you:

- Are currently pregnant or breastfeeding

## EATING IN RESPONSE TO EMOTIONS

- Have a history of eating disorders
- Would likely feel distressed after thinking about your eating behaviour or body image

### **What will you need to do?**

If you agree to take part in this study, you will be asked to complete some questions about yourself and then read about a situation where you imagine you are out for dinner with friends and think about how you would feel in this situation. You will then be asked to complete a 2-minute task, which may involve writing to yourself. This will be anonymous, and what you write here will not be used for research purposes.

You will then be asked to complete some final questions about yourself, including your age, gender, ethnicity, education level and body measurements. You will not be asked for your name, as all data you provide will be anonymous and confidential.

At the end of the study, you will be presented with a debrief page with further study information.

It is expected that it will take you approximately 20 minutes to complete this study.

### **Are there any risks of taking part?**

There are no specific risks to participating in this study, over and above those experienced in everyday life. However, it is recommended that you do not take part in this study if you have a history of eating disorders or would likely feel distressed or upset after thinking about your eating behaviour or body image.

Should any issues arise during the study, you have the right to withdraw at any time and relevant helpline contact details will be provided on the participant debrief page.

### **Are there any benefits of taking part?**

If you are taking part through the RPS system, you will be awarded 2 credits for your participation. Please ensure to enter your correct RPS code when prompted.

By taking part in this research, you will also be contributing to a greater understanding of the psychological effects that writing tasks may have on us.

## **Your right to withdraw and withhold information**

In line with the regulations outlined by the British Psychological Society, you can stop being a part of the research at any time without explanation. You may simply close the web page.

During the study, you have the right to omit or refuse to answer or respond to any question that is asked of you. You will still be eligible for credits via RPS.

If you wish to withdraw your data after completing the study, you can do so using your RPS code, anytime up until 30th April 2023. Please use the researcher contact details below should you wish to withdraw in this timeframe.

## **Your right to confidentiality**

This research will not involve the collection of any identifiable information about you. In line with GDPR regulations, data will be stored confidentially on password-protected university servers, accessible only by the researcher and supervisory team.

Any personal information given will be unidentifiable to an external party – your data will be kept safely and securely. If you wish to raise any concerns about how your personal data is used, you can contact the Birmingham City University Data Protection Officer – [informationmanagement@bcu.ac.uk](mailto:informationmanagement@bcu.ac.uk) or +44 (0)121 331-5288.

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This research has been approved by the Business, Law & Social Sciences Faculty Ethics Committee at Birmingham City University, approval reference [#11151 /sub1 /R(A) /2022 /Oct /BLSS FAEC].

If you have any queries relating to the research prior to, or after taking part, you can contact:

Katherine McAtamney (Lead Researcher) –  
[Katherine.McAtamney@mail.bcu.ac.uk](mailto:Katherine.McAtamney@mail.bcu.ac.uk)

Dr Deborah Wallis (Lead Supervisor) – [Deborah.Wallis@bcu.ac.uk](mailto:Deborah.Wallis@bcu.ac.uk)

If you are unhappy at any point during the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly – [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

[v1 / RPS / 8th November 2022]



## Appendix V – Consent form for experimental study

In order to participate in this study, we need to ensure that you understand the nature of the research, as outlined on the previous Participant Information Page [v1 / Prolific/RPS / 8<sup>th</sup> November 2022].

Please tick the boxes to indicate that you understand and agree to the following:

- ☐ I confirm that I have fully read and understood the Participant Information Page for this study. I have had the opportunity to consider the information and ask questions. Any questions have been answered in a satisfactory manner.
- ☐ I understand that in order to take part in this research, I must: live in the United Kingdom, be aged over 18 years, identify as a woman, and be able to read and write in fluent English.
- ☐ I understand that I should not take part in this study if I am pregnant or breastfeeding, have a history of eating disorders, or would likely feel distressed after thinking about my eating behaviour or body image.
- ☐ I understand that any personal data I provide, including my age, sex, ethnicity and body measurements will be processed confidentially.
- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time without having to give a reason, and without penalty.
- ☐ I understand that the data I provide in this study may be used in further research and presented in academic publications (e.g. journals or conferences) and that if it is used will be fully anonymised.
- ☐ I understand that this study involves completion of standardised tests but the results are not sufficient for any diagnostic purposes and that researchers cannot discuss individual test scores.
- ☐ I agree to take part in this study.

## **Appendix W – Debrief page for experimental study**

### **Prolific**

#### **Participant Debrief Page**

##### **Summary of project**

Thank you for taking the time to participate in this research project. This study aimed to explore whether a 2-minute writing task could help to reduce the sensation of 'feeling fat'. You were asked to imagine a scenario in which some people report greater sensations of 'feeling fat', and were then asked to either write about your feelings or a hobby.

The answers you provided at the start of the study will be used to see if there are individual differences in how people respond to the writing tasks.

Literature indicates that 'feeling fat' is an important construct in body image and eating behaviours, linked to unfavourable outcomes and poor psychological wellbeing. The overall purpose of this research is to identify brief ways to reduce the sensation of feeling fat in the general population.

The findings from this study will help to inform literature around 'feeling fat', and future interventions to help individuals from the general population who experience the sensation and associated unfavourable outcomes.

##### **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

If you need to talk to someone following the research:

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<https://www.beateatingdisorders.org.uk/support-services>

*Samaritans* | Helpline: 116 123 | Email: [jo@samaritans.org](mailto:jo@samaritans.org)  
<https://www.samaritans.org>

##### **If you want to withdraw from the study**

Your data will be kept confidentially on a password-protected university server, accessible only by the researcher and research supervisors. If you wish to withdraw your data after completing the study, you can do so using your Prolific ID code, anytime up until 31<sup>st</sup> January 2023.

## EATING IN RESPONSE TO EMOTIONS

To withdraw your data, please contact the researchers using the contact information provided below.

### **Katherine McAtamney**

Researcher

PhD Candidate in Psychology

Katherine.McAtamney@mail.bcu.ac.uk

### **Dr Deborah Wallis**

Lead Supervisor

Reader in Psychology

Deborah.Wallis@bcu.ac.uk

### **Any more questions?**

Thank you for taking part in this research project. If you have any further questions, please contact the researchers.

### **End of study**

Please see the below YouTube videos if you wish to watch any uplifting videos following this study.



## EATING IN RESPONSE TO EMOTIONS



You may now close the webpage.

[v1 / Prolific / 8th November 2022]

## **RPS**

### **Participant Debrief Page**

#### **Summary of project**

Thank you for taking the time to participate in this research project. This study aimed to explore whether a 2-minute writing task could help to reduce the sensation of 'feeling fat'. You were asked to imagine a scenario in which some people report greater sensations of 'feeling fat', and were then either asked to write about your feelings or a hobby.

The answers you provided at the start of the study will be used to see if there are individual differences in how people respond to the writing tasks.

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The findings from this study will help to inform literature around 'feeling fat', and future interventions to help individuals from the general population who experience the sensation and associated unfavourable outcomes.

#### **Further guidance**

If you are unhappy at any point because of the research, or if there is a problem, please contact the Business, Law & Social Sciences Faculty Ethics Committee directly at [blssethics@bcu.ac.uk](mailto:blssethics@bcu.ac.uk)

If you need to talk to someone following the research:

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<https://www.beateatingdisorders.org.uk/support-services>

*Samaritans* | Helpline: 116 123 | Email: [jo@samaritans.org](mailto:jo@samaritans.org)  
<https://www.samaritans.org>

#### **If you want to withdraw from the study**

Your data will be kept confidentially on a password-protected university server, accessible only by the researcher and research supervisors. If you wish to withdraw your data after completing the study, you can do so using your RPS code, anytime up until 31<sup>st</sup> January 2023.

## EATING IN RESPONSE TO EMOTIONS

To withdraw your data, please contact the researchers using the contact information provided below.

### **Katherine McAtamney**

Researcher

PhD Candidate in Psychology

Katherine.McAtamney@mail.bcu.ac.uk

### **Dr Deborah Wallis**

Lead Supervisor

Reader in Psychology

Deborah.Wallis@bcu.ac.uk

### **Any more questions?**

Thank you for taking part in this research project. If you have any further questions, please contact the researchers.

### **End of study**

Please see the below YouTube videos if you wish to watch any uplifting videos following this study.



## EATING IN RESPONSE TO EMOTIONS



You may now close the webpage.

[v1 / RPS / 8th November 2022]

## Appendix X – Ethical approval for experimental study



Faculty of Business, Law & Social Sciences Research Office  
Curzon Building, 4 Cardigan Street  
Birmingham  
B4 7BD

BLSSethics@bcu.ac.uk;

21/Dec/2022

Miss Katherine McAtamney

katherine.mcatamney@mail.bcu.ac.uk

Dear Katherine ,

**Re:** McAtamney /#11152 /sub1 /Am /2022 /Dec /BLSS FAEC - Testing the efficacy of a brief emotion identification and description intervention for the state sensation of feeling fat

Thank you for your application for approval of amendments regarding the above study. I am happy to take Chair's Action and approve these amendments.

Provided that you are granted Permission of Access by relevant parties (meeting requirements as laid out by them), you may continue your activity.

I can also confirm that any person participating in the project is covered under the University's insurance arrangements.

Please note that ethics approval only covers your activity as it has been detailed in your ethics application. If you wish to make any changes to the activity, then you must submit an Amendment application for approval of the proposed changes.

Examples of changes include (but are not limited to) adding a new study site, a new method of participant recruitment, adding a new method of data collection and/or change of Project Lead.

Please also note that the Committee should be notified of any serious adverse effects arising as a result of this activity.

If for any reason the Committee feels that the activity is no longer ethically sound, it reserves the right to withdraw its approval. In the unlikely event of issues arising which would lead to this, you will be consulted.

**Keep a copy of this letter along with the corresponding application for your records as evidence of approval.**

If you have any queries, please contact BLSSethics@bcu.ac.uk;

If you would like to provide feedback on the ethics process, please complete the feedback form using [this link](#).

I wish you every success with your activity.

Yours Sincerely,

Miss Nimrah Khan  
Research Ethics Officer

On behalf of the Business, Law and Social Sciences Faculty Academic Ethics Committee



## **Annexes**

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## Annex 1 – Conference Poster: RESFEST 2020

# EMOTIONAL EATING DURING COVID-19 IN THE UNITED KINGDOM: THE ROLES OF ALEXITHYMIA AND EMOTION DYSREGULATION



Katherine McAtamney | Supervised by Dr Deborah Wallis, Dr Helen Egan &amp; Dr Michael Mantzios

## Background

Social distancing is a key public health measure to prevent transmission of COVID-19, but may pose its own significant mental health and wellbeing risks<sup>1</sup>, with growing evidence for the negative impact on mental health and eating behaviours<sup>2,3</sup> and evidence from lockdowns in other countries reporting increased rates of emotional eating<sup>4,5,6</sup>. Emotional eating in response to negative emotions has been found to be associated with poorer wellbeing, greater eating disorder symptomatology, and difficulties in emotional regulation<sup>7</sup>. Emotion dysregulation has been identified as a moderator strengthening the relationship between negative emotional eating and disordered eating<sup>8</sup>.

Alexithymia is a personality trait characterised by difficulties identifying and describing feelings<sup>9</sup>, and it is related to poorer therapeutic outcomes transdiagnostically. Emerging evidence indicates that alexithymia relates to emotional eating<sup>10,11,12</sup>, but the exact mechanisms have not been determined. Teaching emotion regulation skills may result in decreased emotional eating<sup>13</sup>, but the ability to identify and understand emotions is a necessary prerequisite to developing adaptive emotion regulation skills<sup>14</sup>.

## Results

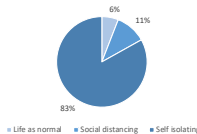
T tests were employed to test for differences between those who reported changes in the amount eaten over the previous week during the lockdown period (i.e. more or less food), and those who did not. Those who reported a change in the amount eaten also reported: **more depression** –  $t(134) = 2.56, p = .012, d = 0.44$ ; **greater difficulty identifying feelings** –  $t(134) = 2.25, p = .026, d = 0.39$ ; **greater emotional eating urges in response to depression** –  $t(134) = 2.28, p = .024, d = 0.40$ ; and, **greater emotional eating behaviour in response to sadness** –  $t(134) = 2.06, p = .042, d = 0.35$ .

A regression-based approach to mediation was employed to explore the direct and indirect effects of DIF and DDF on emotional eating. All analyses were controlled for gender, age, BMI and reported change in amount eaten. First, DIF was entered as the predictor, DERS as the mediator, and EES as the outcome. No direct effects were shown, but a significant indirect effect was identified. Next, DDF was entered as the predictor. Again, no direct effect but a significant indirect effect was found.

## Aims

1. To explore perceived changes in eating behaviour and self-reported negative affect during the COVID-19 lockdown
2. To examine the direct and indirect effects of affective characteristics of alexithymia on emotional eating via emotion dysregulation

Situation over the previous week:



Amount of food eaten over the previous week:

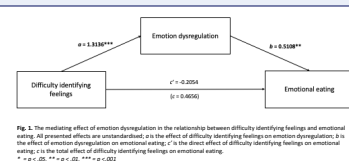
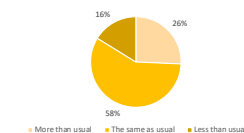


Fig. 1. The mediating effect of emotion dysregulation in the relationship between difficulty identifying feelings and emotional eating. All presented effects are unstandardized,  $\beta$  is the effect of difficulty identifying feelings on emotion dysregulation,  $\beta$  is the effect of emotion dysregulation on emotional eating,  $\beta$  is the direct effect of difficulty identifying feelings on emotional eating.  $^* p < .05$ ,  $^{**} p < .01$ ,  $^{***} p < .001$ .

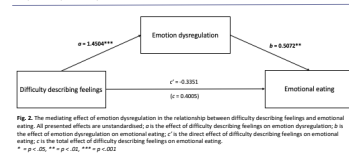


Fig. 2. The mediating effect of emotion dysregulation in the relationship between difficulty describing feelings and emotional eating. All presented effects are unstandardized,  $\beta$  is the effect of difficulty describing feelings on emotion dysregulation,  $\beta$  is the effect of emotion dysregulation on emotional eating,  $\beta$  is the direct effect of difficulty describing feelings on emotional eating.  $^* p < .05$ ,  $^{**} p < .01$ ,  $^{***} p < .001$ .

## Methodology

**Design.** A cross-sectional questionnaire-based quantitative design was used.

**Participants.** One hundred and fifty-eight participants were recruited via social media and recruitment platform, Prolific. Twenty two participants were removed from the final sample due to inaccurate or missing data. The final sample ( $n=136$ ) were 65% female (35% male, 1% prefer not to say), 83% White (5% Mixed/multiple ethnic groups, 4% Asian, 4% Black, 4% Other ethnic group), and 61% had at least an undergraduate degree level of education.

**Procedure.** Participants completed an online questionnaire hosted by Qualtrics. It comprised demographic questions, questions about their situation and eating behaviours during COVID-19 lockdown at time of completion (July, 2020), and a battery of measures for psychological variables and emotional eating.

**Measures.** Toronto Alexithymia Scale (TAS-20<sup>15</sup>); Difficulties in Emotion Regulation Scale (DERS<sup>16</sup>), Emotional Eating Scale (EES<sup>17</sup>), Salzburg Emotional Eating Scale (SEES<sup>18</sup>) and DASS-21 (Depression, Anxiety, and Stress Scale<sup>19</sup>)

## Discussion

**Summary of findings. (Aim 1)** Those who reported a change in the amount of food eaten also reported significantly greater depression, and greater emotional eating urges and behaviours in response to depression/sadness over the same period. They also reported higher levels of DIF. Emotional eating in response to depression is the most closely related to poorer psychological outcomes<sup>7</sup>, so it is important to understand mechanisms behind emotional eating. **(Aim 2)** There were indirect effects of DIF and DDF on emotional eating urges via emotion dysregulation. Greater impairment in identifying/describing feelings predicts greater difficulties in emotion regulation, which in turn predict greater emotional eating urges in response to negative emotions during the lockdown period.

**Limitations.** Cross-sectional design limits inference of causation in the mediation models. Self-reported emotional eating is subject to bias and inaccurate recall, and there is criticism for the self-report nature of the TAS-20.

**Conclusions.** This is the first study to examine the effects of alexithymia on emotional eating in the general population. It offers an insight into self-reported changes to eating behaviours during the COVID-19 pandemic in the UK.

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## Annex 2 – Conference Poster: BFDG 2021, RESJAM 2022

# SELF-REPORTED EMOTIONAL EATING: THE ROLES OF ALEXITHYMIA AND EMOTION DYSREGULATION

Katherine McAtamney | Supervised by Dr Deborah Wallis, Dr Helen Egan & Dr Michael Mantzios  
School of Social Sciences, Birmingham City University, Cardigan Street, Birmingham, B4 7DB, United Kingdom  
Katherine.McAtamney@mail.bcu.ac.uk

## Background

Eating in response to negative emotions has been associated with poorer wellbeing, greater eating disorder symptomatology, and difficulties in emotional regulation<sup>1</sup>. Alexithymia is a personality trait partially characterised by difficulties identifying (DIF) and describing feelings (DDF)<sup>2</sup>, and there is emerging evidence that alexithymia relates to emotional eating<sup>3,4,5</sup>. However, the mechanisms driving this relationship have yet to be determined. Teaching emotion regulation skills may result in decreased emotional eating<sup>6</sup>, but the ability to identify and understand emotions is a necessary prerequisite to developing adaptive emotion regulation skills<sup>7</sup>. It is important to understand the relationship between alexithymia and emotional eating, and elucidate the role of emotion dysregulation, in order to inform future emotional eating support for individuals who have difficulties identifying and describing their feelings.

**Aim.** To examine the direct and indirect effects of difficulty identifying and difficulty describing feelings on emotional eating via emotion dysregulation.

## Methodology

**Design.** A cross-sectional questionnaire-based quantitative design was used. Data were collected in July 2020.

**Participants.** One hundred and fifty-eight participants were recruited via social media and recruitment platform, Prolific. Twenty two participants were removed from the final sample due to inaccurate or missing data. The final sample (n=136) were 65% female (35% male, 1% prefer not to say), 83% White (5% Mixed/multiple ethnic groups, 4% Asian, 4% Black, 4% Other ethnic group), and 61% had at least an undergraduate degree.

**Procedure.** Participants completed a online questionnaire hosted by Qualtrics. They completed a battery of measures for psychological variables and emotional eating, followed by demographic questions.

**Measures.** Alexithymia was measured with the Toronto Alexithymia Scale (TAS-20<sup>8</sup>); emotion dysregulation was measured with the Difficulties in Emotion Regulation Scale (DERS<sup>9</sup>); Self-reported emotional eating urges were measured with the Emotional Eating Scale (EES<sup>10</sup>).

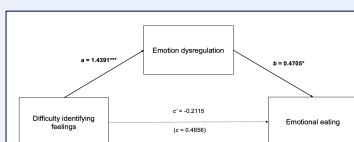


Fig. 1. The indirect effect of difficulty identifying feelings on emotional eating via emotion dysregulation.

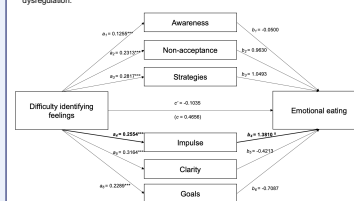


Fig. 2. Exploration of the indirect effect of difficulty identifying feelings on emotional eating via the six subscales of difficulties in emotion regulation.

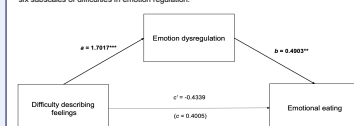


Fig. 3. The indirect effect of difficulty describing feelings on emotional eating via emotion dysregulation.

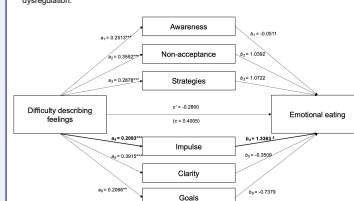


Fig. 4. Exploration of the indirect effect of difficulty describing feelings on emotional eating via the six subscales of difficulties in emotion regulation.

All presented effects are unstandardised;  $\beta_1$  is the effect of difficulty identifying/describing feelings on emotion dysregulation/subscales;  $\beta_2$  is the effect of emotion dysregulation/subscales on emotional eating;  $c'$  is the direct effect of difficulty identifying/describing feelings on emotional eating;  $c$  is the total effect of difficulty identifying/describing feelings on emotional eating.  
\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

## Results

A regression-based approach to mediation was employed to explore the direct and indirect effects of DIF and DDF on emotional eating. All analyses were controlled for gender, age, BMI and reported change in amount eaten compared to before the pandemic. First, DIF subscale of the TAS-20 was entered as the predictor, total DERS score as the mediator, and total EES score as the outcome. No direct effects were shown, but a significant indirect effect was identified. Next, DDF subscale of the TAS-20 was entered as the predictor. No direct effects were shown, but a significant indirect effect was found.

Further analyses were conducted to explore if any particular subscales of emotion dysregulation were driving these indirect effects. Parallel mediation models were conducted using the six subscales of the DERS, with EES as the outcome, entering first DIF as the predictor and then DDF as the predictor. Both of these further analyses identified the potential role of the subscale *impulse control difficulties*, for which the indirect effects approached significance.

## Discussion

**Limitations.** Cross-sectional design limits inference of causation in the mediation models, although alternate models were tested with no direct or indirect effects identified. Self-reported emotional eating is subject to bias and inaccurate recall (e.g. triple recall bias<sup>11</sup>).

**Future research and implications.** Investigate the potential role of impulse control difficulties in the relationship between alexithymia and emotional eating. Emotional eating support should consider identifying and describing feelings, before targeting emotion regulation.

**Conclusions.** Findings of this study indicate that greater difficulties identifying or describing feelings predict greater emotion dysregulation, which in turn predicts greater urges to eat in response to negative emotions. Impulse control difficulties may drive these indirect effects.

<sup>1</sup> Braden, Muehlenberger, Wattard, & Enley (2018). *Appetite*, 125, 410–417. doi: 10.1016/j.appet.2018.02.022

<sup>2</sup> Taylor & Bagby (2005). In Bar-On & Parker (eds) *The Handbook of Emotional Intelligence* (pp. 41–67).

<sup>3</sup> Larsen et al. (2008). *The International Journal of Eating Disorders*, 38(5), 368–376. doi: 10.1002/eat.20449

<sup>4</sup> Chouin, van Boven, & van Leeuwen (2009). *Appetite*, 52(2), doi: 10.1016/j.appet.2009.06.001

<sup>5</sup> Proulx, Chénier, Simon, Lussier, & Barthe (2003). *Clepsy Research*, 11(2), 195–201. doi: 10.1038/eat.2003.31

<sup>6</sup> Roosen, Suter, Adler, Calabro, & van Erpen (2012). *Nutrition Hospital*, 27(4), 1141–1147. doi: 10.33394/2012.27.4.5843

<sup>7</sup> Vine & Allan (2014). *Journal of Social and Clinical Psychology*, 33(4), 319–342. doi: 10.1027/s12801.0000000000000001

<sup>8</sup> Bagby, Parker, & Taylor (1994). *Journal of Psychosomatic Research*, 38(1), 23–32. doi: 10.1016/0272-7355(94)90005-1

<sup>9</sup> Kaufman, Xia, Fucini, Yagcioglu, Skidmore, & Crowell (2016). *Journal of Psychopathology and Behavioral Assessment*, 38(3), 443–455. doi: 10.1007/s10862-016-9529-3

<sup>10</sup> Anon, Kennedy, & Agnew (1995). *International Journal of Eating Disorders*, 18(1), 79–90. doi: 10.1002/1098-108X(199507)18:1<79::AID-EAT2200180109>3.0.CO;2-V

<sup>11</sup> Evers, de Ridder, & Adriaens (2009). *Health Psychology*, 28(6), 717–725. doi: 10.1037/a0016700



## Annex 3 – Conference Poster: MHPN 2022

# HOW DO INDIVIDUALS WITH AND WITHOUT ALEXITHYMIA REPORT EATING IN RESPONSE TO EMOTIONS? A THINK ALOUD STUDY WORK IN PROGRESS

Katherine McAtamney, Dr Helen Egan, Dr Michael Mantzios, & Dr Deborah Wallis  
School of Social Sciences, Birmingham City University, Cardigan Street, Birmingham, B4 7DB, United Kingdom  
Katherine.McAtamney@mail.bcu.ac.uk

## Background

Emotional eating research may involve a triple recall bias, as individuals need to accurately recall<sup>1</sup>:

1. Negative emotions
2. Food intake
3. The association between both

Alexithymia is a trait characterised by difficulties identifying and describing feelings, and is associated with emotional eating. A recent systematic review highlighted a reduction in explicit memory for emotional information in individuals with alexithymia<sup>2</sup>.

This may exacerbate the recall biases that emotional eating measures face.

## Aims

What are people thinking when they complete emotional eating scales?

1. General population?
2. Alexithymic population?

12:29

BIRMINGHAM CITY University

**Record** **Submit**

Powered by Phonic

Please indicate the answer that applies to you by selecting the appropriate response box from the 5 options. **Please remember to think out loud for the entire time.**

**Do you have the desire to eat when you are irritated?**

Never ☐

Rarely ☐

Sometimes ☐

Often ☐

Very Often ☐

<sup>1</sup>Evans et al. (2009). *Health Psychology*, 28(6). Doi: 10.1037/a0016700  
<sup>2</sup>Appelk & Jäger (2019). *Dement Neuropsychol*, 13(1). Doi: 10.1500/1980-57642018n13-010003  
<sup>3</sup>Van Strien et al. (1989). *International Journal of Eating Disorders*, 9(2). Doi: 10.1002/1098-108X(198902)9:2<295::AID-EAT2280090208>3.0.CO;2-1  
<sup>4</sup>Bagby et al. (1994). *Journal of Psychosomatic Research*, 36. Doi: 10.1016/0272-7359(94)90005-1  
<sup>5</sup>French et al. (2007). *Journal of Health Psychology*, 24(5). Doi: 10.1177/1359103007073174  
<sup>6</sup>van der Cuij et al. (2011). *British Journal of Health Psychology*, Doi: 10.1348/135910710X000819  
<sup>7</sup>Angus et al. (2016/2020). *J. Health Psychol.*, 25(12). Doi: 10.1177/1359103116281942

## Materials and Methodology



A think aloud protocol is being followed, and adapted for online data collection by integrating the microphone function of *phonic* into the questionnaire hosted on *Qualtrics*.

Participants are asked to think every thought aloud whilst completing an emotional eating scale. The DEBQ-EE<sup>3</sup> is the most commonly used measure of self-reported emotional eating behaviour in the alexithymia literature, therefore used for this study. The TAS-20<sup>4</sup> scale is used to assess the presence of alexithymic traits – this was completed as normal.

The study is advertised on social media, including alexithymia related fora. We are aiming for  $n = 15$  within each group.

## Analysis

Responses will be transcribed and the coding framework developed iteratively during analysis, considering frameworks utilised in previous think aloud studies<sup>5,6,7</sup>. Two authors will independently code the data, and agreement will be calculated (Cohen's  $\kappa$ ).

### Example coding framework<sup>7</sup>:

1. No problems (i.e. thought aloud)
2. Missing or insufficient thinking aloud
3. Re-read or stumbled in reading
4. Difficulty generating an answer
5. Difficulty with the response format
6. Questioned content (wording issue)
7. Confusion or misinterpretation
8. Incongruent response (written and verbal)



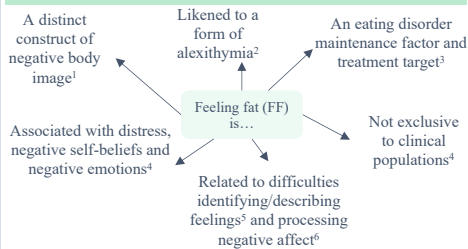
## Annex 4 – Conference Poster: BFDG 2023

# Testing a Brief Intervention for the State Sensation of Feeling Fat: Emotion Identification and Description

McAtamney K.<sup>1</sup>, Mantzios, M.<sup>1</sup>, Egan, H.<sup>1</sup>, Pink, A. E.<sup>2,3</sup>, Williams, C.<sup>3</sup>, & Wallis, D. J.<sup>1</sup>

<sup>1</sup>Birmingham City University, <sup>2</sup>A\*STAR Singapore, <sup>3</sup>Swansea University

## 1. Background



Self-compassion (SC) is inversely linked to many aspects of negative body image and eating disorder symptomatology<sup>7</sup>, and those with greater SC may better differentiate negative emotions<sup>8</sup> and be protected against adverse outcomes of shape and weight overvaluation<sup>9</sup>. However, the association between FF and SC is unclear.

Emotion dysregulation moderates the effect of FF on disordered eating behaviours, so improving emotion regulation may benefit the relationship between FF and disordered eating<sup>10</sup>. However, targeting adaptive emotion regulation logically requires first identifying/describing the emotion<sup>11</sup>. Existing approaches to target FF address emotions underpinning the sensation, but these are situated within clinical contexts and long-term interventions<sup>12,13</sup>.

## 2. Aims

1. Examine the relationship between FF and SC
2. Test a brief intervention to reduce state FF
3. Explore if specific traits moderate intervention efficacy

## 3. Methods

**Design.** Experimental. For Open Science Framework preregistration and audio pitch of this poster, scan:



**Participants.** 188 women aged 19-75 ( $M = 38.18$ ;  $SD = 13.69$ ) were recruited via Prolific and a university platform.

**Procedure.** Informed consent → trait and state measures of FF and mood → FF manipulation → state measures → randomised to intervention conditions → state measures → demographic information.

**Data analysis.** Pearson's correlations (trait measures), one-way ANCOVA (covariate BMI) with FF as the outcome to detect differences across intervention condition, and moderation analyses (traits as moderators)

## 6. Discussion

**Aim 1.** Negative relationship between FF and SC in a non-clinical sample of women, aligning with previous research into the relationship between FF and other aspects of body image.

**Aim 2.** Neither intervention condition were more effective at reducing FF than the control, and the control condition resulted in significant improvements in common mood states. Whilst not significant, the greatest mean reduction in FF was seen in the control condition. Future research should explore the potential role of positive distraction for FF within non-clinical populations.

## 4. Materials

**Traits.** Body Attitudes Questionnaire feeling fat subscale (BAQ-FF<sup>14</sup>), Toronto Alexithymia Scale (TAS-20<sup>15</sup>); Self Compassion Scale (SCS<sup>16</sup>)

**States.** "How  $x$  do you currently feel?" – five moods, visual analogue scale (0-100).

**FF manipulation:** A negative self-comparison vignette<sup>5</sup> to induce FF.

**FF intervention:** Participants were asked to write for 1-2 minutes. Wording was informed by the CBT-E manual<sup>12</sup> and previous writing intervention studies<sup>17</sup>.

- Condition 1:** Emotion identification and description with a visual prompt of the Feelings Wheel
- Condition 2:** Emotion identification and description without visual prompt
- Condition 3:** Control task (hobbies)

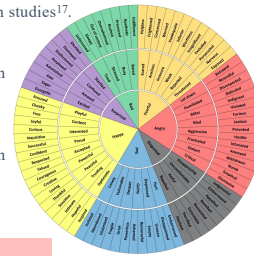
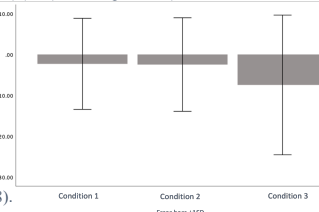


Image provided by G. Roberts

## 5. Results

**Aim 1.** SCS negatively correlated with BAQ-FF ( $r(186) = -.348, p < .001$ ) and TAS-20 ( $r(186) = -.634, p < .001$ ). BAQ-FF positively correlated with TAS-20 ( $r(186) = .208, p = .002$ ). Only BAQ-FF significantly correlated with BMI ( $r(178) = .671, p < .001$ ).

**Aim 2.** Controlling for BMI, no significant difference in FF change scores across conditions, ( $F(2,164) = .847, p = .738, \eta^2 = .248$ ).



Significant differences across conditions for mood:

- Happy ( $F(2,185) = 7.78, p < .001, \eta^2 = .078$ )
- Calm ( $F(2,185) = 16.56, p < .001, \eta^2 = .152$ )
- Sad ( $F(2,185) = 9.44, p < .001, \eta^2 = .093$ )
- Anxious ( $F(2,185) = 10.35, p < .001, \eta^2 = .101$ )
- Stressed ( $F(2,185) = 6.42, p = .002, \eta^2 = .065$ )

The control condition saw the greatest increase in happy ( $M = 11.27, SD = 2.67$ ) and calm mood ( $M = 13.55, SD = 2.70$ ), and greatest decrease in sad ( $M = -10.19, SD = 2.32$ ), anxious ( $M = -9.42, SD = 2.20$ ) and stress mood ( $M = -8.07, SD = 2.36$ ).

**Aim 3.** The overall models were not significant:

- BAQ-FF ( $R^2 = .03, F(4,165) = 1.44, p = .224$ ).
- TAS-20 ( $R^2 = .03, F(4,165) = 1.46, p = .219$ ).
- SCS ( $R^2 = .04, F(4,165) = 1.76, p = .139$ ).

**Aim 3.** Trait FF, alexithymia and SC did not moderate intervention efficacy.

**Limitations.** States were measured immediately after the intervention, so longer term effects are unclear. Single-item scales may limit present findings. The sample was female, British and predominantly white (89.9%), limiting generalisability of findings.

<sup>1</sup> Lunden et al. (2018) *Body Image*, 23, 163-167.

<sup>2</sup> <https://doi.org/10.1016/j.bodyim.2018.04.001>

<sup>3</sup> Andersen (2000) *Eat. Disord.* 8(2), 167-169.

<sup>4</sup> <https://doi.org/10.1080/10640260008251223>

<sup>5</sup> Mehak & Racine (2020) *Int. J. Eat. Disord.* 53(9), 1400-1404.

<sup>6</sup> <https://doi.org/10.1002/eat.23336>

<sup>7</sup> Cooper et al. (2007) *European Eat. Disord. Review*, 15(5), 366-372.

<sup>8</sup> <https://doi.org/10.1002/eat.23336>

<sup>9</sup> Pink et al. (2021) *Physiology & Behavior*, 239.

<sup>10</sup> <https://doi.org/10.1016/j.physbeh.2021.113501>

<sup>11</sup> Major et al. (2019) *European Journal of Psychotherapy and Counselling*, 21(1), 52.

<sup>12</sup> <https://doi.org/10.1080/13642537.2018.1563909>

<sup>13</sup> Braun et al. (2016) *Body Image*, 17, 117-131.

<sup>14</sup> <https://doi.org/10.1016/j.bodyim.2016.03.003>

<sup>15</sup> Galili-Weinstein et al. (2019) *The Journal of Positive Psychology*.

<sup>16</sup> <https://doi.org/10.1080/17439760.2019.1627396>

<sup>17</sup> Duarte et al. (2017) *Clinical Psychology and Psychotherapy*, 26(4).

<sup>18</sup> <https://doi.org/10.1002/cpp.2094>

<sup>19</sup> Mehak et al. (2022) *Eating Behaviours*, 4.

<sup>20</sup> <https://doi.org/10.1016/j.eatbeh.2022.101597>

<sup>21</sup> Vine & Aldao (2014) *Journal of Social and Clinical Psychology*, 33(4), 319-342.

<sup>22</sup> <https://doi.org/10.1521/jsep.2014.33.4.319>

<sup>23</sup> Fairburn (2008) *Guildford Press* New York.

<sup>24</sup> Calugi et al. (2018) *Behaviour Research & Therapy*, 105, 63-68.

<sup>25</sup> <https://doi.org/10.1016/j.brat.2018.04.001>

<sup>26</sup> Beau-Tremblay & Walker (1991) *Psychol. Med.*, 21(3), 775-784.

<sup>27</sup> <https://doi.org/10.1017/S0033291700022406>

<sup>28</sup> Bagby et al. (1994) *Journal of Psychosomatic Research*, 38(1), 23-32.

<sup>29</sup> [https://doi.org/10.1016/0022-3999\(94\)90005-1](https://doi.org/10.1016/0022-3999(94)90005-1)

<sup>30</sup> Neff (2003) *Self & Identity*, 3(3), 223-250.

<sup>31</sup> <https://doi.org/10.1080/1528860309027>

<sup>32</sup> Moffitt et al. (2018) *Body Image*, 27, 67-76.

<sup>33</sup> <https://doi.org/10.1016/j.bodyim.2018.08.008>

## **Annex 5 – Appetite Manuscript: cross-sectional study 1**

### **Emotional eating during COVID-19 in the United Kingdom: exploring the roles of alexithymia and emotion dysregulation**

Katherine McAtamney<sup>a</sup>, Dr Michail Mantzios<sup>a</sup>, Dr Helen Egan<sup>a</sup>, Dr Deborah J. Wallis<sup>a\*</sup>

<sup>a</sup>Department of Psychology, Schools of Social Sciences, Birmingham City University, Cardigan Street, Birmingham, United Kingdom, B4 7DB

**Keywords:** alexithymia; emotion dysregulation; emotional eating; pandemic; mediation

#### **Abstract**

Emotional eating, loosely defined as overeating in response to negative emotions, has been associated with poor physical and psychological outcomes. During a time of heightened negative affect, it is important to understand the impact of the COVID-19 pandemic and associated lockdown measures on eating behaviours, and further elucidate the ways in which emotional eating is related to emotion dysregulation and impaired abilities to identify emotions (i.e. alexithymia). The aims of this study were to explore perceived changes in eating behaviours in relation to self-reported negative affect during the pandemic and to examine direct and indirect effects of alexithymia on emotional eating. An online questionnaire measured these constructs in the general population of the United Kingdom (n = 136). Findings demonstrated that those who reported changes to their eating behaviours during the pandemic also reported greater levels of depression during the same time frame. Mediation analyses revealed that difficulties identifying and describing feelings both predicted emotional eating indirectly via emotion dysregulation. Findings contribute to the understanding of the mechanisms underpinning the relationship between alexithymia and emotional eating and describe changes to eating behaviours during COVID-19. We discuss how these findings should be applied, and recommendations for future research.

## 1. Introduction

The novel coronavirus disease (COVID-19) is an infectious respiratory virus, declared a global pandemic on 11<sup>th</sup> March, 2020 (World Health Organization, 2020). As a result of implemented lockdowns to prevent transmission, movements and interactions have been limited with significant impacts upon daily routines (Brooks et al., 2020; Lima et al., 2020). Government guidance in the United Kingdom included explicit recommendations to avoid face-to-face interactions and gatherings with friends and family (Public Health England, 2020). This social distancing is a key public health measure to prevent transmission of COVID-19, but may pose its own significant mental health and wellbeing risks (Lades et al., 2020). A panel study collecting weekly data of over 90,000 adults found that 35% of respondents reported their recent mental health to be worse than compared to usual before lockdown (Fancourt et al., 2020b). Previous research has demonstrated that disordered eating behaviour in the general population can be triggered by feelings of boredom and loneliness (Bruce & Agras, 1992), and distress following a disaster (Kuijer & Boyce, 2012). Research exploring impacts of COVID-19 lockdown measures on the general population found a third of individuals with no history of eating disorders reported increased binge eating behaviours compared to before the pandemic (Phillipou et al., 2020), and 17% of adults in the United Kingdom reported eating more food than usual, while 23% reported eating less healthfully than usual (Fancourt et al., 2020a).

These changes may reflect emotional eating behaviours, due to lockdown measures eliciting feelings of isolation and distress (Brooks et al., 2020). Cross-sectional studies conducted during the primary lockdown periods in various countries have explored self-reported emotional eating. One study compared samples in Spain and Greece, finding that despite disparity in severity of lockdown measures, both groups reported greater emotional eating than pre-pandemic community samples, with no significant difference in emotional eating levels between groups in each country (Papandreou et al., 2020). An Italian study found that half of respondents reported using food as a means of comfort in response to anxious states, increasing their food intake to feel better, and feeling anxious due to their current eating habits; within the sample, female respondents declared themselves to be more prone to these described behaviours (Di Renzo et al., 2020). This was also demonstrated in another Italian study, which found half of their sample felt they had modified their dietary habits during the lockdown, with 42% attributing an increase in food intake to higher anxiety levels (Scarmozzino & Visioli, 2020). An American study reported that perceived stress was

significantly correlated with emotional eating during the pandemic, and that self-reported emotional eating mediated identified associations between perceived stress and food choice motives of mood, convenience, sensory appeal, price and familiarity (Shen et al., 2020). It also discusses the role of comfort food during previous crises, with eating's role in alleviating stress and improving mood (see Shen et al., 2020). Situational explanations for increased emotional eating during this time may also include the fact that it is found to be more frequent when individuals are alone and eating at home (Baumeister et al., 1994).

Emotional eating, as “the tendency to overeat in response to negative emotions” (van Strien et al., 2007, p. 106) is considered an atypical stress response, compared to the typical response of not eating (Gold & Chrousos, 2002). Emotional eating may be problematic for physical health, as negative affect and distress are associated with increased quantity of consumed snacks (O'Connor & O'Connor, 2004; Oliver & Wardle, 1999; van Strien, Herman, & Verheijden, 2012) and less healthful choices such as opting for sweet and fatty foods (Oliver et al., 2000; Wallis & Hetherington, 2009; Zellner et al., 2006). Psychological implications of emotional eating are reported from findings which suggest that eating in response to anxiety, anger, boredom and particularly depression was found to be associated with poorer wellbeing, greater eating disorder symptomatology and difficulties in emotion regulation (Braden et al., 2018; Geliebter & Aversa, 2003; Meule et al., 2018; Nolan et al., 2010). Overeating in response to positive emotions has also been observed (Cardi et al., 2015; Evers et al., 2013), but this was not found to be related to the poorer physical and psychological outcomes implicated in negative emotional eating and may instead represent a functional, healthy eating style (Braden et al., 2018; Geliebter & Aversa, 2003; Meule et al., 2018; Nolan et al., 2010). Eating in response to negative and positive emotions may represent different constructs (van Strien et al., 2013), and predict overeating via different mechanisms (Sultson et al., 2017). There is a need to understand the mechanisms underlying emotional eating, particularly the atypical and potentially problematic response of eating in response to negative emotions.

Theories of emotional eating include the psychosomatic theory which posits that poor interoceptive awareness relates to an inability to recognise hunger and satiety signals and distinguish these from other bodily sensations (Bruch, 1973), resulting in eating in response to sensations such as emotional arousal. The homeostatic theory of obesity posits a circle of discontent involving increased body dissatisfaction, negative affect, and subsequent consumption of energy dense foods (Marks, 2015). Research demonstrated that negative affect is associated with emotional eating urges, which in turn predict worsened negative



affect (Haedt-Matt et al., 2014), partially reflecting this reciprocal model. Emotional eating has been related to an increase in sweet, fatty foods in response to stress (Oliver et al., 2000), although experimental research pinpointed increased food intake only in response to ego-threat stressors (Wallis & Hetherington, 2004), highlighting that emotional eating may function to alleviate negative *self-focused* emotions (Adam & Epel, 2007). This aligns with escape theory that describes eating to avoid aversive self-awareness and emotional distress (Heatherton & Baumeister, 1991). Integral to all theories of emotional eating is the role of emotion dysregulation, or difficulties in emotion regulation; these terms are used interchangeably. Gratz and Roemer (2004) proposed a model of emotion regulation which describes a multidimensional construct involving: the awareness, understanding and acceptance of emotions; the flexible use of non-avoidant, situationally appropriate strategies to modulate intensity and duration of emotion responses to meet desired goals and situational demands; and, the willingness to experience negative emotions. The relative absence of any of these abilities indicate difficulties in emotion regulation. Maladaptive emotion regulation, such as persistent avoidance or control of emotion (Gratz, Dixon, Kiel, & Tull, 2018), is thought to function to regulate emotions when putatively adaptive strategies are unavailable (Gratz, 2003). The role of emotion dysregulation is supported in loss-of-control eating (Kenardy et al., 1996) and disordered eating (Lavender & Anderson, 2010; Whiteside et al., 2007), with greater reports of bingeing and purging behaviours accompanying distress (Racine & Wildes, 2013). Emotion dysregulation has been identified as a moderator in the relationship between emotional eating and disordered eating, with difficulties in emotion regulation strengthening the relationship between negative emotional eating and disordered eating (Barnhart et al., 2021), and not positive emotional eating.

Alexithymia is a personality trait present in around 10% of the general population (Honkalampi et al., 2017), which conceptually overlaps with both emotion dysregulation and components of interoception (van Strien & Ouwers, 2007; Zamariola et al., 2018). Salient features are: (a) difficulty identifying feelings and distinguishing these from other bodily sensations; (b) difficulty describing feelings to others; (c) constricted imaginal processes; and, (d) a stimulus-bound, externally-oriented cognitive style (Taylor & Bagby, 2000). The impaired ability to distinguish feelings from other bodily sensations is conceptually similar to poor interoception and a diminished recognition and interpretation of bodily sensations (Murphy et al., 2018), as identified in the psychosomatic theory of emotional eating (Bruch, 1973). A recent review proposed alexithymia and emotion dysregulation among possible mechanisms of emotional eating (van Strien, 2018), yet the relationship between alexithymia

and emotional eating has not been extensively researched. Significant positive relationships have been identified between these constructs, more specifically between emotional eating and the affective characteristics of difficulty identifying and describing feelings (Larsen van Strien, Eisinga, & Engels, 2006; Ouwens, van Strien, & van Leeuwe, 2009; Pink, Lee, Price and Williams, 2019). Emotional eating was found to be significantly predicted by difficulty identifying feelings in individuals with binge eating disorder (Pinaquy, Chabrol, Simon, Louvet, & Barbe, 2003), and experimental findings with student samples suggest those with difficulties identifying and describing their feelings showed more stress-induced eating (van Strien & Ouwens, 2007). Proposed pathways between these variables include the reported significant indirect effect of depression on emotional eating via difficulty identifying feelings (Ouwens et al., 2009), however, alexithymia as a relatively stable personality trait (Norman et al., 2019) may not make a suitable mediating variable for informing interventions to assist with emotional eating (Fiedler et al., 2018). Pink et al. (2019) aimed to understand the role of alexithymia as an explanatory mechanism in emotional eating to explain body mass index (BMI) variability. The model identified a significant indirect effect of affective characteristics of alexithymia via negative affect (measured as anxiety), and via negative urgency and emotional eating, in a student sample. A self-replication study within a general population sample demonstrated that negative affect (as measured by both depression and anxiety) played roles in the indirect effect of alexithymia on BMI (Pink et al., 2019). Their findings also indicated that the characteristic of difficulty identifying feelings could be a key facet of alexithymia in relation to emotional eating. This model did not provide decisive mechanisms that underpin the relationship between alexithymia and emotional eating in the general population, but has methodological strengths stemming from its use of a self-replication study.

How alexithymia relates to emotional eating remains unclear. Two theoretical mechanisms have been proposed: (1) alexithymia as a deficit of interoception results in insensitivity to satiety cues, thus eating in response to bodily sensations that are not hunger such as emotional arousal; and (2) eating to regulate negative affective states common in alexithymia, thus emotional eating represents maladaptive regulation of those emotions. These mechanisms are not necessarily mutually exclusive (Lyvers, Brown, & Thorberg, 2019), and logically may both be supported through learning to identify and respond to emotions adaptively. The ability to identify and understand emotions is a necessary prerequisite to developing adaptive emotion regulation skills (Vine & Aldao, 2014). It has been suggested that teaching emotion regulation skills could result in decreased emotional

eating (Roosen et al., 2012), however, for individuals with higher levels of affective alexithymic characteristics and associated deficits, focusing on these aspects must precede targeting emotion.

The relationship between alexithymia and eating behaviours in response to emotion is logical, to regulate emotions first requires a level of emotion processing. Individuals with alexithymia experience an impaired ability to process emotions at an affective and cognitive level, captured by the characteristics of alexithymia (Goerlich, 2018). Therefore, emotion dysregulation may underpin the relationship between alexithymia and emotional eating; individuals with higher levels of alexithymia experience problems with processing and subsequently regulating emotions (Barrett et al., 2001), increasing the risk of developing conditions characterised by (Goerlich, 2018) or behaviours associated with emotion dysregulation. It is important to examine alexithymia and emotion dysregulation to understand the relationship between them, and how they relate independently and synergistically with other constructs such as emotional eating. There is growing consensus for conceptualising alexithymia as a personality trait with relative, rather than absolute stability. This means whilst levels can fluctuate, individual differences remain similar over time (Norman et al., 2019), and it is unlikely to be affected through interventions (Iancu et al., 2006; Schmidt et al., 1993). Therefore, theoretically it would have temporal precedence and as such be a predictor when examining the direct and indirect effects on targetable skills such as emotion regulation and behaviours such as emotional eating (Fiedler et al., 2018).

There is a need to understand how people respond to, and cope with, the threat of a global pandemic (Arden & Chilcot, 2020). As emotional eating is underpinned by maladaptively regulating emotions, exhibited behaviours may differ during these times which may elicit greater feelings of isolation and distress in the general population (Brooks et al., 2020). Although a level of stress is essentially unavoidable when facing a pandemic, wellbeing remains key to supporting and facilitating good health (Vieira et al., 2020) and preventing negative effects on psychological wellbeing should be considered a marker of a successful lockdown to support public health (Brooks et al., 2020). Therefore, there is a need to provide understanding and information to individuals, communities, and healthcare providers to support healthy behaviours during lockdowns (Balanzá-Martínez et al., 2020). Alexithymia is typically a risk factor for poorer outcomes in therapeutic eating interventions (Pinna et al., 2015), and specifically the characteristic of difficulty identifying feelings was found to be a significant negative predictor of treatment outcomes (Speranza et al., 2007).

Exploring specific mechanisms of emotional eating in individuals with greater levels of alexithymia is important for supporting these individuals.

There were two aims of the current study. Firstly, to explore perceived changes in eating behaviour and self-reported negative affect during the COVID-19 lockdown, to understand the impact on individuals within the general population of the United Kingdom. The second aim of the study was to examine the direct and indirect effects of affective characteristics of alexithymia on emotional eating via emotion dysregulation, to expand upon previously proposed models and understand the mechanisms by which alexithymia may relate to emotional eating. It is predicted that the affective characteristics of alexithymia will predict emotion dysregulation, which will in turn predict emotional eating, as reported during the COVID-19 pandemic.

## 2. Methods

### 2.1. Participants

One hundred and fifty-eight participants were recruited through opportunity sampling using adverts on social media sites and the research participation platform, Prolific. Individuals with a history of eating, mood, addictive, or substance use disorders were excluded from taking part.

### 2.2. Measures

**Demographics.** Participants provided their age, gender, relationship status, ethnicity and educational level. They also provided anthropometric measurements and indicated their dieting status.

**COVID-19 questions.** Participants reported to what extent they were following guidance regarding social distancing, and how their general eating behaviours differed compared to usual before COVID-19.

**Negative affect.** The Depression, Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995) measures self-reported negative emotional states over the past week. Three subscales comprising seven items measure depression (e.g. “I couldn't seem to experience any positive feeling at all”), anxiety (e.g. “I was worried about situations in which I might panic and make a fool of myself”) and stress (e.g. “I tended to overreact to situations”). Items

are scored on a four-point Likert scale, indicating how much the statements applied over the last week (0 = Did not apply to me at all; 3 = Applied to me very much, or most of the time). Each scale can be scored independently by doubling the sum of its items or combined to provide a score of a higher-order general distress factor. Higher scores indicate greater presence of a negative emotional state. The DASS-21 has demonstrated strong convergent and discriminant validity with other measures of depression and anxiety symptoms (e.g. Norton, 2007). Cronbach's alpha values indicate high internal consistency for each of the subscales: depression ( $\alpha = 0.91$ ), anxiety ( $\alpha = 0.82$ ), and stress ( $\alpha = 0.86$ ), as well as the higher-order general distress factor ( $\alpha = 0.93$ ).

**Alexithymia.** The Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994) is a 20-item self-report scale measuring three facets of alexithymia: difficulty identifying feelings (DIF; e.g. "I am often confused about what I feel exactly"), difficulty describing feelings (DDF; e.g. "It is difficult for me to find the appropriate words for my feelings"), and externally-oriented thinking style (EOT; e.g. "I would rather talk to people about their daily routines than their feelings"). Participants use a five-point Likert scale to indicate how much they agree with each item (1 = strongly disagree; 5 = strongly agree). Summed scores of each subscale can be used independently or combined to create a global TAS-20 score. Higher scores indicate a greater presence of alexithymic characteristics. For research purposes, cut-offs are provided with global scores >60 indicating the presence of alexithymia. The TAS-20 is valid across situations and populations (Bagby et al., 2020), and valid for administering as an online version (Bagby et al., 2014). Internal consistency of the scale was found to be high in the present study ( $\alpha = 0.85$ ), as were the DIF ( $\alpha = 0.85$ ) and DDF ( $\alpha = 0.73$ ) subscales. Consistent with previous research (Larsen et al., 2006; Pinaquy et al., 2003; Pink et al., 2019), internal consistency of the EOT subscale was much lower ( $\alpha = 0.59$ ).

**Emotion dysregulation.** The short form version of the Difficulties in Emotion Regulation Scale (DERS-SF; Kaufman et al., 2016) comprises 18 items which measure six facets of emotion dysregulation: non-acceptance of emotional responses (e.g. "When I'm upset, I become irritated at myself for feeling that way"), difficulties in directing goal-directed behaviour (e.g. "When I'm upset, I have difficulty concentrating"), impulse control difficulties (e.g. "When I'm upset, I lose control over my behaviour"), lack of emotional awareness (e.g. "I pay attention to how I feel"), limited access to emotion regulation strategies (e.g. "When I'm upset, I believe there is nothing I can do to make myself feel better"), and lack of emotional clarity (e.g. "I have no idea how I am feeling"). Participants

respond using a five-point scale to indicate how often the described items happen (1 = Almost never [0-10%]; 5 = Almost always [91-100%]). Responses can be scored using sums, with higher scores reflecting greater difficulties in emotion regulation, used continuously. The DERS-SF maintains the excellent psychometric properties of the original 36-item version developed by Gratz and Roemer (2004), and as a streamlined version is better suited to minimise fatigue (Kaufman et al., 2016). Internal consistency for the total score was high ( $\alpha = 0.90$ ), but as demonstrated in previous findings (Hallion et al., 2018), the DERS-SF is psychometrically stronger after removing the awareness subscale ( $\alpha = 0.91$ ).

***Emotional eating urges.*** The Emotional Eating Scale (EES; Arnow, Kenardy, & Agras, 1995) assesses participants' reported urge to eat in response to 25 negative emotions. There are four emotional eating subscales: depression (e.g. "lonely"), anxiety (e.g. "worried"), anger/frustration (e.g. "furious") and somatic (e.g. "jittery") (Goldbacher et al., 2012). Participants indicate their urge to eat using a five-point scale (0 = no desire to eat; 4 = an overwhelming urge to eat), with higher summed scores indicating a greater urge to eat in response to emotions. The EES has been validated in nonclinical populations (Waller & Osman, 1998), and its internal consistency in the present study was high ( $\alpha = 0.94$ ), with acceptable Cronbach's alpha values for each of the subscales ( $\alpha > 0.73$  for all).

***Emotional eating behaviours.*** The Salzburg Emotional Eating Scale (SEES; Meule et al., 2018) assesses reported eating behaviour, rather than urges, in response to 20 positive and negative emotions. Four subscales measure happiness (e.g. "When I am cheerful"), sadness (e.g. "When I feel lonely"), anger (e.g. "When I am irritated"), and anxiety (e.g. "When I am nervous"). Participants respond using a five-point scale to indicate whether they eat more or less in response to each emotion (1 = I eat much less than usual; 5 = I eat much more than usual). Mean scores are computed for each subscale which indicate whether individuals eat less when experiencing these emotions (scores  $< 3$ ), eat the same amount (scores = 3), or eat more (scores  $> 3$ ). There is preliminary support for the validity of the SEES (Meule et al., 2018), but limitations of the self-report nature are strongly acknowledged by authors. In the present study, Cronbach's alpha values indicate internal consistency was high for each of the subscales: happiness ( $\alpha = 0.87$ ), sadness ( $\alpha = 0.83$ ), anger ( $\alpha = 0.84$ ), and anxiety ( $\alpha = 0.92$ ).

### 2.3. Procedure

Ethical approval was obtained from the Faculty Academics Ethics Committee of a university in the West Midlands, United Kingdom (approval code

7327/Am/2020/Jul/BLSSFAEC), and this study was conducted in accordance with the Declaration of Helsinki. Participants recruited via Prolific ( $n = 133$ ) received £2.15 remuneration, with no other financial or material incentives for any participants.

The study comprised a single questionnaire which was completed online via the survey hosting website Qualtrics. Data collection took place in mid-July 2020, during the gradual easing of the initial lockdown measures across devolved nations of the United Kingdom. Participants were presented with information before indicating their consent by agreeing to take part. A battery of measures was presented, with the order of scales randomised to control for order and fatigue effects. Participants completed questions pertaining to their lives and behaviours during the pandemic. After completing the scales, participants completed questions pertaining to demographic information, which took place at the end of the questionnaire to minimise effects of fatigue on scale completion. The titles of each scale were omitted to reduce response bias. Upon completion, participants were presented with a debrief information page, outlining the purpose of the study.

#### *2.4. Data analysis*

Data were analysed using IBM SPSS Statistics 25.0 and PROCESS v3.5 (Hayes, 2017). Preliminary analyses examined for outliers and the assumptions of normality were met. T tests were employed to test for differences between those who reported changes in their eating behaviours over the previous week during COVID-19, and those who did not, to explore the first aim of the study. Pearson correlations were used to investigate the associations between measured continuous variables. PROCESS was used to test theorised models of the second aim, using a regression-based approach to mediation to explore the direct and indirect effects of alexithymia on emotional eating with emotion dysregulation a potential mediator. In this approach, effects are assessed with bias-corrected accelerated bootstrap confidence intervals (CI) that are considered significant when the upper and lower bound of the bias-corrected 95% CI do not span zero. Bootstrapping with 5,000 samples was used, a method which is effective with smaller samples and the least vulnerable to Type 1 errors (Preacher & Hayes, 2008).

Gender, age and BMI have previously been associated with alexithymia and emotional eating (Geliebter & Aversa, 2003; Larsen et al., 2006; Mattila et al., 2006) so these were controlled for in all models alongside self-reported change in amount eaten. Affective characteristics of alexithymia (DIF and DDF) were entered as predictor variables. Emotional

eating urges as measured by EES total score, and emotional eating behaviours as measured by SEES subscales were entered as outcome variables. Emotion dysregulation was represented by DERS-SF total scores omitting the awareness scale, in all analyses.

### 3. Results

#### 3.1. Participant characteristics

Twenty-two participants were discounted in final analyses due to the provision of inaccurate data, or due to reporting height and weight values which may indicate potential eating disorder history (exclusion of BMI outside of 18.5kg/m<sup>2</sup> to 50 kg/m<sup>2</sup> range, classifications of underweight and super obesity). The final sample of 136 participants was 64.7% female (34.6% male, 0.7% preferred not to disclose), with a mean age of 32 years ( $SD = 11.88$ ; range = 18 to 72 years). The sample was 83.1% White (5.1% mixed/multiple ethnic groups, 4.4% Asian, 3.7% Black, 3.7% other ethnic group) with the majority of individuals having completed a minimum of an undergraduate-level degree (61%). The majority of participants reported not currently dieting (82.4%), and the sample had a mean BMI of 26.21kg/m<sup>2</sup> ( $SD = 5.39$ ; range = 18.55 to 47.47).

#### 3.2. Descriptives

Mean total scores of continuous variables are presented in Table 1. Levels of alexithymia were consistent with previously reported rates in general population samples (Pink, Lee, Price, & Williams, 2019; Salminen, Saarijärvi, Äärelä, Toikka, & Kauhanen, 1999) with 11.0% of participants ( $n = 15$ ) scoring above categorical cut-offs indicating the presence of alexithymia. The presence of alexithymia was borderline in 27.2% of participants ( $n = 37$ ) and there was an absence of alexithymia in 61.8% participants ( $n = 84$ ).

A majority of respondents showed “normal” levels of anxiety (64.7%) and stress (61.8%) over the previous week during COVID-19. Around half of respondents showed “normal” levels of depression (51.5%). A greater number of participants reported severe or extremely severe depression (19.1%) over the previous week during COVID-19, than severe or extremely severe anxiety (9.5%) or stress (9.6%).

Mean levels of self-reported emotional eating urges as measured with the EES were lower than that reported in previous research with a similar sample (Pink et al., 2019), with



total scores around 20 points lower (out of a maximum score of 100). Mean levels of self-reported emotional eating behaviours as measured with the SEES were comparable to general population samples used for the development and preliminary validation of the scale (Meule et al., 2018).

**Table 1**

Means and standard deviations of continuous variables.

Measure	<i>M</i>	<i>SD</i>
DASS-21	31.98	24.79
Depression	11.57	10.42
Anxiety	6.41	7.36
Stress	12.29	8.97
TAS-20		
Global score	46.54	11.01
DIF	15.42	5.72
DDF	13.02	4.13
EOT	18.10	4.03
DERS-SF	36.38	11.05
EES	31.11	18.22
SEES		
Happiness	2.94	0.52
Sadness	3.60	0.77
Anxiety	2.52	0.92
Anger	2.76	0.76

*Note:* DASS-21 = Depression, Anxiety and Stress Scale; TAS-20 = Toronto Alexithymia Scale; DIF = Difficulty identifying feelings; DDF = Difficulty describing feelings; EOT = Externally-oriented thinking; DERS-SF = Difficulties in Emotion Regulation short-form omitting the awareness subscale; EES = Emotional Eating Scale; SEES = Salzburg Emotional Eating Scale.

### *3.3. Reported behaviours during the COVID-19 pandemic*

Of the 136 participants, 5.9% reported living their life as normal compared to before the pandemic, 11.0% were completely isolating from other people, and 83.1% reported to adhering to Government guidance for social distancing.

A majority of participants (58.1%) reported no change in the amount of food they had eaten over the previous week compared to before COVID-19, whilst 16.2% reported eating less on average and 25.7% reported eating more. Those who reported a change in the amount they had eaten over the previous week also reported significantly more depression in the same time frame ( $M = 14.21$ ;  $SD = 10.63$ ), compared to those who had no change in their eating ( $M = 9.67$   $SD = 9.90$ ),  $t(134) = 2.56$ ,  $p = .012$ , with a medium effect size ( $d = 0.44$ ). The group who reported a change in the amount they had eaten also reported significantly greater difficulties identifying feelings ( $M = 16.70$ ;  $SD = 5.73$ ), compared to those who reported no change ( $M = 14.49$ ,  $SD = 5.57$ ),  $t(134) = 2.25$ ,  $p = .026$ , with a medium effect size ( $d = 0.39$ ). There were no significant group differences for difficulties in emotion regulation; however, the group who had reported a change in the amount they had eaten over the previous week also reported greater scores on the ‘strategies’ subscale of emotion dysregulation, which approached significance. There were no differences for anxiety or stress reported over the past week when comparing these groups. Furthermore, those who reported a change in the amount they had eaten over the previous week also reported significantly greater emotional eating urges in response to depression as measured by the EES ( $M = 15.16$ ;  $SD = 6.74$ ), compared to those who reported no change in their eating ( $M = 12.24$ ,  $SD = 7.80$ ),  $t(134) = 2.28$ ,  $p = .024$ , with a medium effect size ( $d = 0.40$ ); and those who reported a change also reported significantly greater emotional eating behaviours in response to sadness as measured by the SEES ( $M = 3.76$ ;  $SD = 0.78$ ), compared to those who reported no change ( $M = 3.49$ ,  $SD = 0.75$ ),  $t(134) = 2.06$ ,  $p = .042$ , with a medium effect size ( $d = 0.35$ ). These findings demonstrate associations between perceived change in eating behaviour with negative affect and reported emotional eating in response to negative emotion. Specific differences based on those who had reported eating more or less were not tested due to limited sample sizes in these groups.

Over half of respondents (53.7%) reported no change in the perceived healthfulness of the food they had consumed over the previous week compared to before COVID-19, whilst 27.9% reported eating less healthfully and 18.4% reported eating more healthfully. Those who reported eating more or less healthfully compared to usual did not report significant differences in the measured psychological variables (negative affect, alexithymia, or emotion dysregulation), nor in reported emotional eating urges or behaviour compared to those who reported no change in the healthfulness of the food consumed.

[INSERT TABLE 2]

### 3.4. Correlation analyses

Pearson's correlations were conducted to explore the relationships between measured variables (see Table 2 for correlation matrix). Significant positive correlations were found between TAS-20 global scores and DERS-SF total scores ( $r = .616, p < .001$ ), specifically with all DERS-SF subscales of non-acceptance ( $r = .466, p < .001$ ), strategies ( $r = .483, p < .001$ ), impulse ( $r = .436, p < .001$ ), clarity ( $r = .678, p < .001$ ) and goals ( $r = .347, p < .001$ ). The DIF scale of the TAS reported significant positive correlations with the DERS-SF total scores ( $r = .687, p < .001$ ), and again all subscales, non-acceptance ( $r = .455, p < .001$ ), strategies ( $r = .582, p < .001$ ), impulse ( $r = .505, p < .001$ ), clarity ( $r = .708, p < .001$ ) and goals ( $r = .438, p < .001$ ). The DDF scale of the TAS reported significant positive correlations with the DERS-SF total scores ( $r = .553, p < .001$ ), and again all subscales, non-acceptance ( $r = .483, p < .001$ ), strategies ( $r = .425, p < .001$ ), impulse ( $r = .317, p < .001$ ), clarity ( $r = .652, p < .001$ ) and goals ( $r = .288, p < .001$ ). The EOT scale of the TAS reported no overall significant correlation with the DERS-SF total score, but it did report weak positive correlations with the impulse ( $r = .149, p = .042$ ) and clarity ( $r = .180, p = .018$ ) subscales.

Neither of these psychological variables (alexithymia or emotion dysregulation), nor any of their subscales, significantly related to emotional eating behaviours as measured by subscales of the SEES. However, EES total scores reported weak correlations with the DERS-SF total score ( $r = .259, p = .001$ ) and the subscales of non-acceptance ( $r = .248, p = .002$ ), strategies ( $r = .240, p = .002$ ), and impulse ( $r = .292, p < .001$ ). The EES subscale of depression reported a weak correlation with the DIF facet of alexithymia only ( $r = .146, p = .045$ ), and again weak correlations with the DERS-SF total score ( $r = .238, p = .003$ ), and the subscales of non-acceptance ( $r = .242, p = .002$ ), strategies ( $r = .224, p = .004$ ), and impulse ( $r = .274, p = .001$ ). The EES subscale of anxiety reported weak correlations with the DERS-SF total score ( $r = .191, p = .013$ ), and the subscales of non-acceptance ( $r = .184, p = .016$ ), strategies ( $r = .194, p = .012$ ), and impulse ( $r = .251, p = .002$ ). The EES subscale of anger reported a weak correlation with the TAS-20 global scores ( $r = .149, p = .042$ ), and more specifically the cognitive characteristic of EOT ( $r = .153, p = .038$ ). It also reported weak correlations with the DERS-SF total score ( $r = .243, p = .002$ ), and the subscales of non-acceptance ( $r = .211, p = .007$ ), strategies ( $r = .215, p = .006$ ), and impulse ( $r = .257, p = .001$ ). Finally, the EES subscale of somatic feelings reported a weak correlation with the TAS-20 global score ( $r = .142, p = .049$ ) but no significant relationships with any of the

subscales. It also reported weak correlations with the DERS-SF total score ( $r = .248, p = .002$ ), and the subscales of non-acceptance ( $r = .233, p = .003$ ), strategies ( $r = .219, p = .005$ ), and impulse ( $r = .254, p = .001$ ).

The negative scales of the SEES (sadness, anger, anxiety) positively correlated with the items of the EES, with the exception of SEES anxiety and EES anger which did not correlate significantly. All items of the EES are negative, indicating there is a relationship between urges to eat in response to negative emotions, and self-reported negative emotional eating behaviours. The SEES happiness subscale negatively correlated with SEES sadness, indicating they may reflect opposing constructs with individuals eating more in response to sadness and less in response to happiness, and vice versa.

### 3.5. Mediation analyses

There was no overall significant association between emotional eating measures and DIF or DDF, but at present there is consensus that mediation may exist in the absence of an overall significant association (Hayes, 2017). The PROCESS macro (Model 4) was used to examine the direct and indirect effects of alexithymia on emotional eating, via emotion dysregulation. First, DIF was entered as the predictor variable and emotional eating urges as measured by the EES as the outcome variable. Emotion dysregulation as the DERS-SF total score (omitting the awareness subscale) was entered as a potential mediating variable. There was no significant direct effect of DIF on EES total scores. Findings indicate that DIF was indirectly related to EES total scores through its relationship with emotion dysregulation. As seen in Figure 1, greater difficulty identifying feelings related to greater reported emotion dysregulation ( $B = 1.3136, p < .001$ ), which was subsequently related to more emotional eating urges in response to negative emotions ( $B = 0.5108, p = .007$ ). A 95% bias-corrected confidence interval based on 5,000 bootstrap samples indicated that the indirect effect ( $B = 0.6710$ ) was entirely above zero ( $CI = 0.0452-1.2178$ ), with 13.7% of variance in emotional eating urges accounted for by DIF and emotion dysregulation.

[INSERT FIGURE 1]

Next, DDF was entered as the predictor variable with emotional eating urges as measured by the EES as the outcome variable. Emotion dysregulation was again entered as the potential mediating variable. There was no significant direct effect of DDF on EES total

scores. Findings indicate that DDF was indirectly related to EES total scores through its relationship with emotion dysregulation. As seen in Figure 2, greater difficulty describing feelings related to greater reported emotion dysregulation ( $B = 1.4504, p < .001$ ), which was subsequently related to more emotion eating urges in response to negative emotions ( $B = 0.5072, p = .002$ ). A 95% bias-corrected confidence interval based on 5,000 bootstrap samples indicated that the indirect effect ( $B = 0.7356$ ) was entirely above zero ( $CI = 0.1924-1.3360$ ), with 13.9% of the variance in emotional eating urges accounted for by DDF and emotion dysregulation.

[INSERT FIGURE 2]

There were no direct or indirect effects observed when self-reported negative emotional eating behaviour as measured by SEES subscales were entered as the outcome variables, with either DIF or DDF entered as the predictor variable. Specific subscales of the EES were explored with each predictor variable, identifying different significant models for each predictor. There were no direct effects for either predictors (DIF or DDF) for any of the EES subscales, but indirect effects were identified via emotion dysregulation. Greater DIF was indirectly related to greater emotional eating urges as measured by EES subscales of anxiety, anger and somatic feelings, whilst greater DDF was indirectly related to greater emotional eating urges as measured by EES subscales of depression, anger and somatic feelings. Testing the models with the mediator and outcome variables in the reverse order did not find any significant indirect effects for any models. These findings indicate that emotion dysregulation had a mediating effect on the relationship between affective characteristics of alexithymia and emotional eating urges in this order only.

#### 4. Discussion

There were two aims of the present study. The first aim was to explore perceived changes in eating behaviour compared to usual before COVID-19, and compare with self-reported negative affect during the same time period. The second aim was to examine direct and indirect relationships between alexithymia and emotional eating, to expand upon previously proposed models and apply to eating behaviours during the pandemic. Findings related to each of these aims are discussed below.

Those who reported a change in the amount of food eaten, either more or less, also reported significantly greater negative affect as measured by the depression subscale over the same time frame (i.e. the previous week during lockdown), and significantly greater levels of DIF. This group also reported significantly greater emotional eating urges in response to depression, and emotional eating behaviours in response to sadness. These groups did not significantly differ in their reported difficulties in emotion regulation. There were no significant differences in negative affect, alexithymia, emotion dysregulation or self-reported emotional eating between those who reported eating more or less healthfully over the previous week and those who reported no change. Although the sample is small, it echoes other findings examining changes in eating behaviours during COVID-19 and highlights the components of emotional eating (negative affect and change in eating behaviour) alongside self-reported emotional eating. Furthermore, the percentage of respondents who reported eating more (24.7%) and eating less healthfully (27.3%) is close to the number of respondents who reported this in the panel study of 90,000 respondents (17% and 23% respectively) (Fancourt et al., 2020a). Greater reported depression, and self-reported emotional eating urges and behaviours to this emotion, in those who reported a change in the amount eaten over the previous week compared to before lockdown indicates a presence of emotional eating during lockdown in these individuals. Emotional eating in response to depression is found to be the type most closely related to poorer psychological outcomes (Braden et al., 2018), so it is important to understand the role of emotional eating during the pandemic.

Previous pathways do not examine the mechanisms by which the alexithymic characteristics of impaired abilities to recognise and describe one's emotions result in greater eating in response to emotions. The findings of the mediation analyses indicate the indirect effects of DIF and DDF on emotional eating via emotion dysregulation. There is no direct effect observed by either predictor (DIF or DDF) on emotional eating; these models explain

emotional eating as reported during the COVID-19 lockdown through indirect effects of difficulty identifying feelings and difficulty describing feelings, which in turn predict emotion dysregulation, which in turn predicts greater emotional eating urges as measured by the EES. There were no direct or indirect effects when factors of the SEES were entered as outcome variables with either predictor, which suggests the affective characteristics of alexithymia only exert indirect effects on self-reported emotional eating urges (as measured by EES) and not on self-reported emotional eating behaviours (as measured by SEES). Emotional eating was measured in the context of during the COVID-19 pandemic, as such findings demonstrate the indirect effect of alexithymia on emotional eating during this time.

Correlation analyses highlighted that the EES total score and subscales positively correlated with SEES negative subscale scores. This indicates that urges to eat in response to negative emotions are related to greater self-reported negative emotional eating behaviours. However, the mediation regression analyses predicted only urges and not behaviours. This suggests that mechanisms which influence self-reported behaviours differ to those which predict urges to eat in response to negative emotions. There may be barriers to eating behaviours, such as the accessibility and availability of foods creating a gap between desired eating and self-reported actual eating. The EES and SEES only refer to the amount of food which an individual self-reports how much they feel a desire to eat, or have eaten, in response to these emotions; these scales do not consider type of food, so mechanisms involved in predicting the type of food eaten in response to emotions should be examined.

The ‘apt’ response to negative affect or stress is to reduce eating (Schachter et al., 1968), with the biologically ‘inapt’ response of eating food in response reflecting the definition of emotional eating. Recent literature posits that ‘unhappy overeating’ and ‘happy undereating’ may represent two sides of the same coin as behaviours exhibited by an individual, and this is considered less favourable than the opposing coin of ‘happy

overeating' and 'unhappy undereating' due to the association of poorer outcomes from negative emotional overeating (Braden et al., 2018). The present findings demonstrated a weak negative correlation between the happiness and sadness subscales of the SEES, which suggests that individuals who report eating more in response to sadness, also report eating less in response to happiness, and vice versa. These findings support this analogy (Meule et al., 2018), providing support for this inverse relationship within the general population which remains apparent during a global pandemic when approximately 40% of participants reported changes in their eating behaviours.

There are limitations of the present study. By definition, a mediator occurs after that which it mediates and before the outcome (Kraemer et al., 2001), and the timing of alexithymia in the explored models is assumed on the basis of theory, i.e. being a relatively stable personality trait, and therefore must precede behaviours (i.e. emotional eating) and learned skills (i.e. emotion dysregulation). However, the cross-sectional design does not allow for confirmation of causation in the mediation models. To address this limitation, the mediating and outcome variables were tested in a model in reverse order to test alternative causal models as recommended by Fiedler et al. (2018). When EES preceded DERS, there were no significant direct or indirect effects identified, which is incompatible with mediation taking place; this was demonstrated with both DIF and DDF as predictors. Therefore, it is not the case that DIF or DDF predict emotional eating which in turn predicts emotion dysregulation. Limitations stemming from data collection include the self-report of perceived changes in how much individuals are eating and how healthful they perceive their diet to be, which are subject to bias and inaccurate recall. Similarly, self-report measures of alexithymia have been criticised due to the level of introspection required to respond to the items (Lane et al., 2015). Nonetheless, it is proposed that individuals with alexithymia are able to respond to related items on self-report measures (Bagby et al., 2020). Whilst other research designs are



suited to mixed assessments of alexithymia via observer-reported alongside self-reported measures, online questionnaires can only make use of self-report measures. Furthermore, the emotional eating construct is multifaceted and influenced by context meaning it is not fully captured by questionnaire measures (Lattimore, 2020). The present study utilised the EES and SEES which measure self-reported emotional eating urges and behaviours respectively, to garner a wider measurement of the emotional eating construct.

The present study found emotion dysregulation accounted for some of the variance between alexithymia and emotional eating, meaning there are other constructs involved, which may vary for each specific negative emotion which individuals report eating in response to. The present study found DIF and DDF had indirect effects on different subscales of the EES; greater DIF predicted greater emotion dysregulation which in turn predicted the anxiety, anger and somatic subscales of the EES, whilst greater DDF predicted greater emotion dysregulation which in turn predicted the depression, anger and somatic subscales of the EES. This suggests that different mechanisms may underpin the relationships with specific emotions and their subsequent impact on eating behaviours, and echoes previous research which found self-reported depression and anxiety had differing relationships with alexithymia (Pink et al., 2019). Specific emotions may have varying influences on individuals' eating behaviours, dependent on factors including their ability to identify broader and more specific emotions. It is thought that interoceptive reliance, which describes how much an individual trusts their bodily signals and determines how they respond, may underpin how an individual responds behaviourally to negative affect regardless of how well they identify and regulate it – with a lack of interoceptive reliance predicting greater emotion dysregulation and in turn a greater risk of emotional eating (Willem et al., 2020). So individuals may need to be able to first identify their emotions and also trust them in order to adaptively regulate and respond to them.

A focus in the United Kingdom and its framing of COVID-19 risk has been greater body weight (see Department of Health and Social Care, 2020); stigma surrounding this may elicit greater negative affect (Puhl & Heuer, 2010) and contribute to emotional eating behaviours. Existing research investigating emotional eating is largely situated within the context of obesity and weight loss, often stigmatising due to its weight-normative approach despite weight stigma identified as a risk factor for reduced quality of life (Puhl & Suh, 2015). Emotional eating can have negative psychological impacts irrespective of any influence on weight, with a need for mechanisms to be understood and interventions to be informed which go beyond a primary objective of weight management.

Eating in response to emotions can be positive for some individuals, as it is context-dependent (Lattimore, 2020). It was found to buffer the association between adverse life events and perceived stress, but only in individuals without elevated levels of depressive symptoms (Finch & Tomiyama, 2015). Therefore, eating in response to stressors may protect some individuals, highlighting the nuances of eating behaviours in relation to informing interventions. Rather than targeting emotional eating itself, psychological variables which predict it could be the focus to support individuals in their response to and regulation of emotions. The current study identified the role of emotion dysregulation for individuals with greater difficulty identifying their feelings, which may be a potential target for emotional eating interventions during pandemics and similar situations for this population.

Psychotherapies for emotional eating such as compassion focused and dialectical behaviour therapies (Roosen et al., 2012) are rooted in emotion regulation and acceptance, with identifying emotions key to promoting efficacy as a prerequisite to developing adaptive regulation skills (Vine & Aldao, 2014). Implications may involve psychoeducation for those delivering emotion regulation-based therapeutic interventions for eating behaviours, to inform about the importance of initial successful identification and description of feelings and

identify individuals who need greater support to minimise poorer therapeutic outcomes. This could extend transdiagnostically across clinical and subclinical populations, particularly for interventions across the spectrum of emotional and binge eating behaviours.

The results of the current study should be interpreted within the context of the study's limitations and of the COVID-19 pandemic, with emotions and subsequent behaviours reported likely to be different compared to usual before the pandemic or once it has abated. Whilst not a laboratory study, the contemporary global pandemic and the impact on individual wellbeing and eating behaviours in the United Kingdom (Fancourt et al., 2020a, 2020b) has provided an opportunity for examining emotional eating in an atypical situation for large groups of the general population. Future research should seek to examine these mechanisms under conditions in which emotional eating can be observed. Deficits in emotion regulation and how they predict subsequent behaviour are likely to be better understood by assessing these difficulties in situations that approximate real-life situations with the use of state emotion dysregulation measures such as the S-DERS which measures in the moment difficulties in emotion regulation, thus better suited to laboratory-based research studies. Future research should seek to test the proposed model once the pandemic has abated.

To our knowledge, this is the first study to examine emotional eating within the general population which examines indirect effects of alexithymia. The study identifies the indirect effects of both difficulty identifying and describing feelings on emotional eating urges, via emotion dysregulation. As this was demonstrated within a sample of the general population during the COVID-19 pandemic, findings should be followed up outside of the pandemic. These results extend beyond the current literature, and offer an insight into self-reported changes to eating behaviours during the COVID-19 pandemic.

### **Declarations of interest**

All authors declare that they have no conflicts of interest.

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### **Contributors**

KM and DW designed the study. KM conducted the data analyses. KM, DW, and MM interpreted the data. KM wrote the initial version of the manuscript. DW, MM and HE reviewed and edited the manuscript. All authors approved the final version of the manuscript.

### **Data statement**

Data available upon request to the corresponding author.

## **Annex 6 – Appetite Manuscript: systematic review**

### **A systematic review of the relationship between alexithymia and emotional eating in adults**

Katherine McAtamney\*, Dr Michail Mantzios, Dr Helen Egan, Dr Deborah J. Wallis

Keywords: *alexithymia, emotion processing, eating behavior, emotional eating, systematic review*

#### **Abstract**

Elucidating psychological characteristics associated with emotional eating may further inform interventions for this behaviour related to eating psychopathology. The present systematic review aimed to examine the relationship between alexithymia and self-reported emotional eating in adults, and provide a narrative synthesis of the existing literature. Using the PRISMA method for systematic reviews, six databases (MEDLINE, PsycInfo, PsycArticles, PubMed, SCOPUS, and Web of Science) were searched for peer-reviewed, quantitative research published between January 1994 and 20<sup>th</sup> July 2021, when the searches were conducted. Eligible articles investigated the association between alexithymia, as measured by the Toronto Alexithymia Scale (Bagby et al., 1994), and emotional eating, as measured by any validated self-report instrument. Nine cross-sectional articles were reviewed, and risk of bias was assessed using the Appraisal Tool for Cross-Sectional Studies (Downes et al., 2016). A narrative synthesis of articles suggests positive associations between alexithymia and self-reported emotional eating. Five measures of emotional eating were used across articles, with limited but consistent evidence for the relationship between alexithymia

and emotional eating as measured by the Dutch Eating Behaviour Questionnaire (van Strien et al., 1986). Further research is required to add evidence to the nature of the relationship between alexithymia and emotional eating, and to explore mechanisms that might underpin any relationships. Understanding the association between alexithymia and emotional eating may support strategies and interventions for those seeking help for emotional eating and related eating behaviours.

## 1. INTRODUCTION

Sifneos (1973) coined the term alexithymia (may be translated from the Greek *a* [no] – *lexis* [words] – *thymia* [emotion]; literal meaning “no words for emotion”) to describe a cluster of characteristics, which reflect the experience of difficulties processing emotions at cognitive and affective levels (Goerlich, 2018). It is considered a personality trait (Luminet et al., 2001) with salient features of: (a) difficulty identifying feelings (DIF) and distinguishing between feelings and bodily sensations of arousal; (b) difficulty describing feelings (DDF) to other people; (c) constricted imaginal processes (IMP) evidenced by a paucity of fantasy; and (d) a stimulus-bound, externally oriented cognitive style (EOT; Taylor & Bagby, 2000). The prevalence of alexithymia is around 10% within the general population (Honkalampi et al., 2017; Kokkonen et al., 2001; Salminen et al., 1999), with higher reported levels observed within psychiatric populations (McGillivray et al., 2017), including those with eating disorders and non-clinical levels of disordered eating.

The relationship between alexithymia and eating disorders has been examined by a systematic review (see Nowakowski et al., 2013) and meta-analysis (see Westwood et al., 2017), with findings highlighting higher levels of alexithymia in populations with eating disorders compared to healthy controls. Individuals with anorexia nervosa or binge eating disorder reported significantly greater affective (i.e. DIF, DDF) but not cognitive (i.e. EOT) characteristics than control groups (Pinaquy et al., 2003; Taylor et al., 1996). The presence of

alexithymia is related to poorer clinical and treatment outcomes in patients with eating disorders (Pinna et al., 2015; Speranza et al., 2007).

Positive associations have also been identified between alexithymia and subclinical eating psychopathology (Ridout et al., 2010). A recent review of studies with non-clinical samples of children and adolescents identified distinct domains of emotional regulation, including difficulty describing feelings, as predictive factors of overeating behaviour (Favieri et al., 2021), although not all studies employed specific measures of alexithymia. Emotional eating, commonly conceptualised as “the tendency to overeat in response to negative emotions” (van Strien et al., 2007, p. 106), is an important clinical dimension for eating psychopathology (Ricca et al., 2012) and may predict binge eating (Pinaquy et al., 2003; Stice et al., 2002). Affective characteristics of alexithymia have been found to significantly predict emotional eating in samples of women with binge eating disorder (Pinaquy et al., 2003). Other research within non-clinical populations found these affective characteristics to exert their effects indirectly on emotional eating through emotion dysregulation, with an absence of any direct effects (McAtamney et al., 2021).

Existing literature exploring the association between alexithymia and emotional eating in adults has not been systematically reviewed to ascertain any trends. A comprehensive examination of this relationship will offer further understanding of the psychological characteristics that relate to emotional eating and potentially influence intervention outcomes when targeting emotion regulation and associated behaviours (i.e., emotional eating).

### **1.1. Objectives**

This review aimed to examine the relationship between alexithymia and self-reported emotional eating in adults, through a narrative synthesis of existing literature.

## 2. Methods

### 2.1. Search strategy

The systematic review was conducted according to the PRISMA 2020 Statement (Page et al., 2021). On the 20<sup>th</sup> July 2021, electronic databases were searched systematically for original research articles published in peer-reviewed journals. Truncated terms relating to alexithymia and emotional eating were used with Boolean operators (see Table 1). Results were independently screened for relevance by two reviewers (KM, DJW), first by title and then by abstract. If the abstract indicated eligibility, full texts were retrieved to determine inclusion or exclusion.

Table 1

*Search string used to systematically search electronic databases for relevant articles. Bold terms indicate Boolean operators.*

Search String	Databases Searched
("alexithymia" <b>OR</b> "alexithymic" <b>OR</b> "alexithymi*" <b>OR</b> "toronto alexithymia scale" <b>OR</b> "difficulty identifying feelings" <b>OR</b> "difficulty describing feelings" <b>OR</b> "difficulty identifying emotions" <b>OR</b> "difficulty describing emotions") <b>AND</b> ("emotional eat*" <b>OR</b> "emotional overeat*" <b>OR</b> "stress eat*" <b>OR</b> "comfort eat*")	MEDLINE, PsycInfo, PsycArticles, PubMed, SCOPUS, Web of Science

### 2.2. Eligibility criteria

Articles were considered if they included quantitative observational or experimental research, were written in English, and were published in peer-reviewed journals. Conference abstracts or letters, clinical guidelines, book chapters, reviews which do not use original data, and dissertations or theses were not included. Articles with any adult clinical or nonclinical populations of interest were eligible for inclusion if they clearly reported associations between alexithymia and emotional eating.



Alexithymia must have been measured using the twenty-item version of the Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994); therefore, searches were limited to research published since 1994. Subjective and objective measures of emotional eating are not thought to measure the same construct (Alzheimer et al., 2021). For this review, only self-reported emotional eating using previously validated measures was examined – capturing how individuals perceive changes in their eating behaviour in response to emotional states.

### **2.3. Data extraction and quality assessment**

A data extraction form was created to compile and standardise the following information from each included article: authors, year of publication, location, research design, sample characteristics, recruitment methods, measures of alexithymia and emotional eating, and reported associations between variables. A finding was deemed statistically significant when  $p < .05$  was reported.

Risk of bias was assessed to evaluate how the methodology may have affected the results and reporting of the research. Included articles were all cross-sectional design, so only the Appraisal Tool for Cross-Sectional Studies (AXIS; Downes et al., 2016) was employed. The AXIS outlines, for each article, 20 items considering the clarity of rationale and methodology, reporting of results, and ethical dimensions. Items are answered with ‘yes’, ‘no’, or ‘do not know’, with higher scores reflecting higher quality. Two authors evaluated risk of bias, with any discrepancies discussed and resolved by consensus.

### **2.4. Data synthesis**

Narrative synthesis was used to bring together findings of included articles relating to any association between alexithymia and emotional eating. This method is appropriate for use

with emotional eating literature due to heterogeneity of data resulting from the use of various measures.

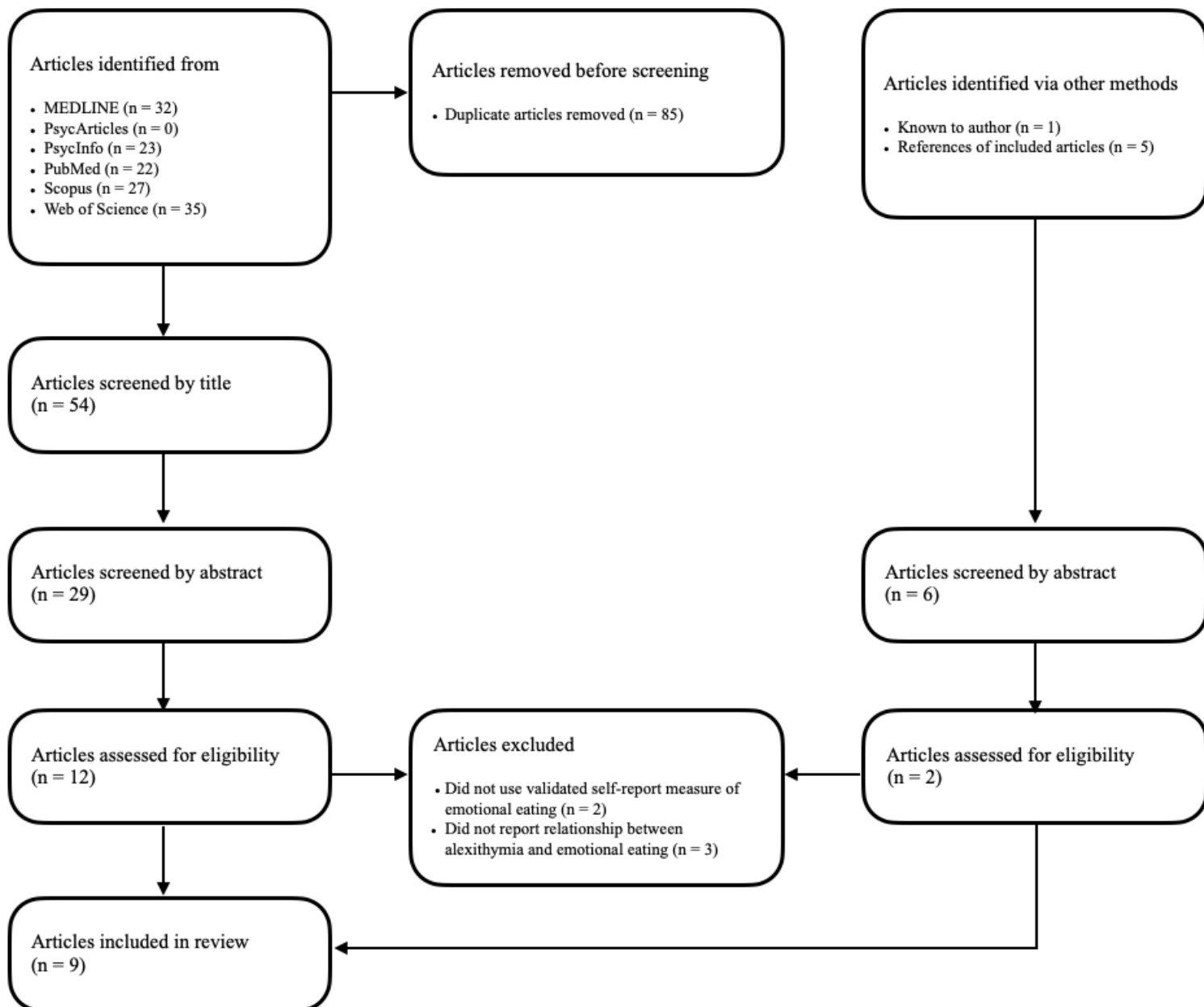


Figure 1. PRISMA 2020 Flow Diagram illustrating the process of selecting articles.

### 3. Results

#### 3.1. Search results

The process of determining article eligibility is outlined in Figure 1. Initial database searches identified 139 articles, with six further articles identified from other sources. Of the 35 titles considered potentially eligible, 14 were accepted based on their abstracts. Five full-text articles were excluded (see Table 2), and nine eligible articles were included in the narrative synthesis.

Table 2

*Excluded full-text articles and reasons for exclusion (n = 5).*

Reason for exclusion	Article authors
Did not measure emotional eating or use a validated self-report measure of emotional eating	Noli et al. (2010); van Strien et al. (2007)
Did not report the relationship between alexithymia and emotional eating	Spence & Courbasson (2012); Zeeck et al. (2011); Wheeler & Broad (1994)

#### 3.2. Characteristics of included articles

Nine cross-sectional articles published between 2003 and 2021 were included. Sample sizes used in the analyses ranged from 40 to 549, totalling 2754 participants across all articles. Two articles investigated the relationship between alexithymia and emotional eating in university populations (Lyvers et al., 2019; Pink et al., 2019), one of which replicated the research with a general population sample (Pink et al., 2019). Three further articles examined alexithymia and emotional eating within general population samples (Cecchetto et al., 2021;

McAtamney et al., 2021; Strodl & Wylie, 2020). Three articles sampled only individuals living with obesity (Larsen et al., 2006; Pinaquy et al., 2003; Zijlstra et al., 2012), one of which grouped participants based on whether they met criteria for binge eating disorder or not (Pinaquy et al., 2003). One article recruited participants who were concerned about their weight (Ouwens et al., 2009). See Table 3 for key characteristics and methodological quality ratings of included articles.

Table 3

*Key characteristics of included articles and methodological quality ratings.*

Authors (Year)	Country	Analytical sample size	% Female	Emotional eating measure	Relationship between alexithymia and emotional eating	Methodological quality ratings
Cecchetto, Aiello, Gentili, Ionta, & Osimo (2021)	Italy	General population (n=365)	73.1	DEBQ-EE	Higher DEBQ-EE scores were found among those with higher TAS-20 scores. DEBQ-EE scores were predicted by the interaction between TAS-20 and quality of life.	15
Larsen, van Strien, Eisinga, & Engels (2006)	Netherlands	Individuals living with obesity (n=410)	82.9	DEBQ-EE	TAS-20 total, DIF and DDF scores positively correlated with DEBQ-EE. No significant correlations between EOT and DEBQ-EE. DIF and DDF were more strongly associated with DEBQ-EE in men than women.	13
Lyvers, Brown, & Thorberg (2019)	Australia	University students were at least occasional consumers of caffeine products (n=224)	82.1	DEBQ-EE	TAS-20 total scores positively correlated with DEBQ-EE. TAS-20 total scores were a significant positive predictor of DEBQ-EE.	14
McAtamney, Mantzios, Egan, & Wallis (2021)	United Kingdom	General population (n=136)	64.7	EES, SEES	No significant correlations between TAS-20 total nor subscale scores and total EES scores. There were also no significant correlations with any SEES subscale scores. DIF and DDF each exerted indirect effects on EES total scores, via emotion dysregulation. No significant effects of DIF nor DDF on SEES subscales.	15

Ouwens, van Strien, & van Leeuwe (2009)	Netherlands	Individuals living with obesity (n=549)	100	DEBQ-EE	DIF positively correlated with DEBQ-EE. DIF mediated the relationship between depression and DEBQ-EE.	12
Pinaquy, Chabrol, Simon, Louvet, & Barbe (2003)	France	Individuals living with overweight/obesity, with (n=40) and without (n=129) binge eating disorder	100	DEBQ-EE	TAS-20 total scores predicted DEBQ-EE in the group with binge eating disorder only. Further analyses with subscales identified that only DIF predicted DEBQ-EE in this group.	11
Pink, Lee, Price, & Williams (2019)	United Kingdom	Study 1: Students (n=125)	85.6	EES, TFEQ-R18-EE	TAS-20 total and DIF scores positively correlated with EES. No significant correlation between DDF nor EOT with EES. No significant correlations between TAS-20 total nor subscale scores and TFEQ-R18-EE.	15
		Study 2: General population (n=342)	81.2	EES, TFEQ-R18-EE	TAS-20 total, DIF and DDF scores each positively correlated with EES and TFEQ-R18-EE. No significant correlation between EOT and either measure of emotional eating.	14
Strodl & Wylie (2020)	Australia	General population (n=332)	90.7	TFEQ-R21-EE	Both DIF and DDF were positively correlated with TFEQ-R21-EE.	17
Zijlstra et al. (2012)	Netherlands	Individuals with obesity (n=102)	100	DEBQ-EE	Positive correlation between DIF and DEBQ-EE, which became non-significant after correcting for external and restrained eating scores. No significant correlation between DDF and DEBQ-EE.	17

*Note:* DEBQ-EE = Dutch Eating Behaviour Questionnaire, emotional eating subscale. EES = Emotional Eating Scale. SEES= Salzburg Emotional Eating Scale; TFEQ-R18-EE = Three Factor Eating Questionnaire, revised 18-item version, emotional eating subscale. TFEQ-R21-EE = Three Factor Eating Questionnaire, revised 21-item version, emotional eating subscale. TAS-20 = Toronto Alexithymia Scale. DIF = Difficulty Identifying Feelings subscale. DDF = Difficulty Describing Feelings subscale.

### 3.3. Quality of included articles

Methodological quality is reported individually for both studies conducted within the article by Pink et al. (2019). All articles met 11 or more of the outlined criteria, meaning quality was at least moderate. All articles failed to meet criteria related to addressing and

categorising, or describing non-responders. Three articles did not report details of ethical approval nor of obtaining consent from participants (Larsen et al., 2006; Ouwens et al., 2009; Pinaquy et al., 2003). Only two articles justified their sample size (Strodl & Wylie, 2020; Zijlstra et al., 2012). Reported results appear internally consistent for most articles, with data clearly reporting the sample size. All articles had generally a low risk of bias. One study reported additional analyses within the discussion, conducting using participants excluded from the main analyses for reporting having a current or past eating disorder (Cecchetto et al., 2021). The authors acknowledged the limitations of these additional analyses, due to them being outside the aim of the study and the small sample size ( $n=35$ ). As such, the additional analyses were not included in the present review.

### **3.4. Associations between alexithymia and emotional eating**

Alexithymia was measured across all articles using the TAS-20, as either total scores or individual subscale scores. Emotional eating was measured with four different self-report scales: the emotional eating subscale of the Dutch Eating Behaviour Questionnaire (DEBQ-EE; van Strien et al., 1986), the Emotional Eating Scale (EES; Arnow et al., 1995), the Salzburg Emotional Eating Scale (SEES; Meule et al., 2018), or the Three Factor Eating Questionnaire emotional eating subscale from either the 18-item (TFEQ-R18-EE; Karlsson et al., 2000) or 21-item revised versions (TFEQ-R21-EE; Tholin et al., 2005). Reported associations from included articles are presented below, grouped by emotional eating measure.

Seven articles reported bivariate correlation analyses between alexithymia and emotional eating scores. Eight articles reported (direct and/or indirect) effects of alexithymia on emotional eating, and one article reported effects of emotional eating on alexithymia.

**3.4.1. DEBQ-EE.** The emotional eating subscale of the DEBQ comprises 13 items corresponding to the desire to overeat in response to negative emotions. Lyvers et al. (2019)

reported a positive relationship of medium strength between total TAS-20 scores and emotional eating ( $r = .21, p < .01$ ). Larsen et al. (2006) reported a stronger relationship in males ( $r = .40, p < .01$ ) than females ( $r = .18, p < .01$ ). When exploring TAS-20 subscales, they reported that DIF and DDF were also more strongly related to desire toward emotional eating in males (DIF  $r = .50, p < .001$ ; DDF  $r = .41, p < .001$ ) than females (DIF  $r = .28, p < .001$ ; DDF  $r = .17, p < .01$ ), whilst EOT was not significantly related to emotional eating in males nor females. Ouwens et al. (2009) reported a significant positive correlation between DIF and emotional eating ( $r = .34, p < .01$ ), as did Zijlstra et al. (2012) ( $r = .35, p < .01$ ) although this became non-significant after accounting for external and restrained eating as measured by the DEBQ. They did not find a significant relationship between DDF and emotional eating.

Among the general population sample, Cecchetto et al. (2021) reported higher desire toward emotional eating among individuals with higher TAS-20 scores ( $\chi^2 (1) = 7.91, p = .005$ ). Post-hoc analyses identified a significant interaction between TAS-20 scores and quality of life ( $\chi^2 (1) = 4.70, p = .030$ ; researchers defined quality of life with a measure combining quality and quantity of personal space at home and family income, see Cecchetto et al. 2021 for details), in which higher TAS-20 scores were associated with higher emotional eating among individuals with higher quality of life ( $t (482) = 3.88, p < .001$ ), while TAS-20 scores did not exert effects on emotional eating in individuals with lower quality of life. Lyvers et al. (2019) found that after controlling for demographic variables (i.e. age, gender, education), alexithymia (as TAS-20 total scores) predicted emotional eating ( $F_{\text{change}} (1, 219) = 10.29, p = .002$ ), the presumed mediator in the tested model examining effects of alexithymia on caffeine consumption. The final model was not significant. A separate hierarchical regression was conducted to assess predictors of emotional eating, in which they found alexithymia to be a significant predictor contributing 5% of the variance ( $F_{\text{change}} (1, 217) =$

11.10,  $p < .001$ ). Pinaquy et al. (2003) reported that TAS-20 total scores significantly predicted emotional eating ( $B = .365, p = .005$ ), with further analyses with subscales identifying DIF as the only significant predictor ( $B = .77, p = .001$ ). These findings were reported for the group with binge eating disorder, whilst no significant associations were reported for those without binge eating disorder. Larsen et al. (2006) explored the association between alexithymia and emotional eating in males and females, reporting significant interactions between gender and both DIF ( $F_{\text{change}}(1, 403) = 5.31, p = .02$ ) and DDF ( $F_{\text{change}}(1, 403) = 7.70, p = .006$ ), but not EOT. Subscales of DIF and DDF were categorised as high and low, with higher scores on each specifically associated with greater levels of emotional eating in men than women. Ouwens et al. (2009) reported a potential indirect effect of depression on emotional eating *through* DIF, in which depression predicted DIF ( $B = .60, p < .01$ ) and in turn DIF predicted emotional eating ( $B = .14, p < .01$ ).

Lyvers et al. (2019) also tested the reverse of the model which assessed the alexithymia-caffeine relationship via emotional eating, instead assessing effects of emotional eating on caffeine consumption via alexithymia. In this model, they found that emotional eating was a predictor of alexithymia when added to the model after demographic variables ( $F_{\text{change}}(1, 219) = 10.29, p = .002$ ). The final model was significant, indicating potential mediation in this direction. Of relation to the present review, this was the only article to investigate and report the effects of emotional eating on alexithymia.

**3.4.2. EES.** This scale comprises 25 items that measure *urges* to eat in response to negative emotions, used as either a total score or individual subscale scores for depression, anxiety, anger and somatic symptoms. Pink et al. (2019) reported a positive correlation between TAS-20 and EES total score within both the student sample ( $r = .176, p < .05$ ) and the general population sample ( $r = .217, p < .01$ ). When looking at TAS-20 subscales, DIF correlated with EES in the student ( $r = .203, p < .05$ ) and general population sample ( $r =$



.265,  $p < .001$ ), whilst DDF correlated with EES only in the general population sample ( $r = .174$ ,  $p < .001$ ). The EOT subscale did not correlate with EES in either sample. However, McAtamney et al. (2021) did not report any significant correlations between TAS-20 (total nor subscales) and EES total scores. When examining EES subscales, weak correlations were identified between TAS-20 total scores and EES subscales of anger ( $r = .149$ ,  $p < .05$ ) and somatic symptoms ( $r = .142$ ,  $p < .05$ ), as well as DIF and depression ( $r = .146$ ,  $p < .05$ ), and EOT and anger ( $r = .153$ ,  $p < .05$ ). When examining the effects of DIF and DDF on EES total scores, they did not identify a significant direct effect. However, positive indirect effects were reported for both DIF ( $B = .671$ , 95%CI = 0.0452, 1.2178) and DDF ( $B = .736$ , 95%CI = 0.1924, 1.3360) on EES, through emotion dysregulation.

**3.4.3. SEES.** This 20-item scale measures perceived over- and under-eating behaviour in response to negative and positive emotions, using subscale scores of happiness, sadness, anger and anxiety. McAtamney et al. (2021) reported no significant correlations between TAS-20 (total nor any subscale) with any subscales of the SEES. Further, there were no direct nor indirect effects of DIF nor DDF, via emotion dysregulation, on any SEES subscales.

**3.4.4. TFEQ-EE.** The TFEQ-R18-EE comprises three items measuring self-reported emotional eating behaviour, whilst the TFEQ-R21-EE comprises six items. Pink et al. (2019) reported that the relationship between TAS-20 total and TFEQ-R18-EE scores was not significant for the student sample but was significant for the general population sample ( $r = .135$ ,  $p < .05$ ). Neither DIF nor DDF significantly correlated with TFEQ-R18-EE scores in the student sample, but weak correlations were significant in the general population sample (DIF  $r = .180$ ,  $p < .001$ ; DDF  $r = .218$ ,  $p < .05$ ). Emotional eating did not significantly relate to EOT in either sample. Strodl and Wylie (2020) reported weak correlations between TFEQ-R21-EE and both DIF ( $r = .20$ ,  $p < .001$ ) and DDF ( $r = .11$ ,  $p < .05$ ). They also tested whether

these affective characteristics mediated the effects of forms of childhood trauma on emotional eating, but no significant indirect effects were identified.

#### **4. Discussion**

The present systematic review aimed to synthesise findings of published research articles that examined the association between alexithymia and self-reported emotional eating. Despite a general paucity of research examining the association between these variables, nine articles were identified as eligible for inclusion. The DEBQ-EE was the most frequently used measure of emotional eating, and used within six articles. Two articles employed the EES, whilst the SEES, TFEQ-R18-EE and TFEQ-R21-EE were each employed only once.

Reported results from articles using the DEBQ-EE to measure emotional eating generally indicate a positive relationship with alexithymia as total scores or affective characteristic subscale scores (Larsen et al., 2006; Lyvers et al., 2019; Ouwens et al., 2009; Zijlstra et al., 2021). A higher desire to eat when in an emotional state was identified among those with higher alexithymia total scores (Cecchetto et al., 2021). Results also provide preliminary support for the role of alexithymia in predicting emotional eating, as measured by the DEBQ-EE (Lyvers et al., 2019; Ouwens et al., 2009; Pinaquy et al., 2003), with potential gender differences in the strength of association between affective alexithymia characteristics and emotional eating (Larsen et al., 2006).

Reported results from articles using the EES were mixed in their support for the association between variables. Significant relationships were found between alexithymia (total TAS-20, DIF, DDF) and emotional eating across general population and student samples, with the exception of DDF in the student sample (Pink et al., 2019). Other findings did not identify a clear relationship between alexithymia (total nor subscale scores) and

emotional eating, but did report possible indirect effects of DIF and DDF on emotional eating *through* emotion dysregulation (McAtamney et al., 2021).

The TFEQ-R18-EE, TFEQ-R21-EE and SEES were each used by one article. Limited findings report no significant associations between alexithymia and SEES subscale scores (McAtamney et al., 2021), nor with TFEQ-R18-EE scores in a student sample (Pink et al., 2019). However, within general population samples, weak correlations were identified between affective alexithymic characteristics and TFEQ-R18-EE (Pink et al., 2019) and TFEQ-R21-EE scores (Strodl & Wylie, 2020).

Overall, existing research indicates there may be a positive association between alexithymia (as TAS-20 total, DIF or DDF scores) and DEBQ-EE scores. These findings suggest that higher levels of alexithymia, and its specific affective characteristics, may relate to, and potentially predict, greater tendencies towards emotional eating. However, only six studies used this measure of emotional eating, so these findings are discussed with caution within this review. Reported results using other emotional eating measures are less consistent and have even fewer articles employing each of the measures.

Three articles recruited only female participants (Ouwens et al., 2009; Pinaquy et al., 2003; Zijlstra et al., 2012), and four of the remaining six articles comprised at least 81% female samples. Larsen et al. (2006) explored gender differences and identified that there was a stronger relationship between alexithymia and emotional eating in males than females. However, their sample was only 17% male ( $n = 40$ ), and to date there has been no further research to explore these differences. There is a need for research to explore any sex/gender-differences in this relationship, and particularly within samples of non-females.

Included articles reported associations between alexithymia and emotional eating, but there was limited examination of mechanisms underpinning the association. McAtamney et al. (2021) reported the specific indirect effect of alexithymia on emotional eating through

emotion dysregulation. Two models were presented, with DIF and DDF as predictors, but in each model only about 14% of variance in emotional eating was explained. Two mechanisms of how alexithymia relates to emotional eating have been proposed: (1) alexithymia as a deficit in interoceptive awareness results in insensitivity to satiety cues, thus eating in response to other bodily sensations such as emotional arousal; and (2) eating as a way of regulating negative affective states which are common in alexithymia, thus representing maladaptive emotion regulation. However, these are not necessarily mutually exclusive (Lyvers et al., 2019). Both of these mechanisms could be supported through learning to identify and respond to emotions adaptively.

Teaching emotion regulation skills may result in decreased emotional eating (Roosen et al., 2012), but for individuals with higher levels of alexithymia focusing on the affective characteristics should take priority as the ability to identify and understand emotions is a logical prerequisite to developing skills to regulate them (Vine & Aldao, 2014). Emotional eating is important to explore given its association with eating psychopathology (Pinaquy et al., 2003; Ricca et al., 2012; Stice et al., 2002), and understanding related psychological characteristics is important to help inform the development of strategies to manage it. The identification of preliminary support for an association between alexithymia and emotional eating is useful, as the presence of alexithymia may present a barrier to psychotherapeutic treatment approaches (Lumley et al., 2007) and relates to less favourable outcomes (Pinna et al., 2015).

The present review reported the results of a comprehensive search of existing research, systematically searching key databases for research articles. Two reviewers independently screened articles for eligibility, and evaluated methodology of those included. However, inclusion of articles was limited to those published in peer-reviewed journals and in English, which may have resulted in publication bias and potential overestimation of any

association between variables. Whilst in general, reviewed articles indicated that alexithymia may predict emotional eating as measured by the DEBQ-EE, one article also found that emotional eating predicted alexithymia (Lyvers et al., 2019). Due to the limited number of articles, all of which are cross-sectional, causation between alexithymia and emotional eating cannot be inferred and indication of support for the relationship is discussed with caution. Further research should consider experimental designs to explore causality and more accurately inform potential interventions.

Five different self-report measures of emotional eating were used in the included articles. Due to heterogeneity from different measures, and the limited number of articles employing each measure, a meta-analysis was not feasible within the present review. The present review included only quantitative research using the TAS-20. It has been recommended that alexithymia is best measured using a combination of self-reported and observer-rated measures (Bagby et al., 2020), but this requires a structured interview with a trained professional and is not commonly used in cross-sectional research. Further research using gold-standard, validated and consistent measures of alexithymia and emotional eating is required to provide stronger evidence for the nature of the relationship and enable feasibility of a meta-analysis to examine the statistical relationship between variables. Considering these limitations, qualitative work to explore experiences of alexithymia and emotional eating would also be valuable to further elucidate the nature of any associations between these constructs.

#### **4.1. Conclusions**

These findings add to extant literature through highlighting current evidence into the association between alexithymia and emotional eating. The included evidence considered from nine articles provides preliminary support for a positive relationship between alexithymia and emotional eating, most frequently as measured by the DEBQ-EE as a desire

to eat more in response to negative emotions. The review has highlighted the need for further research to evidence and examine underlying mechanisms across more diverse samples. This would have the potential to subsequently inform support strategies to reduce emotional eating in alexithymic populations.

### **Ethical Statement**

This article does not contain any studies or experiment involving human participants performed by any of the authors.

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### **Contributors**

Author KM undertook the electronic literature searches, and Authors KM and DJW screened articles for inclusion. Author KM collected data from articles and Authors KM and DW assessed articles for risk of bias. Author KM wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

### **Conflict of Interest**

All authors declare they have no conflict of interest.

### **Other Information**

The PRISMA 2020 Statement requires the present review to specify that it was not registered, and a protocol was not prepared.

### **Availability of Data and Other Materials**

Data collection forms and data extracted from included articles can be provided upon request.