

Improving treatment engagement in people  
with eating disorders: utilising digital  
approaches

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## **Copyright Statement**

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## Abstract

Engaging people with psychological treatment is vital to ensuring effective outcomes. This is particularly relevant to the treatment of eating disorders, as up to 35% of individuals referred to an eating disorder service never access treatment. Internet-based programs have emerged as a novel approach to the treatment of eating disorders, however these too have reported issues with lack of uptake and engagement.

The aims of this research were (1) to assess the effectiveness of a novel pre-treatment motivational web based intervention (MotivATE) at improving treatment attendance at an eating disorders service, and (2) to explore the factors that might influence engagement with online support tools.

An initial systematic review indicated that brief motivational interventions were acceptable for addressing low motivation to change and engagement issues, with online interventions highlighted as a viable delivery method. However, the results of a zelen randomised trial in a local eating disorder service showed no increase in attendance for those offered access to the MotivATE intervention. Only one third of participants offered access to MotivATE actually registered to use the intervention, suggesting that issues with uptake were potentially a key factor in the lack of demonstrated effectiveness.

A concurrent online focus group suggested that whilst people with eating disorders do identify a potential role within treatment for online support such as MotivATE, this is limited by negative attitudes towards these approaches which may contribute to low uptake. However, it was also noted that factors such as exposure to online support and effective design may serve to help mitigate these negative attitudes. This was supported by an online survey in which participants rated a range of designs of the front page of MotivATE for aesthetics and behavioural indicators derived from an adapted technology acceptance model. Multi-level modelling of this data showed that judgements of simplicity and craftsmanship significantly influenced behavioural intentions towards the intervention; a finding that was supported in a final online study that compared levels of use and changes in attitudes pre/post between MotivATE and a version redesigned using the factors highlighted in the previous study.

Whilst MotivATE was not shown to be effective at improving treatment attendance in its current state, digital approaches may still represent a viable and potentially effective approach to addressing issues with treatment engagement, particularly early in the treatment pathway. However, in order not to themselves be significantly impacted by low engagement, the way in which these interventions are both designed and presented needs to be carefully considered. This research provides a novel contribution to the literature both through the development and piloting of an intervention to increase treatment engagement in people with eating disorders, as

well as furthering our understanding of how users engage with digital interventions, in particular the role of visual aesthetics.

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None

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Denison-Day J, Appleton KM, Newell C, Muir S. (2018) Improving motivation to change amongst individuals with eating disorders: A systematic review. *International Journal of Eating Disorders*, 1(18). <https://doi.org/10.1002/eat.22945>.

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## **Author's Declaration**

I hereby declare that the work presented in this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature:

## **Chapter 1: Introduction**

It is estimated that one in four adults and one in ten children are likely to have a mental health problem in any given year (McManus, Meltzer, Brugha & Bebbington, 2009), with one in six people experiencing a common mental health problem each week (McManus, Bebbington, Jenkins & Brugha, 2016). The economic cost to the UK is thought to be between £70 and £100 billion a year (OECD, 2014). Engaging people with treatment is vital to addressing this issue, as no matter how effective the interventions offered by health services may be, their impact will be limited if they are not properly delivered to patients.

Engagement is poorly defined within the literature, but is a term generally used in relation to the following three issues surrounding the delivery of treatment: uptake, the number of people who actively seek and enter into a treatment; attrition, typically defined as the number of people not completing a course of treatment; and non-adherence, in that people may not follow a treatment as it is intended by the therapist (Cavanagh, 2010; Melville, Casey & Kavanagh, 2010; Nicholas et al., 2010). For the purposes of this PhD, the focus will be on the first of these issues, that being the uptake of treatment and services.

The issue of lack of engagement in healthcare can be seen from the worrying estimate that only about a quarter of people with a mental health problem receive ongoing treatment (McManus, Meltzer, Brugha & Bebbington, 2009), as well as the fact that, across the UK, a substantial proportion of people do not access any mental health support. For example, only 65% of people with psychotic disorders are thought to receive treatment (The Mental Health Policy Group, 2015).

The problem is further evidenced in face to face therapies due to the number of patients who did not attend (DNA) their appointments with outpatient services. According to Mitchell and Selmes (2007), this rate of non-attendance for psychiatric appointments is double the one for other medical specialties, a figure supported by the Department of Health, who reported that in 2002-2003 the DNA rate of psychiatric outpatient appointments was 19.1% in England, while the overall NHS rate was 11.7% (Department of Health, 2013). Clinical evidence suggests that psychiatric patients who miss follow up appointments have a higher chance of being admitted over a 12-month

period and there is more likelihood of a negative effect on the condition (Killaspy, Banerjee, King & Lloyd, 2000). Not only does a lack of engagement impact the patient, but it is estimated that in excess of £900 million per year is lost due to non-attendance of appointments in the NHS (Minshall & Neligan, 2017; NHS, 2014).

## **1.1 Eating Disorders**

Eating disorders (EDs) are a series of serious psychiatric illnesses relating to an individual's abnormal relationships and attitudes towards food, exercise and body shape resulting in changes in eating habits and behaviour, often as a coping mechanism for difficult emotions or relationships (Williams & Reid, 2010). Diagnostic criteria identify four common types of eating disorder (American Psychological Association, 2013):

- Anorexia Nervosa (AN), which is characterised by an inability to maintain an adequate, healthy body weight, usually as a result of diminished calorie intake or excessive exercise.
- Bulimia Nervosa (BN) is characterised by recurrent episodes of uncontrolled food consumption, binge eating, in combination with some form of unhealthy compensatory behaviour such as purging through vomiting or the use of laxatives or diuretics.
- Binge Eating Disorder (BED) is characterised by repeated episodes of bingeing without any form of compensatory behaviour.
- Eating disorder not otherwise specified (EDNOS) was a catchall DSM-IV diagnosis for patients with significant features of eating disorders that do not meet the criteria for AN, BN or BED. This was replaced in DSM-V with the criteria of other specified feeding or eating disorder (OSFED), as a result of the broad definition of EDNOS meaning that people with very different symptoms were being classified as having the same diagnosis. This made it difficult to access care specific to the disorder and conduct research on the diversity of pathology within EDNOS (APA, 1994; 2013).

It is estimated that EDs affect 1.6 million people in the UK, a number thought to be on the rise, with admissions for care increasing by 7% each year (Beat, 2015; Sweeting et al., 2015). Recovery from an eating disorder is often a long and difficult process, with research suggesting that only 46% of patients fully recover from anorexia nervosa, whilst a third improve with only partial or residual features of the disorder, and 20% remain chronically ill for the long term (Steinhausen, 2009).

This has particular significance given that eating disorders have the highest mortality rate of all mental health conditions, with a meta-analysis showing standardised mortality ratios of 5.86 for AN, 1.93 for BN, and 1.92 for EDNOS (Arcelus, Mitchell, Wales & Nielsen, 2011). EDs therefore can have devastating consequences for the affected individual and their family members (Nielsen & Bará-Carril, 2003), as well as for the wider community, with estimated costs to the NHS of between £3.9 and £4.6 billion per year (Beat, 2015).

When treating EDs early intervention can be vital, as this reduces the risks of chronicity, which in turn lowers the risks to the individual, the burden of care for families and the costs to the healthcare system (Grange & Loeb, 2007; Vaz, Conceição & Machado, 2014).

A number of approaches are currently supported by the evidence base, with the largest support being for cognitive behavioural therapy, in both individual and group settings, as well as family based therapy for adolescents, but with growing evidence for alternative approaches such as the use of acceptance and commitment therapy (Hay, 2013). Indeed, there is good evidence that tailored psychological treatments such as enhanced cognitive behavioural therapy are effective at reducing ED pathology (Fairburn et al., 2009; Fairburn et al., 2013; Hay, 2013).

However, research indicates that up to 35% of patients who are referred to an ED service never access treatment (Leavey, Vallianatou, Johnson-Sabine, Rae & Gunputh, 2011; Muir et al., 2017; Waller et al., 2009). Non-attendance at adult mental health services is a substantial problem (Schauman, Aschan, Arias, Beards & Clement, 2014), with those who do not engage with treatment being unlikely to recover independently and more likely to have poorer long term outcomes (Keel & Brown, 2010; Pike, 1998).

Non-attendance is frequently due to a complex collection of factors, with individuals with EDs often being highly ambivalent about change (Colton & Pistrang, 2004; Leavey, Vallianatou, Johnson-Sabine, Rae & Gunpath, 2011; Williams & Reid, 2010). The role an individual's ED plays can be highly valued and perceived as functional, for example, by providing a sense of emotional or social avoidance, and in the early stages of an ED a person may be in denial about the problematic aspects of their behaviour (Schoen et al., 2012). People can also become stuck in their behaviours, leading to low confidence and fears about change, with the locus of control, which describes the amount of control an individual feels they have over their own life and choices, becoming an external element; thus resulting in a passive approach to treatment and recovery. These internal factors are also compounded by external and practical issues, such as negative experiences with healthcare services and professionals, as well as the impact of social stigma. Qualitative research conducted with individuals recovering from EDs suggests that these factors amongst people with EDs are potentially modifiable barriers to engagement with services (Leavey, Vallianatou, Johnson-Sabine, Rae & Gunpath, 2011).

## **1.2 Improving Motivation to Change**

Patients with EDs are known to be ambivalent about their eating disorder symptoms. This is often due to the fact that whilst the eating disorder is perceived as a burden, it can also provide reasons for retention, such as providing a sense of mastery or acting as a coping mechanism (Leavey et al., 2011). This often results in low motivation to change, which has been defined as an individual's desire and drive for change (Carey, Purnine, Maisto, & Carey, 1999). Perhaps unsurprisingly then, poor engagement and high levels of drop-out are common in the treatment of eating disorders (Waller et al., 2009), and low motivation to change is thought to be one of the factors responsible for these difficulties (Serpell, Treasure, Teasdale & Sullivan, 1999). Indeed, it has been proposed that factors relating to low levels of motivation to change play a key role in the maintenance of the disorder and failure to seek treatment (Schmidt, & Treasure, 1997).

The transtheoretical model (TTM) of change is a theory developed for examining motivational and behavioural change among individuals in treatment (Prochaska, DiClemente, & Norcross, 1992), offering a framework for conceptualising stages of readiness for change, and the processes that help individuals progress through these stages. The TTM proposes that motivation to change can be broken down into discrete stages. This is known as the Stages of Change model, which describes behavioural change as occurring through the following five stages as shown in figure 1.1 (Prochaska, DiClemente, & Norcross, 1992):

- *Precontemplation*: in which individuals may be unaware of the problem, and unwilling to change.
- *Contemplation*: in which individuals are thinking about change but are not yet ready to make a commitment.
- *Preparation*: in which individuals are intending to change in the near future.
- *Action*: in which individuals are actively involved in making changes.
- *Maintenance*: in which individuals are working to maintain the changes made.

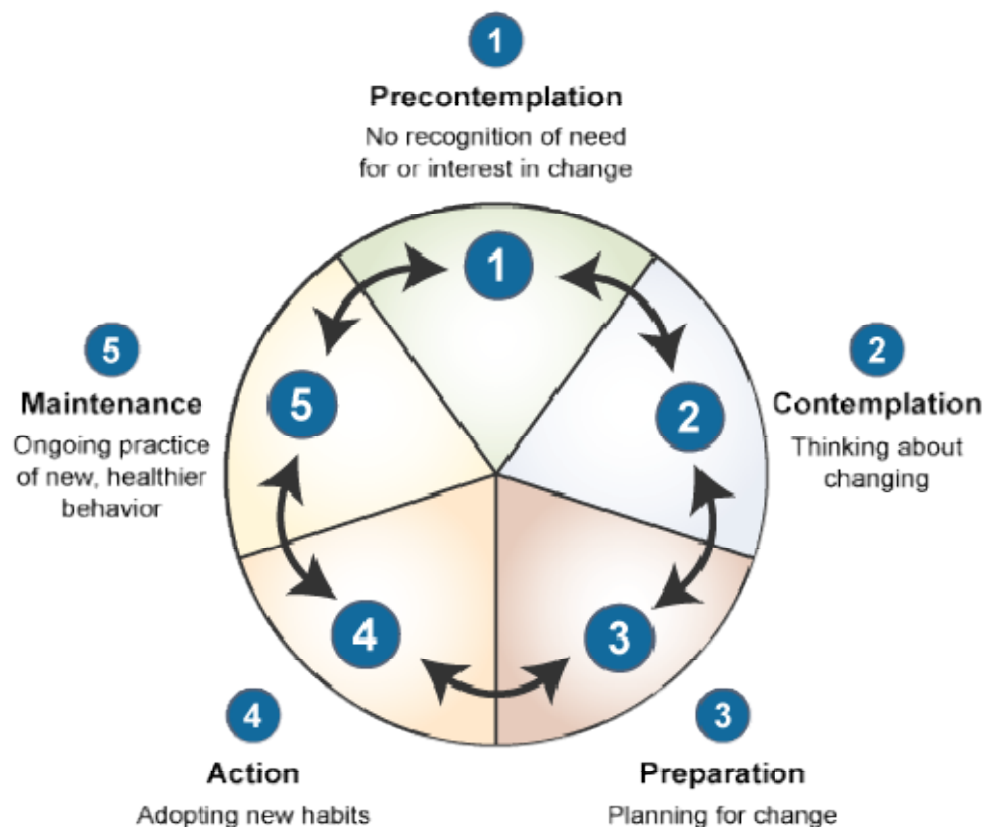


Figure 1.1. The Transtheoretical Stages of Change Model. Source: Prochaska, J. O. & Di Clemente, C. C., (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research and Practice*, 19(3), 276-288. Figure 2, p. 283.

The concept that behaviour change is a temporal progression through stages, rather than an all or nothing phenomenon, is one of the key aspects of the TTM (Prochaska & Velicer, 1997; Scholl, 2002; Velicer et al., 1998). Furthermore, this process is considered to be a dynamic one, with Prochaska and DiClemente (1992) suggesting that most individuals will shift through the different stages several times before reaching permanent maintenance.

The TTM also outlines ten processes of change, a series of covert and overt activities that underpin the shifts in attitudes, intentions, and behaviours that drive the movement between the stages (Patten, Vollman & Thurston, 2000; Prochaska & Velicer, 1997; Prochaska et al., 1992; Rodgers, Courneya, & Bayduza, 2001):

- *Consciousness Raising*: using information, education, and personal feedback to increase awareness about the causes, consequences, and cures for a particular problem behaviour.
- *Dramatic Relief*: increased emotional experiences followed by reduced affect if appropriate action can be taken, such as feeling fear, anxiety, or worry because of the problem behaviour, or feeling inspiration and hope when hearing about how they are able to change.
- *Environmental Re-evaluation*: the assessment of how the presence or absence of a behaviour affects one's social environment.
- *Self Re-evaluation*: the assessment of one's self image with and without the problem behaviour.
- *Self Liberation*: believing in one's ability to change and making commitments and recommitments to act on that belief.
- *Social Liberation*: realising that society is supportive of the desired change, which may require an increase in social opportunities or alternatives.
- *Contingency Management*: providing consequences for taking steps in a particular direction.
- *Helping Relationships*: the care, trust, openness, acceptance and support for the healthy behaviour change provided by people who are supportive of the change.

- *Counter-conditioning*: learning healthy behaviours to substitute problem behaviours.
- *Stimulus Control*: removing cues for problem behaviours and using reminders and cues that encourage healthy behaviours.

These processes of change can be mapped against the stages of change, with the first four processes used in the early stages, while the last four are associated with the later stages, with self-liberation playing a key role during the preparation stage. This mapping can be seen in figure 1.2 (Patten et al., 2000; Velicer et al., 1998).

		Stages of Change				
		Precontem- plation	Contemplation	Preparation	Action	Maintenance
Processes	Consciousness raising Dramatic relief Environmental reevaluation Self-reevaluation			Self-liberation	Contingency management Helping relationship Counterconditioning Stimulus control	

Figure 1.2. Stages of Change in Which Change Processes Are Most Emphasised. Source: Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American journal of health promotion*, 12(1), 38-48. Table 2, p. 43.

The progression of an individual towards positive behavioural change is also believed to be driven by the interplay between self-efficacy and temptation. Drawn from the work of Bandura (1977; 1982), self-efficacy theory proposes that the perception a person has about his or her own abilities to act out a specific behaviour is important in determining behaviour change. Within the framework of the TTM, this is translated as the situation-specific confidence people have that they can cope with high risk situations without relapsing to their problematic behaviour (Prochaska & Velicer, 1997). This self-efficacy is in turn challenged by temptation, which reflects the intensity of urges to engage in a specific habit when in the midst of difficult situations (Prochaska & Velicer, 1997).



A final key aspect of the TTM that is used to outline the cognitive changes that accompany the progression through stages of change is the concept of decisional balance. This refers to the individual's weighing of the pros with the cons, that is to say, the benefits of changing the behaviour against the costs of changing the behaviour (Patten et al., 2000; Prochaska & Velicer, 1997). This concept was developed based on the core constructs of Janis and Mann's (1977) decision-making model, and it has been identified that individual's judgments of pros and cons vary through the stages of change (Prochaska et al., 1994). In the early stages of the TTM, individuals judge the pros of the problem behaviour to outweigh the cons, a judgement which shifts, and then reverses, as they move through the stages of change (Prochaska et al., 1994).

It is worth noting that the TTM is based on a series of critical assumptions which drive theory, research and practice (Prochaska & Velicer, 1997):

- No single theory can account for all of the complexities of behaviour change, therefore, a more comprehensive model will most likely emerge from an integration across major theories.
- Behaviour change is a process that unfolds over time through a sequence of stages.
- Stages are both stable and open to change, just as chronic behavioural risk factors are both stable and open to change.
- Without planned interventions, individuals will remain stuck in the early stages. There is no inherent motivation to progress through the stages of intentional change as there seems to be in stages of physical and psychological development.
- The majority of at-risk individuals are not prepared for action and will not be served by traditional action-oriented prevention programs. Health promotion can have much greater impacts if it shifts from an action paradigm to a stage paradigm.

- Specific processes and principles of change need to be applied at specific stages if progress through the stages is to occur. In the stage paradigm, intervention programs are matched to each individual's stage of change.
- Chronic behaviour patterns are usually due to some combination of biological, social, and self-control factors. Stage-matched interventions have been primarily designed to enhance self-controls.

This approach has shown promise in the field of behaviour change (Rodgers et al., 2001). These behaviours include smoking cessation (Andersen & Keller, 2002; DiClemente & Prochaska, 1982), cocaine use, weight control (Fallon & Hausenblas, 2004; Marshall & Biddle, 2001; Rodgers et al., 2001), high-fat diets, adolescent delinquent behaviours, safer sex (Patten et al., 2000), sunscreen use and physicians' preventive practices with smokers (Marshall & Biddle, 2001; Patten et al., 2000). Whilst it was originally developed for health behaviour problems such as those listed above, it has also been meaningfully applied to adults with eating disorders (Blake, Turnbull & Treasure, 1997).

Indeed, there is evidence that an individual's initial stage of change is related to improvement with therapy (Franko, 1997; Treasure et al., 1999). It has been suggested that increasing motivation to change amongst eating disorder populations is associated with a range of positive outcomes. Several studies have indicated a positive association between a high motivation to change and outcomes such as weight gain and changes in eating behaviours. Conversely, lower motivation to change has been associated with more severe eating disorder symptoms and body dissatisfaction (Geller et al., 2008; Zaitsoff & Taylor, 2009). A review by Clausen, Lubeck and Jones (2013) found that higher levels of pre-treatment motivation to change eating behaviour is associated with increased positive treatment outcomes on measures of change in restrictive eating behaviours, bingeing behaviours, and cognitive/affective measures of eating disorder pathology.

However, the TTM and the application of motivational principles to eating disorders has not been without criticism. Bandura (1997) proposed that a genuine stage theory must have three defining properties: qualitative transformations across stages,

invariant sequence of change, and non-reversibility. The dynamic nature of the model clearly violates the second and third of these properties, and Bandura (1997) argued that the factors addressed by the TTM do not differ significantly between true stages but rather exist on a continuum that are then arbitrarily subdivided into discrete categories. Such a criticism of the TTM is itself grounded in an arbitrary definition of how a stage theory should be constructed, with little relevance to its validity or utility. Indeed, on a similar level it has also been argued that the inherent logical validity of the model, in that the proposed stages appear logically necessary, validates the model, even where there is an absence of empirical support (Smedslund, 1997).

A more concerning criticism is the suggestion that human functioning is too versatile and multidimensional to be categorized into the discrete stages of the TTM (Bandura, 1997). This is a potential issue for almost any psychological model, as some element of reductionism is almost unavoidable in any attempt to briefly describe and categorise human behaviour and is explicitly addressed in the first critical assumption of the TTM. This problem is somewhat overcome by the fact that the TTM goes beyond the simple stages of change model and incorporates proposed processes of change, as well as accepting the dynamic elements of behaviour change in the non-linear nature of the model.

Concerns have also been raised regarding the measurement of stages of change, in that stage criteria and classifications are not consistent within or between the commonly used stage of change algorithms and scales, with many scale items being criticised as poorly constructed (Littell & Girvin, 2002). This is an issue that extends into the literature surrounding motivation to change in the context of eating disorders. Whilst a number of validated measures have been produced, as yet no research has been done to examine the most appropriate of these measures nor how widely comparable they are. As such, this is an issue that must be considered when examining the literature in this area, particularly in the context of systematic reviews where attempts are made to synthesise the current evidence base.

Despite these criticisms, the TTM presents a functional way of conceptualising the motivational journey that an individual with an ED might experience during recovery, and hence serves a useful role in understanding and developing treatment. Indeed, it is

suggested that it should, therefore, be at least one aim of treatment for eating disorders to assist the patient in progressing through these stages of change, and to provide mechanisms of support in the event of relapse (NICE, 2017). The ability of an intervention to increase motivation to change amongst eating disorder patients may therefore be integral to the delivery of effective treatment, with an understanding of the best methods for achieving this playing a key role in the design and delivery of future treatment pathways.

Interventions that aim to enhance motivation to change have been increasingly advocated in the treatment of eating disorders (Treasure & Schmidt, 2001), with the National Institute of Clinical Excellence (NICE) recommending that motivation should be directly addressed in the treatment of people with EDs (NICE, 2017). Given these guidelines, it is not surprising that some eating disorder services have begun to include models of motivation as a treatment option (Touyz, Thornton, Rieger, George & Beumont, 2003).

One of the most common approaches to addressing motivation to change is motivational interviewing (MI), which uses the TTM's stages of change to target active cognitive-behavioural strategies in combination with the relationship-building principles of humanistic therapy (Rogers & Carmichael, 1951). Developed by Miller and Rollnick (1991), motivational interviewing has been defined as a client-centred, yet directive, method for enhancing intrinsic motivation to change by exploring and resolving client ambivalence. This is achieved using four basic principles: expressing empathy, developing discrepancy, rolling with resistance, and supporting self-efficacy (Miller & Rollnick, 2001).

The concepts behind motivational interviewing have also resulted in a number of adapted motivational interviewing (AMI) interventions, which refer to interventions that incorporate additional non-motivational interviewing techniques, whilst retaining motivational interviewing principles as the core of treatment (Burke, Arkowitz & Menchola, 2003; Rollnick, Heather, & Bell, 1992). Perhaps one of the most prominent interventions to be developed from MI principles is Motivational Enhancement Therapy (MET), an approach that combines MI with personal feedback of assessment results (Miller, Zweben, DiClemente, & Rychtarik, 1992) and uses motivational

strategies to enable clients to use their own resources in the process of change. Commonly delivered as a brief four session intervention, the goal of MET is to determine which stage the person is in, and then to assist with movement through the stages to reach the goal of sustained change (Project MATCH, 1997).

Though there are limitations with current research on MET and MI (Feld, Woodside, Kaplan, Olmsted & Carter, 2001; Wade, Frayne, Edwards, Robertson & Gilchrist, 2009), these interventions are designed to increase a person's stage of change, with evidence suggesting that the higher the stage of change, the more likely a person is to be motivated to change behaviours (Prochaska & Diclemente, 1983), the lower their post-treatment pathology, and the higher their self-efficacy and engagement with treatment (Dray & Wade, 2012; Wade et al., 2009). More recently, researchers suggest that focusing on offering clients choice during motivational therapy and supporting the increase of autonomous motivation, as per the self-determination theory of behaviour change (Deci & Ryan, 2012), will enhance their desire to change and increase engagement with services (Vansteenkiste & Sheldon, 2005). However, at present these therapies rely on the person attending services in the first place.

### **1.3 Digital Approaches**

One potential avenue to achieving this, as well as offering greater accessibility to these treatments, is by utilising digital approaches. It has been shown that using SMS appointment reminders in health services can halve non-attendance (Guy et al., 2012; Young & Wilkins, 2013), however for ambivalent groups such as those with EDs, less passive interventions that can build autonomous motivation may be more beneficial. Evidence suggests that interventions based on volitional, self-regulatory techniques of 'implementation intentions' can increase attendance rates at psychotherapy by a third (Sheeran, Aubrey & Kellett, 2007). Using digital technology to address issues in health care is a current priority of the NHS (Young & Wilkins, 2013). Indeed, web-based interventions have been shown to be effective and acceptable to users for providing preventative, adjunctive or post-treatment interventions (Fitcher et al., 2012).

In general, the use of internet-based interventions has been identified as having a number of advantages. Delivering interventions via the internet overcomes restrictions introduced by the physical location of both the user and treatment, overcoming geographic boundaries and enabling widespread dissemination (Kersting, Schlicht & Kroker, 2009). This style of intervention also often allows users greater control and flexibility, as internet-based tools can generally be accessed at any time provided the user has a suitable device and an internet connection - something becoming even more prevalent, given the ubiquitous nature of modern online connectivity and the rise in the use of smartphone technology (Khalaf, 2013). This approach also allows greater flexibility with regards to the potential for self-referral. Additionally, modern internet based interventions often include elements of tailoring and user feedback, allowing more personalised treatment approaches than were available in earlier examples of these interventions (Yardley, Morrison, Bradbury & Muller, 2015). Finally, the use of the internet also affords users a greater level of anonymity. This style of intervention is therefore especially relevant for users who might not otherwise access treatment for reasons such as fear of social stigma or lack of easy access to a treatment centre.

However, the use of digital health interventions is not without its criticisms. Firstly, concerns have been raised regarding the potential impact of removing the clinician from some, or all, of a client's treatment and the impact this might have on their clinical outcomes and quality of care (Lupton, 2014). Indeed, this has been demonstrated in the literature, with research showing that including some element of direct contact, even very briefly, has positive benefits over and above the delivery of digital interventions by themselves (Newman, Szkodny, Llera & Przeworski, 2011; Yardley et al., 2016). This is potentially due to a lack of therapeutic alliance with digital interventions, something that has been highlighted as very important to a client's quality of care (Amichai-Hamburger et al., 2014). More modern digital health tools are attempting to address this, using greater levels of tailoring, personalisation and user feedback (Yardley, Morrison, Bradbury & Muller, 2015). A second concern is that despite the common claims that digital interventions are cost effective (Squires & Hester, 2002), these analyses often fail to take into account equipment and development costs (Thirumurthy & Lester, 2012). Lastly, problems with engagement

are commonly encountered in translating these results into practice when rolling out interventions (Doherty, Coyle & Sharry, 2012).

Despite these concerns though, it has been noted that people with eating disorders often turn to the internet for support (Davison, Pennebaker & Dickerson, 2000). Indeed, in recent years, an increasing number of internet-based interventions addressing eating disorders have been developed to facilitate access to effective treatments for these individuals. Many of these internet-based programs have been developed with the aim of preventing eating disorders. However, a recent review has identified an increase in interest in internet based interventions targeting people who already suffer from a diagnosed eating disorder, with internet based interventions addressing bulimia nervosa, binge eating, EDNOS and body dissatisfaction having been developed (Dolemeier, Tietjen, Kersting & Wagner, 2013). Three systematic reviews have examined the effectiveness of existing internet-based eating disorder interventions, and have reported encouraging findings, concluding that internet-based programs are emerging as a successful approach for the treatment of eating disorders (Aardoom, Dingemans, Spinhoven & Van Furth, 2013; Dolemeier et al., 2013; Melioli et al., 2016). Furthermore, two web based interventions developed for eating disorder patients (ESS-KIMO and Smart Eating) have resulted in greater readiness to change, higher self-esteem, self-efficacy and improved clinical outcomes (Hötzel et al., 2014; Leung, Ma & Russell, 2013a; 2013b). Online screening approaches for eating disorders have also been recently explored, with the American based National Eating Disorders Association's online screening tool identifying roughly 200,000 individuals with, or at risk of, an eating disorder; the majority of whom (86%) were not currently in treatment. However, of these, less than 10% opted to engage with self-help or guided self-help online digital programs or expressed interest in calling a helpline for referral to treatment (Taylor et al., 2018).

#### **1.4 This Research**

This PhD was conducted as part of a wider programme of research focusing on the development of MotivATE, a novel web-based intervention intended to be delivered at the point of referral to an eating disorder service. The MotivATE program was

developed prior to the commencement of this PhD using the intervention mapping process outlined by Bartholomew, Parcel and Kok (1998) which recognises three phases of program development: needs assessment, program development and evaluation.

A needs assessment was conducted via an examination of the literature to determine any issues with the current treatment pathway, as well as levels and potential causes of poor treatment engagement and non-attendance, as outlined above. This was followed by a service provision survey of outpatient services in the UK, conducted by telephone with lead consultants and was based on audit data collected as part of service evaluations. This survey found non-attendance, as a result of not opting into the service or not turning up to appointments, ranged from 10-32% of referrals suitable for assessment (Muir et al., 2017). The above, coupled with previous findings in this area (Leavey, Vallianatou, Johnson-Sabine, Rae & Gunpath, 2011; Waller et al., 2009), identified a real need to address non-attendance in services across the UK.

Therefore, this PhD sought to extend this work by exploring issues surrounding engagement, clinical treatment and support in both online and offline settings, with a focus on the uptake of treatment, and ways in which this can be improved. The research was targeted largely at digital health interventions, and more specifically MotivATE, and individuals with eating disorders; a treatment delivery method and population both known to have particular issues with engagement. This topic will be examined from a number of different perspectives and using a range of research methodologies in order to present a well rounded investigation of the issues at hand and of potential ways to address them.

The main aim of this thesis focuses around the assessment and continued development of MotivATE. This work therefore begins by seeking to establish the theoretical feasibility of MotivATE. It then seeks to assess the effectiveness of MotivATE at increasing attendance at an ED service, as well as seeking qualitative feedback on how users perceived and engaged with it, and finally contributing to the continued development of MotivATE by exploring ways in which it might be further optimised through its aesthetics.



This PhD presents several novel and meaningful contributions to the current literature regarding uptake and engagement with treatment, particularly in relation to individuals with eating disorders. Firstly, this research increases our understanding of the impact of treatment on motivation to change amongst individuals with eating disorders, as well as exploring roles of motivational interventions in this context. Secondly, the effectiveness of MotivATE is explored in a clinical trial that seeks to demonstrate its effect on treatment attendance in a naturalistic setting. Thirdly, a qualitative study exploring users' impressions throughout the user pathway is undertaken, in the context of previous experiences of seeking support. Finally, this PhD builds upon previous research on website aesthetics by applying these theories to the clinical field in order to demonstrate the importance of visual design when seeking to engage users with clinical interventions. The research also attempts to generate a model that can be used to better understand this effect and begin to help guide the continued development of MotivATE and other online interventions, both within the eating disorder and wider populations.

To achieve this, the research was conducted in four phases, to address the following research questions:

*1.4.1 What evidence is there that treatment interventions increase motivation to change amongst individuals with eating disorders?*

In order to ensure that a motivationally focused intervention is a feasible way of improving uptake of eating disorder treatment, the first phase of the PhD conducted a systematic review of the literature surrounding the ability of treatment to improve motivation to change in ED patients. Whilst previous systematic reviews have been conducted in this area, conflicting conclusions have been presented, possibly as a result of different reviews examining slightly different sets of studies, due to variations in search terms and inclusion criteria. As a growing body of evidence is beginning to form which conflicts with current guidelines by suggesting that there is insufficient evidence to support the use of motivationally focused interventions, this research sought to consolidate some of the conflicts presented in previous reviews by presenting a wider account of this area of the literature.

This was done by exploring motivational interventions in the wider context of general treatment, examining the effectiveness of treatment at improving motivation to change, before then comparing the effectiveness of explicitly motivational interventions in comparison to common non-motivational treatment approaches. As such an exploration of the evidence for the effectiveness of motivational interventions was conducted, and placed within the context of shifts in motivation to change that can already be found as a result of general practice.

This research contributes to the existing literature by presenting a more nuanced and unified understanding of the current research relating to improving motivation to change in individuals with eating disorders. The review also presents preliminary evidence for the use of online tools as a potential approach to improving motivation to change, which supports the rationale for the development of the MotivATE intervention explored in the remainder of the PhD.

#### *1.4.2 Does adding MotivATE to usual care increase attendance at an adult eating disorders outpatient service?*

Having explored the role of motivational interventions in improving motivation to change amongst individuals with eating disorders, and presented evidence to support the use of an online motivational tool in this context, this PhD then sought to establish whether the use of such a tool significantly improves treatment uptake in practice. Following final alterations and development to the MotivATE intervention, based on patient and service user feedback, the effectiveness of the finished website was trialled in a clinical setting. A zelen randomised control trial was conducted to demonstrate the impact of MotivATE on uptake with treatment at an adult ED outpatient clinic in the naturalistic context of usual care. A single consent zelen design was used, in order to reduce the potential impacts of resentful demoralisation on the control group, as well as to allow the trial to more closely reflect conditions as they would be in general practice. The trial lasted for one year, with all non-urgent adult referrals to the clinic being recruited and randomly assigned to either have access, or no access, to MotivATE during the waiting period for their initial assessment appointment. Attendance at this initial assessment, collected as a part of routine audit

data, was used as the dependent outcome measure. The findings indicated that in its current state, MotivATE did not have a significant impact on attendance at assessment, with follow-up analysis suggesting a lack of uptake within the intervention.

A nested qualitative interview study was also included in the design of this trial, which sought to gain insight into participants' perspectives towards the intervention. However, despite attempts to improve the recruitment procedure at the mid-point of the trial, this aspect of the research failed to recruit sufficient numbers. Whilst this limited the potential scope of the trial at this stage, from a piloting perspective it did highlight the fact that, whilst the email recruitment strategy used in the trial was effective at maintaining anonymity, a more direct approach may be needed in future studies attempting to recruit from this population.

This research therefore made significant contributions to the development of a novel intervention by exploring its effectiveness in a clinical context. In a broader context, this research also contributes to the literature surrounding the use of motivational interventions, particularly in an online context.

#### *1.4.3 What are people with eating disorders' experiences of seeking and engaging with support and how do they perceive and engage with a new online motivational intervention?*

Due to recruitment issues to the nested qualitative study, a complimentary asynchronous online focus group study was designed in order to explore how and why people with eating disorders engage, or fail to engage, with support in both an online and offline context and how, more specifically, they engaged with the MotivATE intervention in this context. Unlike the previously proposed qualitative study, this research recruited from a community rather than clinical sample. Whilst this means that the research was not able to explore users' experiences within the immediate clinical context in which MotivATE was offered, limiting the sample to those currently referred to treatment may have intrinsically limited the study to a small proportion of those who have experienced an eating disorder, as well as bias it towards those more likely to engage with treatment. By expanding into the wider community population,

as well as offering the inherent anonymity afforded by the internet, it was more likely that individuals who self-identify as suffering from an eating disorder but were unwilling to engage with any treatment took part in this research. In an effort to try and replicate more closely the experience of participants in the clinical trial, the study adopted a longitudinal element and utilised several different phases in order to simulate the experiences of considering, finding and then using online support in the form of MotivATE. This was done by running the focus group over a one month period, starting with an open discussion about seeking support, then presenting the front page of the MotivATE program and finally giving participants the opportunity to use it, with conversation continuing throughout. The discussion highlighted that whilst people with eating disorders do identify a potential role within treatment for online support such as MotivATE, this is limited by negative attitudes towards these approaches which may contribute to low uptake. It was also noted that factors such as exposure to online support and effective design may serve to help mitigate these negative attitudes.

This research therefore furthers our understanding of people with eating disorders' experiences and perceptions of seeking support, particularly in online contexts, as well as addressing user experiences of MotivATE, in order to compliment the work conducted in the clinical trial. Thus, a deeper understanding of the interaction between users and MotivATE in the context of engagement is presented, allowing for a more nuanced contribution to the literature, as well as highlighting possible areas for continued development of the intervention. Insights are also provided into potentially modifiable barriers to engagement with online support amongst individuals with eating disorders, allowing for the development of future research exploring ways to address these issues. Furthermore, this study also utilised a lesser used design, adopting a longer-term online approach to simulate the user pathway experienced in a real-world context.

#### *1.4.4 How does the aesthetics of a web-based intervention impact attitude and engagement?*

The final phase of this PhD examined the role of website aesthetics in user uptake of online interventions, something that has been commonly highlighted as an issue for

digital health, once again using the specific example of MotivATE. This was done as issues with uptake are common with web-based interventions, and something which may be further compounded by the ambivalent nature of individuals with eating disorders towards treatment. In order to explore this, stimuli were produced based on the MotivATE front page using criteria derived from the Visual Website Aesthetics Inventory (VisAWI), which was chosen from the aesthetics literature, with the aim of either positively or negatively exemplifying particular aesthetic traits. These stimuli were tested in two rounds of piloting to demonstrate sufficient variance of responses on the VisAWI.

These stimuli were then used in an online questionnaire study to explore the impact of visual aesthetics on behavioural intentions. This was done in the context of applying an adapted form of the Technology Acceptance Model (TAM) to a clinical context, whilst also examining differences in responses between individuals with eating disorders and the general population. This study recruited participants across three conditions: individuals with eating disorders who were shown designs with eating related content (ED-ED), individuals from the general population shown designs with eating related content (GP-ED), and individuals from the general population shown designs with health related content (GP-H). These three conditions were chosen in order to control for the effect that content relevance may have on responses when comparing individuals with eating disorders and the general population, as this subject has not been addressed by the current literature. This research highlighted differences in the way the general population and people with eating disorders responded to stimuli referring to eating disorders, as such final models were generated using pooled data from the ED-ED and GP-H groups. The final model indicated that both simplicity and craftsmanship significantly predicted behavioural intentions.

Once this model had been developed, a final piece of research was conducted to apply this to a scenario with behavioural outcomes in order to assess the potential impact. The model was therefore used to develop two designs of MotivATE, a 'high' and 'low' design, which were then assessed for their impact on user engagement and user attitudes towards online support.

This research therefore applied an established model to a new clinical context, helping to further understand how individuals perceive and consider engaging with clinical interventions at first contact and the role that visual aesthetics plays in this process. By exploring differences in responses between individuals with eating disorders and the general population, the research also contributes to the literature by highlighting variations in the ways that people with different conditions may perceive and engage with digital health interventions. More specifically, it allowed for an in-depth examination of differences in the way people with eating disorders may respond and be influenced by visual aesthetics in comparison to people without an eating disorder. This then helps to demonstrate the importance of visual design in the development of effective and engaging digital health tools, as well as starting to pick apart key elements and the role they play for different populations.

## **Chapter 2: Improving motivation to change amongst individuals with eating disorders: A systematic review.**

### **2.1 Introduction**

As noted in the previous chapter, low motivation to change has been associated with more severe eating disorder symptoms and body dissatisfaction (Geller et al., 2008; Zaitsoff & Taylor, 2009), whilst higher levels of pre-treatment motivation to change are associated with increased positive treatment outcomes relating to restrictive eating behaviours, bingeing behaviours, and cognitive/affective measures of eating disorder pathology (Clausen, Lubeck & Jones, 2013; Treasure et al., 1999). Enhancing motivation to change can therefore be considered essential in the treatment of eating disorders, regardless of the approach taken (NICE, 2017; Treasure & Schmidt, 2001).

The most common form of motivational intervention is Motivational Interviewing (MI), which has been defined as a client-centred yet directive approach for enhancing intrinsic motivation to change by exploring and resolving client ambivalence (Miller & Rollnick, 2002). The concepts behind MI have also resulted in a number of Adapted Motivational Interviewing interventions (AMIs)(Rollnick, Heather, & Bell, 1992; Burke, Arkowitz & Menchola, 2003), such as Motivational Enhancement Therapy (MET)(Miller, Zweben, DiClemente, & Rychtarik, 1992; Project MATCH, 1997).

The use of motivational interventions in the treatment of eating disorders has found support in recent years. Macdonald, Hibbs, Cofield and Treasure (2012) examined the effectiveness of interventions that include the principles and techniques of MI and its adaptations in the treatment of eating disorders. This systematic review found promising results for interventions that included motivational interviewing, particularly with regards to their use in increasing readiness and motivation to change. Similarly, Bonder and Mantler's (2015) review of interventions using both specific and adapted MI approaches reports significant increases in readiness to change in 70% of the 10 studies reviewed. Bonder and Mantler note, however, that only half of these studies found improvements solely in the treatment group.

Despite the increase in the use of these motivational interventions, this approach has recently come under criticism. Knowles, Anokhina and Serpell (2013) reviewed seven studies that aimed to determine whether interventions specifically designed to enhance motivation to change in people with eating disorders were effective. Improvements were made when motivational interventions were compared with lower intensity treatments (e.g. self-help) or with non-clinical populations, but not in clinical samples or in comparison to established treatments (e.g. Cognitive-Behavioural Therapy (CBT)). The review also found that motivational interventions appeared to be effective at improving binge eating behaviours, but not compensatory and restrictive behaviours. As such, Knowles et al. (2013) concluded that the evidence base did not support the widespread dissemination of motivation-enhancing interventions in the treatment of eating disorders. Similarly, Waller (2012) criticised the lack of evidence to support motivational interventions.

Current evidence for the effect of motivation-focused therapies (MI, MET, AMIs) in improving motivation to change is therefore mixed. This is potentially a result of a lack of homogeneity in terms of the study designs, samples and measures used in these studies. It is also of note that risk of bias was not systematically addressed in any of the previous reviews, making it hard to assess the quality of evidence. Additionally, it is difficult to assess the effectiveness of specifically motivational interventions in comparison to other approaches without framing this question within the context of increasing motivation to change in treatment as a whole. This becomes particularly problematic as it can be difficult to draw out the effect of motivational-focused aspects when these therapies are combined with other approaches such as CBT.

### *2.1.1 Aims*

Questions remain as to how effective specific motivation-focused therapies are at improving motivation to change in relation to other therapies. Thus, this systematic review aims to address this uncertainty by taking a broader approach than previous systematic reviews to answer the following research questions:



- 1) What evidence is there that treatment interventions increase motivation to change amongst individuals with eating disorders?
- 2) Are specifically motivationally focused interventions more effective than established treatments at increasing motivation to change?

## **2.2 Methods**

### *2.2.1 Search Strategy*

Searches of the published literature were conducted across all available date ranges on PubMed, PsychInfo and Web of Science for all combinations of the following two sets of terms, in any search field; "eating disorder", "anorexia", "bulimia", "EDNOS", "eating disorder not otherwise specified", "anorexia nervosa", "bulimia nervosa", "binge eating", "disordered eating", "OSFED" and "otherwise specified feeding or eating disorder"

AND "motivation", "motivational", "motivational intervention", "motivational enhancement", "motivational assessment", "motivational interviewing", "behaviour change counselling", "intention to change", "stages of change", "readiness to change", "self determination theory" and "transtheoretical model".

As a result, 108 separate searches were conducted in each online repository, with resulting papers screened against the following inclusion criteria: participants met, or partially met diagnostic criteria for an eating disorder; the research investigated an intervention that was intended for eating disorder patients (i.e. not intended for caregivers); the study included a pre-post test of motivation to change; and was reported in a published article that was available in the English language. The inclusion criteria was limited to articles published in English, because it was estimated the majority of relevant work to have been undertaken in Europe or the US. When exploring the second research question the following additional selection criteria were used to identify relevant studies from those included in the review: compared a specific motivationally focused intervention to an active or treatment as usual (TAU) control group and; included a pre-post test of motivation to change for both groups.

The references lists of these papers and recent reviews in this area were also hand searched for additional papers, with no additional papers identified. The screening and review of published papers was conducted independently by both JD and SM ( $K = 0.96$ ) and any issues were discussed and resolved by consensus.

Identification of unpublished literature was undertaken by contacting corresponding authors of all included papers, as well as a search conducted in the World Health Organisation's International Clinical Trials Registry Platform (ICTRP) using the same method outlined above. Where potential trials of interest were identified, researchers were contacted to enquire about available data. The screening and review of unpublished material was conducted independently by only JD, due to the required reliance on authors.

### *2.2.2 Data Extraction*

Data was extracted from included studies using Microsoft Excel forms to record: sample size, gender, age and eating disorders; the number of completers; study characteristics, including design, treatment and control conditions; motivational measures used and assessment times; motivational outcomes and, where available, effect sizes (where multiple assessment times were examined effect sizes are reported from the first to last assessment). Where effect sizes were not available in the published paper, corresponding authors were contacted to enquire if the information was available. If the information was unavailable, effect sizes were calculated by the authors where the necessary data was available. Individual write-ups of each study were produced to summarise findings and highlight any methodological shortcomings. Data extraction was carried out by JD and confirmed by SM or KA with no disagreements.

The primary outcome investigated was motivation to change between pre- and post-intervention. A narrative synthesis approach was adopted to analyse the extracted data due to the heterogeneity between included studies. Due to the small number of studies available, and the variety of differences between studies, no statistical analysis was conducted.

### *2.2.3 Risk of Bias*

Risk of bias for all included studies was assessed on three domains derived from the Risk of Bias in Non-Randomised Studies (ROBINS-I) tool (Sterne et al., 2016).

Bias in classification of interventions: a judgment of high (low) risk of bias was given if the study intervention(s) type, setting, dose/frequency, intensity and/or timing of intervention was not (was) adequately defined to allow for replication, or if (no) major aspects of the assignments of intervention status were determined in a way that could have been affected by knowledge of the outcome.

Bias due to deviations from intended interventions: a judgment of high (low) risk of bias was given if any (no) deviations from the intended intervention(s) were reported that were likely to have affected the outcome.

Bias due to missing data: a judgment of high risk of bias was given if the outcome data for the study was not (was) available for all, or nearly all (greater than 90% data), participants and (or) missing data was not (was) suitably accounted for in the analyses. This bias was assessed in relation to its impact on reported motivational outcomes.

In addition to this, studies that utilised a randomised control trial design were assessed for risk of bias on the following two domains derived from the Cochrane Collaboration's tool for assessing risk of bias in randomised trials (Higgins et al., 2011):

Selection Bias: a judgment of high (low) risk of bias was given if a non-random (random) approach to sequence generation was reported or (and) if participants or investigators enrolling participants could (not) possibly foresee assignments and thus introduce selection bias.

Performance Bias: a judgment of high (low) risk of bias was given if participants and personnel were (not) aware of which intervention a participant received and (or) the outcome could (not) have been influenced by this lack of blinding.

For each domain, if insufficient information was provided to make a clear judgment the domain was marked as having an unclear risk of bias.

## 2.3 Results

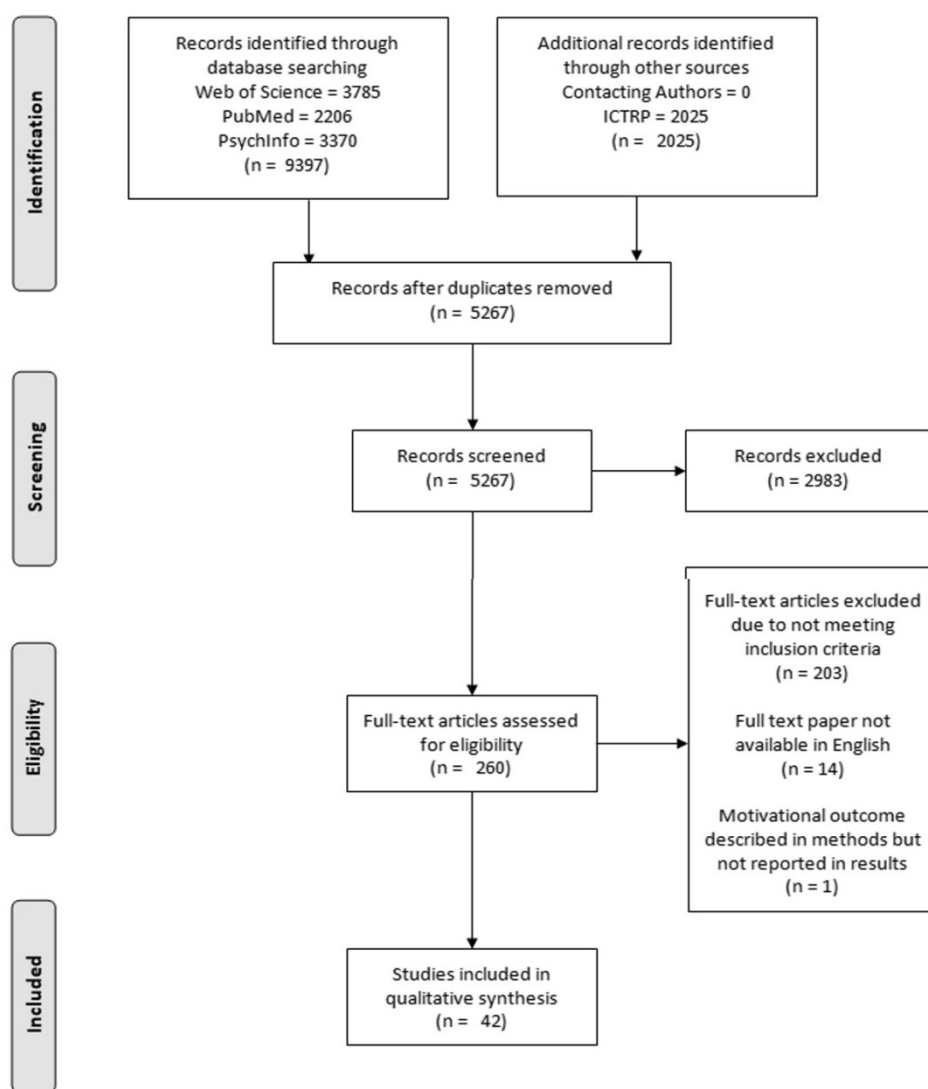


Figure 2.1: PRISMA flow diagram of systematic review.

Original searches of the published literature were conducted between the 9th and 22nd of February, 2016, and updated in August 2017 during the write up of the paper. Searches for unpublished literature were conducted from May – July 2018. Details of the outcomes of the search and screening processes are given in the PRISMA diagram.

42 studies (3241 participants) are included in the review, 41 of which were published in peer reviewed journals, one was unpublished. Participants varied in terms of diagnoses, where 19 studies included patients with a range of eating disorders, 15 focused on anorexia nervosa only, 2 focused on bulimia nervosa only, 2 focused on

binge eating disorder only and 4 did not clearly state the eating disorder of participants in the study. Participants were recruited from different locations, including inpatient, outpatient, community and university settings.

The selected studies investigated a broad range of interventions, including MI, CBT, cognitive remediation therapy, MET, psycho-education and residential treatment programmes.

Studies also varied according to length of follow-up, with 26 studies only making post comparisons immediately after the intervention, five included follow ups which did not examine motivation, whilst the remaining 11 included follow ups that addressed motivation varying from six weeks to two years. Table 2.1 includes full details of all included studies.

Table 2.1: Characteristics of included studies

Author, Year	Sample (Mean Age)	Completed	Eating Disorder	Study Design	Treatment	Control	Assessment Times	Motivatio n Measure	Outcomes	Effect Size (Cohen's d unless stated)
Ackard et al., 2014	182: 175 women and 7 men (24.6)	72 (40%)	AN, BN, EDNOS	Case series	Multi-disciplinary treatment program.	None	Pre, 3-, 6- and 12 months	ED-SOC	Marginal increase of participants in preparation/action stages at 3-months. But decreased to baseline for preparation/action and below baseline for contemplation	Data not available
Ålgars et al., 2015	32 women (23.4)	32 (100%)	Not reported	Case series	Ten 90 minute group CBT-E sessions	None	Pre, post	MSCARED	Significant increase in readiness for change.	Partial $\eta^2 = .40$

		43 (48%) - Active: 23 (44%); Control : 20 (47%)	AN, BN, EDNOS	Sequenti al trial	4 weekly MFT sessions before an enhanced CBT program (length not specified)	Enhance d CBT program	Pre, post	RMI	Significant decrease in pre- contemplation and increase in restriction for treatment group. No comparisons made between conditions.	Data not available
Allen et al., 2011	Gender not given (26.5)									
		56: 26 women and 4 men (12.8)	AN, BN, EDNOS	Case series	Day treatment program	None	Pre, post	MSCARED	Increase of 1.9 (+1.3) stages. Parents reported improvements in perceptions of stages of change. Patients rated themselves at significantly higher stages of change than their parents.	Data not available
Bustin et al., 2013										

Castro-Fornieles et al., 2010	40: 39 women and 1 man (16.2)	31 (78%)	BN	Cohort study	6 to 8 month multidisciplinary program.	None	Pre, 6 months	BNSOCQ	Significant increase in motivation to change at 6 months.	0.28
Dingemans et al., 2013	82 women (27.9)	67 (82%)	Not Stated	RCT	10 individual sessions of CRT (45 min) + treatment as usual.	Treatment as usual	Pre, 6 weeks and 6 months	Motivational Ruler	No significant improvements over time.	<i>Ability to change (0.08); Importance to change (0.04)</i>
Feld et al., 2001	38: Gender not given (26.5)	19 (50%)	AN, BN, EDNOS	Pilot Study	Four hour-long MET sessions taking place over 4 weeks.	None	Pre, post	URICA, Motivational Ruler	Significant increase in action. Significant increases for motivational ruler items.	<i>Action: 0.39 Motivation to change (0.68); Readiness for change (0.81); Confidence for change (0.77)<sup>a</sup></i>



Geller, Zaitsoff & Srikameswaran, 2005	42: 41 women and 1 man (26.6)	31 (74%)	AN, BN, EDNOS	Case series	12–15 week intensive day treatment program	None	Pre, 7 weeks and post	RMI	Significant improvements in motivation.	Partial $\eta^2 = .56$
Geller et al., 2011	175: Gender not given (28.4)	113 (65%)	AN, BN, EDNOS	RCT	5 weekly 60 minute RMT sessions + treatment as usual	Wait listed + treatment as usual	Pre, 6 weeks and 3 months	RMI	Significant shift from restriction pre-contemplation to action at 6 weeks and 3 months in both groups. Significantly more control participants highly ambivalent to change.	RMT ( Partial $\eta^2 = .12$ ), Control ( Partial $\eta^2 = .20$ )
Genders & Tchanturia, 2010	30: 28 women and 2 men (28.4)	18(60%) - 6 (20%) dropout, 6 (20%)	AN	Pilot Study	CRT across 4 group sessions	None	Pre, post	Motivational Ruler	Significant improvements in ability but not importance to change.	Ability to change (0.57); Importance to change (0.06)

		discharged									
George et al., 2007	8 women (36)	8 (100%)	AN, EDNOS	Case series	Day treatment program utilising MET	None	Pre, 6 months	ANSOCQ,	Significant increase in motivation to change scores.	1.08 <sup>a</sup>	
Gowers & Smyth, 2004	42: 41 women and 1 man (16.1)	33 (79%)	AN	Pilot Study	1 individual AMI session as prelude to intensive outpatient program	None	Pre, post	Motivational Ruler	Significant improvements in motivation pre to post. Engagement in out-patient program at follow up predicted by motivation post-intervention.	0.43 <sup>a</sup>	
Hillen et al, 2015	40: women (15.1)	34 (85%)	AN	Cohort study	Inpatient multimodal multidisciplinary treatment program	None	Pre, 6 weeks and discharge	ANSOCQ	Significant increase in motivation admission and discharge.	1.05 <sup>a</sup>	

Hötzel et al., 2014	212 women (27)	125 (59%)	AN, BN	RCT	6 weekly MET online sessions (45 minutes each).	Waitlist	Pre, post	SOCQ—ED	Significant increase in motivation for treatment but not control.	Motivation to: change the fear of becoming fat (0.37); reduce food and weight preoccupation (0.21); to gain weight (0.21)
Kuge et al., 2017	7: gender not given (13.9)	6 (86%)	AN	Single Arm Trial	Multidisciplinary treatment program plus four weekly 40 minute CRT group sessions.	None	Pre, post	Motivational Ruler	Small effect sizes found for ability to change and importance to change	Ability to change (0.31), Importance to change (0.45)
Leung et al., 2013	280: 272 women and 8 men (26)	176 (63%)	Not Stated	Open trial	Smart Eating self-help program	None	Pre, post	MSCARED	Significant improvements in motivation	0.42 <sup>a</sup>

Leung, Ma & Russell, 2013a	185: Adults, 182 women and 3 men (26.5)	46 (24.9%)	AN, BN, EDNOS	Open trial	Online self-help program (Smart Eating)	None	Pre, 1- and 3- months	MSCARED	Significant changes in motivation to give up bingeing and excessive exercise across both follow ups.	Motivation to give up: Dieting (0.09), Bingeing (0.28), Excessive exercise (0.47), Vomiting (0.01), Laxatives (0.03) <sup>a</sup>
Lueng, Ma & Russell, 2013b	194: 191 women and 3 men (26.9)	49 (25%)	Not stated	Open Trial	Online self-help program (Smart Eating)	None	Pre, 1-, 3- and 6- months	MSCARED	Significant improvement in MSCARED scores across all follow-ups.	Partial η <sup>2</sup> = .31
Lloyd et al., 2014	42 gender not given (median = 22)	21 (50%)	AN	Pilot Study	5 group sessions based upon a CBT model of perfectionism.	None	Pre, post	Motivatio nal Ruler	No significant changes for perceived importance to change.Trend towards significance for ability to	Importance to change (0.04); Ability to change (0.38)

									change.	
McHugh, 2007	65 women (16.5)	65 (100%)	AN	Cohort study	Residential treatment program of individual, group, and family therapy + nutritional and medical treatment.	None	Pre, post	ANSOCQ	Readiness for change improved from admission to discharge.	0.73 <sup>a</sup>
Pellizzer, Unpublished	52 gender not given (unknown)	32 (62%)	AN, BN, BED, EDNOS	Pilot Study	10 session CBT-T	None	Pre, session 1, session 4, session 10, 1- and 3-month follow up	Motivational Ruler	Significant improvement in self-efficacy but not readiness to change.	Self-efficacy (0.41); Readiness to change (0.20)
Pretorius et al., 2012	30: 29 women and 1 man	24 (80%)	AN	Open trial	6 week CRT group	None	Pre, post	Motivational ruler	No significant changes in perceived importance to change and	Importance to change (0.15); ability to change

		(15.6)							ability to change.	(0.15)
Riva et al., 2002	20 women (20.3)	20 (100%)	BED	RCT	VR treatment consisting of seven 50 minute 3-D Healing Experiences	Psychonutritional groups using the cognitive-behavioral approach.	Pre, post	URICA	Significant increase in URICA scores for the active condition but not for the control condition.	Data not available <sup>a</sup>
Rodríguez-Cano & Beato-Fernández, 2005	67 women (22.6)	55 (82%)	AN, BN, EDNOS	Case series	1-year multidisciplinary treatment program	None	Pre, 1 year	ACTA	Significant increases in Action and Maintenance and decreases in all other stages.	Pre-contemplation (-0.48), Contemplation (-0.63), Preparation (-0.43), Action (0.39), Maintenance (0.61), Relapse







									participants	to change (0.2)
Tchanturia, Larson & Brown, 2016	98 women (26.3)	98 (100%)	AN	Case Series	4-6 weekly 45 minute group CRT sessions.	None	Pre, post	Motivatio nal Ruler	Significant improvements in ability but not importance to change.	Ability to change (0.34), Important to change (0.04)
Tchanturia et al., 2015	52: 50 women and 2 men (28.4)	33 (60%)	AN	Case series	CREST delivered across 10 sessions	None	Pre, post	Motivatio nal Ruler	Significant improvements in ability but not importance to change.	Ability to change (0.71); importance to change (0.0)
Thaler et al., 2014	107: gender not given (26.5)	83 (78%)	AN, BN, EDNOS	Cohort Study	Intensive day treatment program (DTP) with mandated weight gain	Same as DTP but without mandate d weight gain	Pre, post	ACMTQ	No significant increases in motivation. Increase in mandated weight gain condition but decrease in non-mandated condition.	Partial $\eta^2 =$ .07

Thaler et al., 2016	80: gender not given (26.9)	51 (64%)	AN	Case Series	Inpatient treatment including CBT, SSCM, and psycho-education.	None	Pre, post	ACMTQ	No significant changes motivation.	<i>Autonomous (0.05), Controlled (-0.07)<sup>a</sup></i>
Touyz et al., 2013	63 women (33.2)	55 (87%)	AN	RCT	CBT-AN during 30 outpatient visits across 8 months.	SSCM during 30 outpatient visits across 8 months.	Pre, post, 6- and 12- months	ANSOCQ	No differences between groups pre-post. Increase in motivation across time.	CBT: 1.52, SSCM: 0.91 <sup>a</sup>
Wade, Treasure & Schmidt, 2011	28: 27 women and 1 man (25.6)	23 (82%)	AN	Case series	MANTRA	None	Pre, Post, 3- and 12- months	ANSOCQ	Significant improvements in motivation from pre to post and maintained up to 12 months	1.57
Weiss et al., 2013	39 women (28)	32 (82%)	AN, BN, EDNOS	RCT	4 weekly individual sessions of MI (50 minutes) + treatment	Treatment as usual	Pre, post	Motivational Ruler	Confidence in changing eating increased in both groups.	Partial $\eta^2 = .36$

as usual.

Willinge, Touyz & Thornton, 2010	58: gender not given (22)	44 (76%)	AN, BN, EDNOS	Case series	Open program consisting of CBT and MET, including a 5- and 3-day per week program.	None	Pre, post	ANSOCQ	Significant increase in readiness to change from admission to discharge.	0.7
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*Research Question 2: Studies comparing a specific motivationally focused intervention to an active or treatment as usual (TAU) control group including a motivational measure for both groups*

Cassin et al., 2008	108 women (Not Provided)	94 (87%)	BED	RCT	One individual AMI session (80 minutes) as a prelude to a self-help	Self-help handbook only	Pre, post	Motivational Ruler	Confidence for change significantly higher in AMI than control. No significant differences in	Importance of change(0.10); Readiness for change (0.14); Confidence
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					handbook				importance or readiness to change.	for change (0.96)
									Non-significant increase in both groups pre-post. Non-significant increases in treatment group and decreases in control post-to follow-up.	Data not available
Dean et al., 2008	42 women (22.4)	35 (83%)	AN, BN, BED	Sequential trial	4 weekly MET group sessions + treatment as usual	CBT + Treatment as usual	Pre, post and 6 weeks	ANSOCQ (modified)		
Dunn et al., 2006	90: 79 women and 11 men (19)	59 (66%)	BN, BED, EDNOS	RCT	1 initial 85 minute individual MET session + a self-help manual	Self-help manual only	Pre, post	URICA (modified)	Significant increase for binge and compensatory readiness to change in MET group. No significant changes in	Binge: Pre-contemplation (0.44), contemplation (0.42), action (1.01) Compensatory: Pre-

									control group.	contemplation (1.50), contemplation (1.10), action (0.67) <sup>a</sup>
										<i>MET: Pre-contemplation (-0.34), Contemplation (-0.43), Action (0.32)</i>
Treasure et al., 1999	125 women (28.6)	87 (79%)	BN	RCT	4 weekly individual MET followed by 8 weekly individual or group CBT.	4 weekly individual CBT followed by 8 weekly group CBT.	Pre, post	URICA (modified)	Significant increase in motivation in both groups. More control group participants moved to the action phase	<i>Control: Pre-contemplation (-0.36), Contemplation (-0.27), Action (1.01)<sup>a</sup></i>

Vella-Zarb et al., 2014	45: 44 women and 1 man (24.9)	35 (78%)	BN, BED	RCT	MI (60 minutes) followed by a self help manual (Overcoming Binge Eating).	Psycho-education (60 minutes) followed by a self help manual.	Pre, post	URICA	Significant increase in readiness to change from pre- to post in treatment but not in control group.	0.75
Wade et al., 2009	47: 45 women and 2 men (21.9)	39 (83%)	AN	RCT	Four sessions of MI with a novice therapist + treatment as usual	Treatment as usual	Pre, 2- and 6 weeks	ANSOCQ, Motivational Ruler	Significant increase in motivation at week 2 for both groups but declining below baseline at week 6.	Cohen's w = 0.43

Notes:-

**Eating Disorder:** Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED), Eating Disorder Not Otherwise Specified (EDNOS).

**Study Design:** Randomised Control Trial (RCT).

**Treatment:** Cognitive Behavioural Therapy Enhanced (CBT-E), Motivational Interviewing (MI), Adapted Motivational Interviewing (AMI), Motivational Enhancement Therapy (MET), Readiness and Motivation Therapy (RMT), Maudsley Model for Treatment of Adults with AN (MANTRA), Specialist Supportive Clinical Management (SSCM), Cognitive Remediation Therapy (CRT), Cognitive Remediation and Emotion Skills Training (CREST), Multi-Family Therapy (MFT). Interventions shown in *ITALICS* contain motivational elements.

**Motivational Measures:** Readiness and Motivation Interview (RMI)(Geller & Drab, 1999), Readiness and Motivation Questionnaire (RMQ) (Geller et al., 2013), University of Rhode Island Change Assessment Scale (URICA)(Hasler, Klaghofer & Buddeberg, 2003), Anorexia Nervosa stages of change questionnaire (ANSOCQ)(Reiger et al., 2000), Bulimia Nervosa stages of change questionnaire (BNSOCQ)(Martinez et al., 2007), Attitudes Towards Change in Eating Disorders questionnaire (ACTA)(Fernandez & Cano, 2003), Pros and Cons of Eating Disorders Scale (P— CED)(Gale et al., 2006), Eating Disorders Stage of Change questionnaire (EDSOC)(Ackard et al., 2009), Autonomous and Controlled Motivations for Treatment Questionnaire (ACMTQ)(Zuroff et al., 2007), Motivational Stages of Change for Adolescents questionnaire (MSCARED)(Gusella, Butler, Nichols & Bird, 2003), Stages of Change Questionnaire for Eating Disorders (SOCQ—ED)(von Brachel et al., 2012) and Motivational Likert Scales (Motivational Ruler).

**Effect Size:** <sup>a</sup>Effect sizes shown in *ITALICS* have been calculated using reported means and SDs.

In addition to this, table 2.2 provides a brief summary of the balance of evidence for each of the research questions by highlighting the position of each of the included papers outlined above.

Table 2.2: *Distribution of evidence to support each research question provided by the papers included in this review.*

<b>Research Question</b>	<b>Support</b>	<b>Weak/ Mixed Support</b>	<b>Do Not Support</b>
What evidence is there that treatment interventions increase motivation amongst eating disorder populations?	Weiss et al., 2013; Vella-Zarb et al., 2014; Willinge, Touyz & Thornton, 2010; Hötzel et al., 2014; Treasure et al., 1999; Leung et al., 2013; Rodríguez-Cano et al., 2012; Hillen et al., 2015; Castro-Fornieles et al., 2010; Feld et al., 2001; McHugh, 2007; Geller et al., 2011; Gowers & Smyth, 2004; Riva et al., 2002; Allen et al., 2011; Cassin et al., 2008; Leung, Ma & Russell, 2013a; Tchanturia et al., 2015; Genders & Tchanturia, 2010; Rodríguez-Cano & Beato-Fernández, 2005; Dunn et al., 2006; Geller, Zaitsoff & Srikameswaran, 2005; Ålgars et al., 2015; Bustin et al., 2013; Touyz et al., 2013, Wade, Treasure & Schmidt, 2011; George et al., 2002; Dingemans et al., 2013; Tchanturia, Larson & Brown, 2016; Leung, Ma & Russell, 2013b; Kuge et al., 2017	Tchanturia, Doris & Fleming, 2014; Pretorius et al., 2012; Dean et al., 2008; Wade et al., 2009; Tchanturia, Larsson & Adamson, 2016; Shingleton et al., 2016; Lloyd et al., 2014	Thaler et al., 2016; Thaler et al., 2014; Ackard et al., 2014; Dingemans et al., 2013



Totals (n = 42):	31 (76%)	7 (17%)	4 (7%)
Are motivationally focused interventions more effective than standard treatment at increasing motivation?	Cassin et al., 2008; Dunn et al., 2006; Vella-Zarb et al., 2014		Dean et al., 2008; Treasure et al., 1999; Wade et al., 2009
Totals (n = 6):	3 (50%)	0 (0%)	3 (50%)

Risk of bias across the identified studies was high. Whilst bias due to deviations from intended interventions was judged to be low across all studies, a number of studies failed to adequately describe the full nature of the intervention being investigated (Wade et al., 2009; Bustin et al., 2013; Dean et al., 2008; Rodríguez-Cano & Beato-Fernández, 2005; Thaler et al., 2016). Many studies were given a judgment of high risk of bias from the handling of missing data, with 19 studies reporting dropout rates of greater than 10%, but failing to account for this in their analysis, therefore potentially inflating the impact of the intervention. In the risk of bias for domains relating to randomised control trials, only Vella-Zarb et al.(2014) and Weiss et al. (2013) were judged at high risk of performance bias. None of the included studies were judged to have a high risk of selection bias. Some studies did not provide enough information to make a clear judgment, as can be seen in table 2.3.

Table 2.3: Risk of bias for included studies

Paper	Domain of Risk				
	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Selection Bias	Performance Bias
Ackard et al., 2014	Unclear	Low	High	N/A	N/A
Ålgars et al., 2015	Low	Low	Unclear	N/A	N/A
Allen et al., 2011	Low	Low	Low	N/A	N/A
Bustin et al., 2013	High	Low	High	N/A	N/A
Castro-Fornieles et al., 2010	Low	Low	High	N/A	N/A
Dean et al., 2008	High	Low	High	N/A	N/A
Dingemans et al., 2013	Low	Low	Low	Low	Low
Feld et al., 2001	Low	Low	High	N/A	N/A
Geller, Zaitsoff & Srikameswaran, 2005	Low	Low	High	N/A	N/A
Geller et al., 2011	Low	Low	Low	Low	Low
Genders & Tchanturia, 2010	Low	Low	High	N/A	N/A
George et al., 2007	Low	Low	Low	N/A	N/A
Gowers & Smyth, 2004	Low	Low	Low	N/A	N/A

Hillen et al, 2015	Low	Low	Low	N/A	N/A
Hötzel et al., 2014	Low	Low	Low	Low	Unclear
Kuge et al., 2017	Low	Low	Low	N/A	N/A
Leung et al., 2013	Low	Low	High	N/A	N/A
Leung, Ma & Russell, 2013a	Low	Low	High	N/A	N/A
Leung, Ma & Russell, 2013b	Low	Low	Low	N/A	N/A
Lloyd et al., 2014	Low	Low	High	N/A	N/A
McHugh, 2007	Low	Low	Low	N/A	N/A
Pellizzer, unpublished	Low	Unclear	Low	N/A	N/A
Pretorius et al., 2012	Low	Low	High	N/A	N/A
Riva et al., 2002	Low	Low	Low	Unclear	Unclear
Rodríguez-Cano & Beato-Fernández, 2005	High	Low	High	N/A	N/A
Rodríguez-Cano et al., 2012	Low	Low	High	N/A	N/A
Shingleton et al., 2016	Low	Low	Low	N/A	N/A
Tchanturia, Doris & Fleming, 2014	Low	Low	High	N/A	N/A
Tchanturia, Larsson &	Low	Low	High	N/A	N/A

Adamson, 2016					
Tchanturia, Larson & Brown, 2016	Low	Low	Low	N/A	N/A
Tchanturia et al., 2015	Low	Low	High	N/A	N/A
Thaler et al., 2014	Low	Low	Low	N/A	N/A
Thaler et al., 2016	High	Low	High	N/A	N/A
Touyz et al., 2013	Low	Low	Low	Low	Low
Wade, Treasure & Schmidt, 2011	Low	Low	Low	N/A	N/A
Weiss et al., 2013	Low	Low	Low	Low	High
Willinge, Touyz & Thornton, 2010	Low	Low	High	N/A	N/A

Research Question 2: Studies comparing a specific motivationally focused intervention to an active or treatment as usual (TAU) control group including a motivational measure for both groups

Cassin et al., 2008	Low	Low	Low	Low	Low
Dean et al., 2008	High	Low	High	N/A	N/A
Dunn et al., 2006	Low	Low	Low	Unclear	Low
Treasure et al., 1999	Low	Low	High	Low	Low
Vella-Zarb et al., 2014	Low	Low	Low	Low	High
Wade et al., 2009	High	Low	Low	Low	Low

### *2.3.1 Research Question 1 - What evidence is there that treatment interventions increase motivation amongst eating disorder populations?*

Thirty-one of the 42 studies reported significant improvements in motivation to change due to treatment. Successful interventions included commonly used treatment approaches such as multi-disciplinary treatment programs, CBT, CRT and motivational approaches such as AMIs and MET. More novel interventions also showed promise at improving motivation to change, including digital health approaches such as web-based delivery, the use of virtual reality and text messaging. Risk of bias was generally high, with only 13 studies being judged to have a low risk of bias across all domains (Cassin et al., 2008; Geller et al., 2011; Hötzel et al., 2014; Touyz et al., 2013; Wade et al., 2009; Allen et al., 2011; George et al., 2007; Gowers & Smyth, 2004; Hillen et al., 2015; McHugh, 2007; Tchanturia, Larson & Brown, 2016; Lueng, Ma & Russell, 2013; Kuge et al., 2017).

The positive impact of treatment on motivation to change appears to have a long term effect, with nine of the eleven studies that included a follow-up measure of motivation finding that improvements were maintained, or continued to increase, across all time points up to two years (Dean et al., 2008; Geller et al., 2011; Leung, Ma & Russell, 2013a; Lueng, Ma & Russell, 2013b; Rodríguez-Cano & Beato-Fernández, 2005; Rodríguez-Cano et al., 2012; Touyz et al., 2013; Wade, Treasure & Schmidt, 2011, Pellizzer, unpublished). Only one study, Ackard et al. (2014), found that motivation to change dropped below baseline over time.

Four of the total 42 studies (Thaler et al., 2016; Thaler et al., 2014; Ackard et al., 2014; Dingemans et al., 2013) found no improvements on any measure of motivation to change. The studies examined diverse treatment programs with no focus on a particular intervention, making it difficult to assess whether it was individual or combined elements of the treatment program that failed to improve motivation to change. Of these studies, only Thaler et al. (2014) and Dingemans et al. (2013) were judged to have a low risk of bias across all domains.

The remaining seven of the 42 studies reported either mixed findings or trends towards significance, of which only two had a low risk of bias across all domains (Wade

et al., 2009; Shingleton et al., 2016). Of these seven studies, three found non-significant improvements with small effect sizes (Pretorius et al., 2012; Tchanturia, Doris & Fleming, 2014; Lloyd et al., 2014). Dean et al. (2008) did not report effect sizes but found a non-significant increase in motivation in both groups from pre- to post-treatment, with subsequent non-significant increases for the treatment group and decreases in the control group from post-treatment to follow-up. Tchanturia, Larsson and Adamson (2016) found significant improvements in ability to, though not importance of, change amongst individuals with low autism scale scores but no effects for those with high scores. Wade et al. (2009) found improvements in motivation to change relating to the importance to recover and importance to eat normally and gain weight for both the active and control conditions at week two, but these measures dropped to just below baseline by week six for both groups. Shingleton et al. (2016) similarly found that when exposed to a motivational text message intervention, pre-contemplation scores for participants decreased and action and confidence subscale scores increased significantly. However, pre-contemplation scores were found to decrease less during periods when participants were receiving the text messages, though conversely action scores increased more during this period.

When looking at the seventeen studies deemed to have the lowest risk of bias, the pattern of findings is similar to that of the rest of the literature, with 13 of the 17 studies finding evidence to support the effectiveness of treatment to improve motivation to change (Cassin et al., 2008; Geller et al., 2011; Hötzel et al., 2014; Touyz et al., 2013; Wade et al., 2009; Allen et al., 2011; George et al., 2007; Gowers & Smyth, 2004; Hillen et al., 2015; McHugh, 2007; Tchanturia, Larson & Brown, 2016; Lueng, Ma & Russell, 2013; Kuge et al., 2017). Of the remaining four, Wade et al. (2009) and Shingleton et al. (2016), as noted previously, presented mixed findings, whilst Thaler et al. (2014) and Dingemans et al. (2013) found no significant improvements in motivation to change.

Potential differences in the effect of interventions on motivation to change between different eating disorder diagnoses is difficult to ascertain as only two studies provided sub-group analysis for motivational changes based on eating disorder type (Allen et al., 2001; Rodríguez-Cano et al., 2012). However, in both cases, whilst significant changes in motivation to change were found for all participants, the pattern of change was

different between sub-groups. Allen et al. (2001) found reductions in pre-contemplation in both people with anorexia nervosa and bulimia nervosa, though this was only significant for those with anorexia nervosa. Whilst increases in action ratings to change dietary restraint and increases in internal (self-driven) motivation to change were significant in the bulimia nervosa group, these were not observed for those with anorexia nervosa symptoms. Similarly Rodríguez-Cano et al. (2012) found that more improvement in the action and maintenance stages of the Transtheoretical Model (TTM), and subsequently significantly greater decreases in the relapse stage, were found in individuals with bulimia nervosa non-purging type and EDNOS .

A wide range of validated measures were used to assess motivation to change, however 13 of the 42 studies relied solely on unvalidated likert scale measures, commonly referred to as 'Motivational Rulers' (Cassin et al., 2008; Dingemans et al., 2013; Genders & Tchanturia, 2010; Gowers & Smyth, 2004; Kuge et al., 2017; Lloyd et al., 2014; Pretorius et al., 2012; Tchanturia, Doris & Fleming, 2014; Tchanturia, Larsson & Adamson, 2016; Tchanturia, Larson & Brown, 2016; Tchanturia et al., 2015; Weiss et al., 2013; Pellizzer, unpublished). Looking at the remaining 29 studies the distribution of evidence remained largely the same, with 23 studies reporting significant improvements in motivation to change due to treatment, three studies finding no improvements and the final three studies reporting either mixed findings or trends towards significance.

Studies included in this review examined a wide range of interventions including specifically motivational approaches such as AMIs and MET, as well as commonly used treatment approaches such as multi-disciplinary treatment programs, CBT, Readiness and Motivation Therapy (RMT), Maudsley Model for Treatment of Adults with AN (MANTRA), Cognitive Remediation Therapy (CRT), Cognitive Remediation and Emotion Skills Training (CREST) and Multi-Family Therapy (MFT). It is worth noting that many of the included interventions, even when not specifically motivational in nature, include motivational elements as part of their approach. For example, both CBT and MANTRA contain motivational components, and many multi-disciplinary treatment programs include motivational interventions.

These findings provide clear evidence to support the effectiveness of a wide range of treatments at improving motivation to change in individuals with eating disorders.

### *2.3.2 Research question 2 - Are motivationally focused interventions more effective than standard treatment at increasing motivation?*

Six studies (457 participants) in the review compared a specific motivationally focused intervention to an active or treatment as usual (TAU) control group and also included a motivational measure for both groups (Cassin et al., 2008; Dean et al., 2008; Dunn et al., 2006; Treasure et al., 1999; Vella-Zarb et al., 2014; Wade et al., 2009). Three studies reported significantly greater improvements in motivation for the active condition in comparison to the control (Cassin et al., 2008; Dunn et al., 2006; Vella-Zarb et al., 2014). Each of these studies used a brief single-session motivation treatment compared to a low intensity control group such as self-help or psycho-education. In contrast, all three studies that compared a more intensive motivational element (e.g. over 4 weeks) with established TAU such as CBT found no significant difference between both groups (Dean et al., 2008; Treasure et al., 1999; Wade et al., 2009). It is worth noting that in each of these studies the control intervention may have included some motivational elements. Both Treasure et al. (1999) and Dean et al. (2008) used CBT as part of the control, which addresses the function of the ED and may involve examining the pros and cons of change, which are components of motivational interventions, whilst the TAU approach utilised in Wade et al.'s (2009) study included a two week programme that was intended to support patients in contemplating change. Whilst no study reported any significant differences in baseline motivational measures between groups, Wade et al. (2009) did observe that when categorised into high or low readiness to change, significantly more participants in the TAU condition were in a high state of readiness.

The overall risk of bias for these studies is high. Most studies, other than those by Cassin et al. (2008) and Dunn et al. (2006), suffer from low numbers, either as a result of low recruitment or high rates of attrition. Studies had issues of potential cross-contamination of treatments (Treasure et al., 1999) or did not control for differences



in contact time between treatment arms (Cassin et al., 2008). Only two studies were ascribed a low risk of bias across all domains (Cassin et al., 2008; Wade et al., 2009). Of these Cassin et al. (2008) reported improved motivation to change for the motivational intervention compared to self-help but Wade et al. (2009) found no improvements over treatment as usual. However, the majority of papers used validated measures of motivation to change, with only Cassin et al. (2008) relying solely on an unvalidated likert scale measure.

The evidence here, therefore, is less clear than for the primary research question, with only half the studies reporting that interventions targeted at improving motivation were more effective at improving motivation than a self-help or psycho-education control group, compared to studies comparing higher intensity motivational elements to established treatments such as CBT. However, where research did not find specifically motivational interventions to be more effective than established treatments, these interventions were still shown to be comparable.

## **2.4 Discussion**

The results of this systematic review provide support for the use of a range of treatment approaches to improve motivation to change amongst eating disorders patients, with suggestions that these positive effects are sustained beyond treatment. Given that lack of engagement with interventions is an issue in the treatment of eating disorders, this ability to improve motivation to change can be vital in ensuring effective clinical outcomes (Waller et al., 2009; Ali et al., 2016; Hart et al., 2013).

The results of this review support previous work by Knowles et al. (2013), suggesting that approaches targeted at motivation may be more effective at increasing motivation to change over approaches such as self-help or psycho-education, but are no more effective than interventions such as CBT. The comparison of approaches targeted at motivation specifically with interventions that do not is complicated by the fact that many approaches, such as CBT, MANTRA or multi-disciplinary care programs, incorporate motivational elements. This is further complicated given that in each of the studies examined, motivational interventions were delivered either alongside or in

preparation for non-specifically motivational treatments, and is made particularly difficult in two studies (Dean et al., 2008; Vella-Zarb et al., 2014) that did not fully report the nature of treatment delivered in each condition.

As the evidence presented demonstrates that a range of interventions are effective at improving motivation to change and given that many of these approaches include motivational elements, the low impact of approaches targeted at motivation on motivational outcomes does not necessarily demonstrate a lack of effectiveness. Indeed, when used as brief, single session interventions in comparison to clearly non-motivational approaches such as self-help or psycho-education, benefits are seen. However, the addition of specifically motivational interventions appears unnecessary when combined with approaches that may already integrate motivational approaches. Given that an individual's initial stage of change is related to improvement with therapy (Franko, 1997; Treasure et al., 1999), the use of brief motivational interventions early in the treatment process to promote motivation to change and facilitate further treatment remains a valid approach.

Evidence from this review also suggests that online motivational interventions appear to be an effective approach to improving motivation to change. Such an approach would also allow for interventions to be delivered early in the treatment process when they might have the most impact, such as during waiting list periods before treatment onset. As using digital technology to address issues in health care is a current priority of the NHS (Young & Wilkins, 2013) the early support for the effectiveness of motivational interventions delivered using this modality suggests that this treatment approach may fit in with this drive. Indeed, such approaches are currently being explored, with more online motivational interventions currently being developed (Muir et al., 2017). It is worth noting that engagement and dropout issues were high amongst the currently explored online interventions (Leung et al., 2013; Leung, Ma & Russell, 2013a; Leung, Ma & Russell, 2013b; Hötzel et al., 2014).

Any conclusions are limited by the high risk of bias present in the included studies. This is likely a result of the broad nature of this review, which, whilst done to give a representative view of the literature base, resulted in some limitations. By not limiting the studies included in the review, the studies presented were highly heterogeneous,

including a wide variety of research designs, interventions, and outcome measures. The wide variety of motivational measures used by studies ranged between validated itemised scales, examination of stages of change and single item likert scales, making direct comparisons and synthesis of the information difficult and limiting the strength of conclusions that could be drawn. This lack of consistency, as well as the lack of consensus as to the best approach to measure motivation to change, is a distinct limitation of the current literature in this area that future research might seek to address. The inability to draw meaningful conclusions regarding the impact of interventions on differing ED diagnosis due to the lack of research in this area presents a further limitation of the findings. The review itself is also limited by the decision to restrict the review of the published literature to articles published in English, so a potential selection bias is present, but as the majority of work is likely to have been undertaken in Europe or the US, it is estimated that this risk of bias is very low.

The current literature base could be significantly improved by conducting suitably powered, more methodologically robust research into the effectiveness of motivational interventions. In particular more research is needed into the relative strengths and weaknesses of this approach in comparison to currently available treatment options. It is suggested that such studies use credible, time-matched comparison treatments, report proper description of these treatments, include sufficient blinding and fidelity checks, and use established, comparable measures of motivation to change. Further to this, more research is required providing a deeper analysis of the impact of motivation to change on individuals with different eating disorder diagnoses.

In conclusion, this review presents strong evidence that motivation to change increases due to treatment. Whilst the evidence remains inconclusive with regards to the effectiveness of approaches targeted at motivation over and above established interventions such as CBT, the use of brief, single session motivational interventions do appear to provide benefits over other low intensity approaches such as self-help or psycho-education. However, their use in treatment needs to be carefully considered in relation to other available options.

## **Chapter 3: Impact of a web-based intervention (MotivATE) to increase attendance at an eating disorder service assessment appointment: a zelen randomised control trial**

### **3.1 Introduction**

As was found in the previous chapter, brief motivational interventions present a viable option for increasing motivation to change in people with eating disorders. In order to improve treatment engagement, motivation to change needs to be targeted in pre-treatment, and any intervention designed to target this needs to be brief and easily delivered. When coupled with the initial evidence that online delivery of motivational interventions may be effective, though not without limitations, this presents a potentially new way of approaching the issue of low engagement.

As such, MotivATE, a novel web-based intervention intended to be delivered at the point of referral to an eating disorder service, was created (Muir et al., 2017). The MotivATE program was developed using the intervention mapping process outlined by Bartholomew, Parcel and Kok (1998) which recognises three phases of program development: needs assessment, program development and evaluation.

A needs assessment was conducted via an examination of the literature to determine any issues with the current treatment pathway as well as levels and potential causes of poor treatment engagement and non-attendance, as outlined above. This was followed by a service provision survey of outpatient services in the UK, conducted by telephone with lead consultants and was based on audit data collected as part service evaluations. This survey found non-attendance, as a result of not opting into the service or not turning up to appointments, ranged from 10-32% of referrals suitable for assessment. This, coupled with previous findings in this area (Waller et al., 2009; Leavey, Vallianatou, Johnson-Sabine, Rae & Gunputh, 2011), identified a real need to address non-attendance in services across the UK.

MotivATE was developed using LifeGuide; open-source software enabling behavioural scientists to develop and flexibly modify their own behaviour change interventions

(LifeGuideonline.org). The intervention focuses on managing expectations of assessment, addressing ambivalence and increasing users' motivation and confidence to attend their initial appointment. This is achieved through the use of information, motivational tools, interactive activities and stories from other individuals with eating disorders spread across four 15-20 minute modules.

The next step was to establish whether the MotivATE program was capable of improving attendance at treatment when offered to patients upon referral during the waiting period prior to their initial assessment. As such, a single centre pilot study was conducted in order to establish an initial evidence base for the effectiveness of the MotivATE program in a naturalistic clinical setting. This research, therefore, makes a significant contribution to the further development of a novel intervention. This is achieved by exploring its effectiveness in a clinical context, as well as piloting the methodological approach in preparation for potential use in future larger scale trials. In a broader context, this research also contributes to the literature surrounding the use of motivational interventions in an online context, as well as the role that improving motivation to change may have in improving treatment engagement amongst individuals with eating disorders.

### *3.1.1 Aim*

The aim of this study was to test whether MotivATE can increase attendance at assessment.

### *3.1.2 Primary research question*

Does adding MotivATE to usual care increase attendance to adult Eating Disorders outpatient services?

### *3.1.3 Secondary research questions*

- 1) Do levels of engagement with the MotivATE intervention impact the primary outcome (attendance at assessment)?
- 2) What are patients' perceptions of the MotivATE website and what is the perceived impact of MotivATE on motivation to attend?

## **3.2 Methods**

### *3.2.1 Design*

The research was conducted using a two arm single-consent Zelen randomised control trial.

A randomised control trial (RCT) design was selected for this research as RCTs are the most rigorous way of determining whether a cause-effect relationship exists between treatment and outcome (Sibbald & Roland, 1998). A potential concern with the use of a randomised control trial arises from the fact that the treatment will not be provided to participants in the control condition. However, as this was the first study to generate effectiveness data for the intervention, it was believed that there was sufficient uncertainty to justify the use of this design in light of the methodological advantages. Proper randomisation ensures that characteristics that might affect the relationship between intervention and outcome measures will be roughly equal across all arms of the study, minimising potential bias (Levin, 2007). Furthermore, proper blinding of the randomisation process helps to prevent systematic differences between comparison groups in prognosis or responsiveness to treatments, as well as preventing performance and assessment bias by ensuring that participants and service centre staff do not know which condition has been allocated (Stephenson & Imrie, 1998).

The use of a concurrent control group ensured that the independent variable, in this case the delivery of the MotivATE intervention, was the primary difference between the two groups by reducing the potential for confounding factors. This was deemed preferable to the use of a historical control, as in such cases it is difficult to ensure that the treatment and control groups do not differ with respect to any feature other than

the treatment itself. This is due to both the lack of randomisation and potential inherent differences between populations over time, the result being that one cannot guarantee that any apparent improvement in outcomes is actually due to the intervention, significantly reducing the internal validity of the research (Pocock, 1983). A further issue with the use of a historical control is the inability to implement either concealment or blinding for the treatment group, resulting in the potential for performance bias in the delivery of usual care (Higgins et al., 2011); for example service centre staff may be more engaging or encouraging during initial phone contact with participants when they know that an additional service is being offered prior to assessment.

Further to this, a Zelen randomised consent design (Zelen, 1979), which involves randomising participants prior to consent and then only collecting consent from those in the active condition, was proposed as the most ethical and appropriate approach for answering the research question for several reasons. Firstly, people with EDs are often highly ambivalent about recovery (Leavey, Vallianatou, Johnson-Sabine, Rae & Gunpath, 2011), and as such adding trial consent, particularly with the knowledge that they may not receive the active condition, at a time that might be challenging for this group could be deemed ethically problematic. The addition of full consent prior to randomisation ran the risk of resentful demoralisation within the control group, potentially increasing the rate of non-attendance at assessment appointments. This would not only have implications for the validity of the study, it may also pose significant risks to the health and wellbeing of the patient and their loved ones. Therefore, the use of a Zelen design reduces biases such as those caused by resentful demoralisation and Hawthorne effects, which results in participants changing their behaviour as a result of knowing they are being observed (Payne & Payne, 2004). It also allowed for a trial that more closely replicates what would happen in usual clinical practice.

### *3.2.2 Recruitment*

No active recruitment took place for the study. All adult referrals to the Kimmeridge Court Eating Disorders service, Dorset, UK, over the period of one year (24/10/16 -

23/10/17) were identified for potential inclusion in the study. This time period was chosen to ensure that results were not affected by seasonal variations. No power calculations were done due to limited previous literature directly relating to this research, however a post-hoc power analysis was conducted and is presented in the discussion section. Participants were referred to the eating disorder service by a health professional as part of the usual referral process. Upon referral to the service, patient information was checked by the eating disorders service staff against the following inclusion/exclusion criteria:

#### Inclusion criteria

1) Referrals to the eating disorders service during the study period.

#### Exclusion criteria

1) Inpatients or emergency and urgent cases.

2) Patients who have already been randomised into the study.

3) Non English speakers

All eligible referrals were then randomised into the study using the randomisation procedure outlined below.

#### *3.2.3 Control Condition (Treatment as Usual)*

Participants randomised to the control condition received usual care. This consisted of a phone call from service centre staff, with details of participants' assessment appointments, a letter, plus a compliments, comments, concerns and complaints leaflet sent to their home address.



### *3.2.4 Intervention Condition (MotivATE)*

Participants randomized to the intervention condition received usual care, plus the opportunity to access MotivATE (Muir et al., 2017). MotivATE is a fully automated web-based intervention delivered via four 15-20 minute web-based modules designed to be used prior to an assessment appointment. Participants were able to access MotivATE from their home computer or via tablet or mobile.

MotivATE aims to increase a person's stage of change and is based on Motivational Enhancement Therapy (MET) (Schmidt & Treasure, 1997). This treatment model was developed by integrating Motivational Interviewing (Miller & Rollnick, 1991) and the Transtheoretical Model of Change (Prochaska & DiClemente, 1992), which has proven successful in improving treatment success and engagement. The MET design used in this intervention is intended primarily to address concepts from the earlier stages of change and is aimed to help participants move towards higher stages. This is due to the fact that earlier motivational stages use the processes of change with a cognitive focus, while the later stages, action and maintenance, are predominantly focused on the processes of behaviour change (Prochaska, DiClemente & Norcross, 1992).

MotivATE is delivered via four 15-20 minute web-based modules designed to be used prior to an assessment appointment. This structure was chosen for several reasons: firstly in order to be easily completed within the time between the assessment invite letter and appointment date and secondly due to user feedback regarding service users' concentration levels before treatment. The use of four modules is also supported by research in the addictions field which found that four sessions of MET is as effective as 12 sessions of cognitive-behavioural therapy or a 12-step facilitation therapy approach to treatment (Project MATCH, 1997). Upon accessing the intervention, participants were shown an opening web page linking the user to login and registration pages, as well as signposting new users to the Frequently Asked Questions (FAQs) section. The website has a footer on all pages that links to the FAQs, a help page with emergency contact information and an "about" page providing more information about the intervention and the research team. In order to complete the registration process participants were required to provide their participant ID, as noted in their letter, for identification. As part of this process participants were presented

with a digital copy of the participant information sheet before being asked to complete three consent statements. The first was consent for the use of recorded usage data by the research team, the second was consent for relevant information to be accessed from their records if needed, whilst the third was an opt-in for contact regarding the nested qualitative study after the date of their initial assessment. This contact was in the form of an automated email sent two months after the registration date to ensure the participant's assessment appointment has passed. The email contained a participant information sheet and an invitation to contact the researcher if interested in participating. Due to low uptake for the qualitative study an additional follow up email was added at the mid-point of the study, sent out two weeks after the initial invitation email, which was designed to be shorter and more engaging. Lack of consent to any statement did not prevent access to the intervention. If a participant did not register with the intervention no additional contact was made with them.

Following registration, users have access to the four modules which can be accessed in any order, as well as to a personal profile page.

Module 1 focuses primarily on providing information regarding the assessment as an introduction to the user and to help to "demystify" the assessment process, which has been shown to be important for patients who are characteristically mistrustful of treatment (Vitousek, Watson & Wilson, 1998). This is delivered in several formats, including: direct information, which is recommended over advice while working with people in earlier stages of change (Treasure & Ward, 1997); stories and videos from other service-users, in order to provide lived experience accounts that the user may be better able to relate to; and an interactive quiz, as increased interactivity of web-based interventions has been suggested to provide benefits in producing positive behavioural change (Wantland, Portillo, Holzemer, Slaughter & McGhee, 2004).

Module 2 introduces the user to the Transtheoretical model of change and is designed to help users consider and identify their current stage of change. Users are provided with a full explanation of the model and each of the stages, through the use of direct information, stories and videos from other service-users and interactive questions which direct the initial focus of the information to the user's likely stage of change. At the end of this module users are able to select what stage of change they believe they

are currently in. Establishing what stage of change a patient is in is one of the key principles of the Stages of Change model and of the MET approach, so that the therapeutic interactions address the issues of the patient's specific stage of change (Miller & Rollnick, 1991).

Module 3 follows on from module 2 by providing tailored information and exercises based on the user's stage of change. Should no stage have been selected users are given access to all available information. These exercises include several elements, such as encouraging the user to consider the benefits and costs of maintaining their eating disorder or changing. Perceived benefits of a patient's eating disorder, such as feeling looked after or protected, gaining a sense of control, and feeling special (Serpell et al., 1999; Williams & Reid, 2010) often act as maintaining factors and may limit an individual's motivation to change. As such, prompting the user to weigh up both the costs and benefits encourages a re-evaluation of their eating disorder, with research having shown that motivation to change is enhanced when the benefits and costs are articulated by the participant and not the therapist (Treasure & Ward, 1997; Vitousek, Watson & Wilson, 1998). The exercises are supported via further provision of information regarding common experiences of eating disorders, along with stories and videos from other service users.

Module 4 concludes the intervention by providing further information about the assessment, including insight from a member of the eating disorder service treatment team, and focuses on assisting the user in planning for their appointment through the use of implementation intentions (Prestwich, Sheeran, Webb & Gollwitzer, 2015). Implementation intentions have been shown to be effective at facilitating behaviours (Koestner, Lekes, Powers & Chicoine, 2002) by developing if-then plans that spell out in advance how one wants to strive for a set goal. In this context implementation intentions have been directed towards the goal of attending the assessment appointment (the 'if' element), by allowing users to record the 'what, where and when' of their appointment (the 'then' element), as well as encouraging them to consider any potential obstacles to attendance and how they might be overcome.

These modules could be completed by the participant in any order, but it was recommended that they be completed in sequence. It was expected that participants

would only complete the contents of the interventions once, however they did have access to MotivATE for the duration of the period prior to their initial assessment in order to access their profile and return to any modules should they wish to. All usage data was tracked by the intervention for each participant. Details of the MotivATE content for each module can be found in table 3.1.

Finally participants had access to a profile page which provides quick access to all responses given by the user during the interactive activities, and provides simplified print pages to allow the user to easily create hard copies of this information.

For participants who consented to be contacted regarding the nested qualitative study, once a participant made contact and provisionally agreed to take part, a date, time and location for the interview was agreed. On arrival at the interview location, the participant was provided with a printed copy of the participant information sheet and a consent form to sign. Once consent had been collected, a semi-structured interview was conducted (the question schedule can be found in appendix 2). The interviews were recorded, following which the recording was transcribed and then destroyed.

Table 3.1: Content of MotivATE

Module	Aim	Description
1 – What happens at the first appointment?	Address expectations about the assessment appointment	Provides an interactive quiz to explore common misconceptions about assessment, information about the assessment appointment and stories and videos about others’ experiences.
2 – How motivated are you?	Introduce the idea of change	Introduces people to the stages of change model with stories of others’ experiences. User can choose their stage of change.
3 – Arming yourself with information	Help with recognising	Information about eating disorders that relate to the pros and cons of eating

	problematic behaviours (pre-contemplation). Address ambivalence	disorders. Those who have selected a contemplation or preparation stage of change can complete their own pros and cons table and complete exercises designed to address ambivalence. Again, stories of others' experiences of an eating disorder are included.
4 – Preparing for your assessment	Improve confidence to attend	Includes a video of a clinician welcoming them to the assessment and allows users to make plans to attend their appointment.

Should a participant not access any modules within 7 days of registering they received an automated reminder email, with a second reminder being sent at 14 days after registration. Similarly, after completing a module should a participant not move on to another they received email reminders after 7 and 14 days. Upon completion of all modules participants received a final email congratulating them on completing MotivATE.

The intervention was not altered in any way throughout the course of the trial. Access to MotivATE was offered in addition to treatment as usual via an invitation letter to access MotivATE. The MotivATE invitation letter included a brief outline of MotivATE, the participant's ID number to be used at registration and the URL to access the intervention online.

#### 3.2.4.1 Intervention Development

MotivATE was developed within the framework of the Person Based Approach, which aims to ground the development of behaviour change interventions in a profound understanding of the perspective and psychosocial context of the people who will use them (Yardley, Morrison, Bradbury & Muller, 2015). This was achieved via an iterative process of user evaluation through involvement of people with experience of

the assessment process. Initial acceptability tests of the four modules were conducted and feedback subsequently used to make changes. MotivATE was discussed with eating disorder charities, including B-eat and health professionals, as well as at a number of conferences including International Conference for Eating Disorders and a specific conference for services aimed at improving service attendance (Muir et al., 2017).

The structure and content of MotivATE was developed during team meetings based on a booklet already that had already been devised by members of the team, aiming to help people think about the recovery process, as this had already been well received by existing service users. This booklet was adapted in order to (a) address some of the barriers to engagement identified in the needs assessment stage and incorporate the language and style of a person-based approach, (b) incorporate theoretical elements of motivational theory, (c) better address the program aims (ie, to be specifically about attending an assessment appointment, rather than about beginning therapy), and (d) enhance usability via a online platform (increasing interactivity with videos, quizzes, and click-throughs) and enable tailoring based on the person's stage of change. This online version of MotivATE, as used in this research, was developed using the LifeGuide software, an open-source tool specifically designed to allow behavioural scientists with little or no programming experience to flexibly create and modify Internet-based behaviour change interventions. The LifeGuide program uses an integrated software package including a drag and drop design system to create the look and feel of the website, coupled with a bespoke logic system that controls user movement through the intervention as well as more complex behaviors such as; giving tailored feedback to intervention users, randomising them into groups, scoring questionnaire items, charting progress over time, allowing intervention users to monitor each other's progress and sending automated emails or text messages (LifeGuideonline.org). The LifeGuide system has been used to develop a wide range digital interventions (Bruton et al., 2018; Muler et al., 2017; Geraghty et al., 2017), and has been shown to be a valuable tool to its users (Williams, Yardley & Wills, 2013).

The visual design of MotivATE aimed to present a professional-looking, gender- and age-neutral program. The colour scheme chosen was blue and white, and images were based on nature, with the intention of depicting positive well-being (see [Figure 3.1](#),

with additional screenshots of different sections of MotivATE found in appendix 1). In order to ensure that MotivATE did not negatively influence people or to cause them to compare their body shape or eating behaviours to those of others, no images of people or food were included in the design. Talking-head videos of real people were included throughout, depicting men and women with different eating disorders, in an attempt to provide stories that might resonate with users. Finally, the university and service logos were included on each page to convey professionalism and credibility, in order to make it clear from the start that people with eating disorders, researchers, and clinicians had designed the intervention.



Figure 3.1: Screenshot of the MotivATE homepage

### 3.2.5 Outcomes

The primary outcome was attendance at initial assessment appointment. This was assessed using NHS audit data from the eating disorders service, to result in the number of DNA's (Did Not Attends) in the MotivATE group versus the control group.

Secondary outcomes were:

a) Engagement with the intervention, which was examined using data on the number of sessions completed by each participant and time spent accessing them generated by the intervention.

b) Participants' perceptions of MotivATE and the perceived impact of MotivATE on their motivation to attend assessment. This was assessed using qualitative data collected from participants from the MotivATE group in semi-structured interviews. Participants were given the opportunity to opt-in to take part in a semi-structured qualitative interview upon registering with the intervention. This triggered an automated email following the participants assessment appointment, which outlined the details of the interview and invited participants to take part. At the midpoint of the study, a second follow up email, sent out two weeks after the initial invitation was also added in an attempt to improve uptake.

Due to the nature of the study design, no baseline measures or demographics were collected.

#### Initial Assessment Appointment

The initial assessment for both conditions was the same, constituting usual care, with attendance at this appointment being assessed using routine audit data which will be added to the secure participant database by service staff. All treatment following the initial assessment was usual care and beyond the scope of this study.



### *3.2.6 Randomisation, Allocation Concealment and Blinding*

Study relevant information (control / intervention) was placed in opaque envelopes labelled with participant ID numbers. Participants were pre-randomised using block randomisation into the intervention or control arms by a member of the research team not directly involved in conducting the study. This was achieved by generating a random number string from Random.org which was then broken down into consecutive blocks of eight digits, and manually balanced to ensure even allocation in each block.

As participants were referred to the service they were assigned a participant ID incrementally by the service centre staff. The opaque envelopes labelled with participant numbers were then included with the invitation to assessment letter by service staff. All service centre staff, researchers and participants were thus blind to each referral's group allocation.

Service staff maintained a single, secure record linking the participant's name to their unique participant ID. Once all participants had passed through the study, outcome data was added to the secure record by service staff and any personal identifiers removed prior to this document being delivered to the research team.

### *3.2.7 Analysis*

Initial analysis was conducted on an intention-to-treat basis with all data categorised according to the original allocation using a 2-sided 5% significance level. To examine the research question, a logistic regression was conducted. The independent variable for this analysis was the allocated condition (MotivATE/treatment as usual); the dependent variable was attendance at assessment ('attended' and 'did not attend').

Usage data from the MotivATE condition was analysed using descriptive statistics in order to explore the number of participants who registered with the intervention, as well as how many of the intervention modules were accessed by users. Additionally a follow up of the primary analysis was conducted to compare attendance between

those who registered, or did not register, with MotivATE amongst participants within the MotivATE condition.

Qualitative data was originally to be analysed using thematic analysis (Braun & Clarke, 2004). However as a result of poor recruitment to this aspect of the study it was not possible to complete a full analysis of the data. Data was analysed as case studies instead.

### *3.2.8 Ethical Approval*

The research gained HRA approval (Ref: 16/SC/0431) from the Hampshire A Ethics Committee, and was registered on Clinicaltrials.gov (Trial number: NCT02777944 (19/05/2016)) prior to commencement. In order to ensure participant safety all researchers completed Good Clinical Practice (GCP) and adhered to standard NHS practice guidelines.

### 3.3 Results

#### 3.3.1 Primary Outcome: Attendance at initial assessment appointment

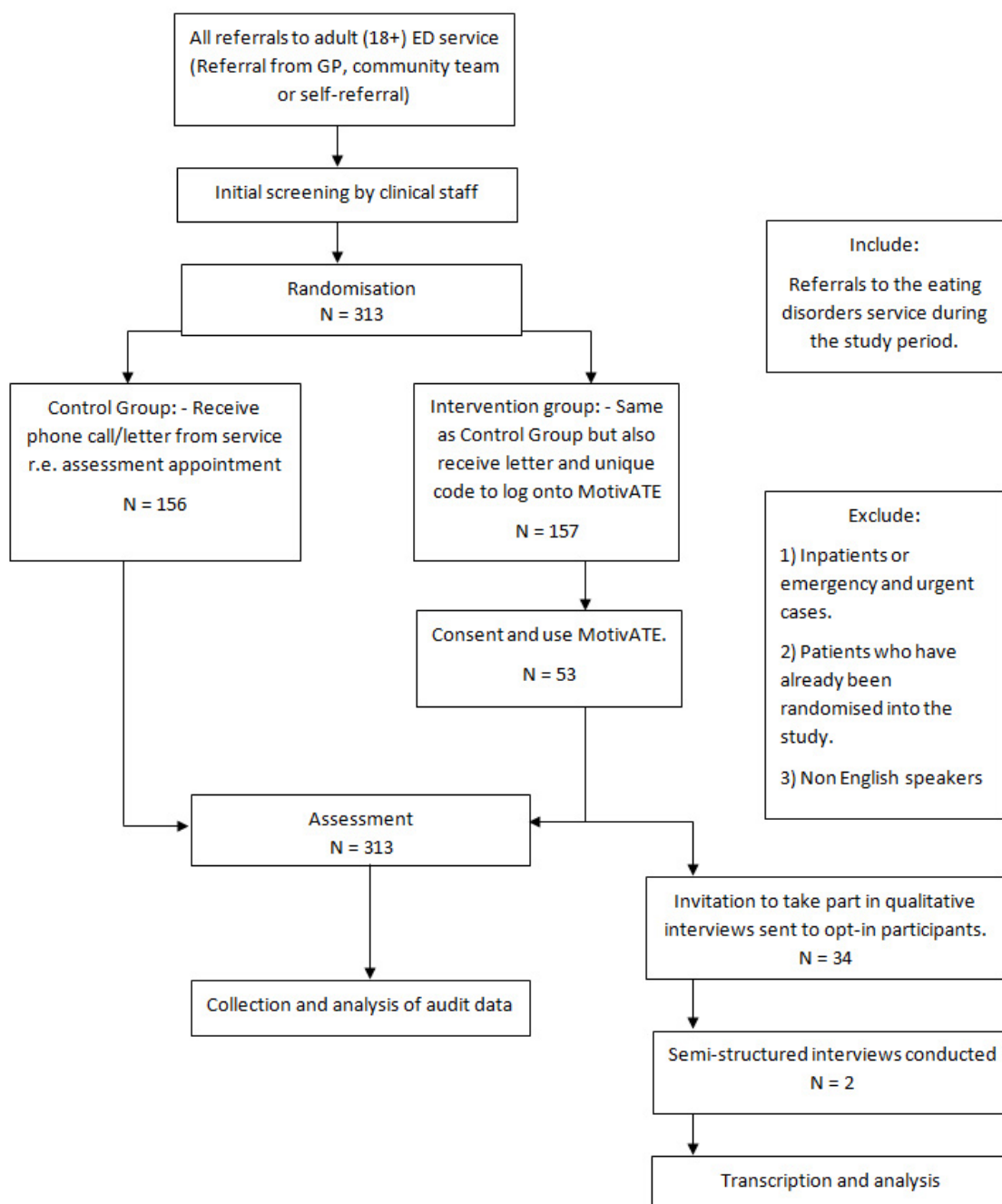


Figure 3.2: Trial Flow Chart

In total, 315 participants were recruited to the study, however two participants were removed from the analysis due to a duplication in the randomisation process. Of the remaining 313 participants, 157 were randomised to the MotivATE condition while 156

were assigned to the control condition. In total, 274 (87.5%) participants attended their assessment appointment, as given in Table 3.2.

Table 3.2: Distribution of attendance at assessment between study groups

		Attended Assessment	
		Yes	No
Condition	MotivATE (n=157)	140 (89%)	17
	Control (n=156)	134 (86%)	22

Binary logistic regression indicated no differences between groups in attendance at the assessment appointment ( $X^2(1)=0.771$ ,  $p = .38$ ). The odds ratio for the effect of being offered access to MotivATE on attendance was 1.35 (95% CI = 0.69-2.66).

### 3.3.2 Secondary Outcomes: Engagement with the intervention

#### Usage analysis

Of the 157 participants assigned to the MotivATE condition, only 53 (33%) registered with the intervention. During the trial period MotivATE registered 1280 separate sessions, however of these, only 87 were sessions generated by the 53 registered participants. Of the 53 participants that registered with MotivATE, seven completed registration but did not engage with any of the content. 86% went on to use on average at least half of the available content, with the average participant accessing two and a half of the MotivATE modules, whilst 22 (43%) used all of the four modules. Table 3.3 shows a breakdown of the number of times each module was accessed by participants. Of those that accessed MotivATE, seventeen (33%) used the intervention more than once, with the average across all participants being 1.64 visits per person.

Table 3.3: Number of times individual modules were accessed

	Module			
	1	2	3	4
Times Accessed	45	36	27	24

Table 3.4 gives the distribution of attendance at assessment for those that did and did not access MotivATE.

Table 3.4: Distribution of attendance at assessment for those that did and did not access MotivATE

		Attended Assessment	
		Yes	No
Condition	Accessed MotivATE (n=53)	52 (98%)	1
	Did not access MotivATE (n=104)	88 (85%)	16

Binary logistic regression indicated that registration with MotivATE did act as a significant predictor of attendance at assessment, where individuals who registered with MotivATE were 9.5x more likely to attend than those who did not (OR = 9.46, 95% CI = 1.22-73.38,  $p = .03$ ). In this instance the model was found to significantly predict attendance at assessment ( $\chi^2(1)=8.451, p = .004$ ).

### 3.3.3 Secondary Outcomes: Perceptions of the intervention

The initial aim of this research was to recruit 20 participants who used MotivATE in order to conduct a full thematic analysis regarding the impact that MotivATE had on its users. However, potentially as a result of low uptake and engagement with the intervention as outlined above, only two people took part in the qualitative interviews. As such these are presented as case studies to provide some insight into user experiences of the MotivATE program. Both interview participants were female and

took part in the interview after having both used MotivATE and attended their initial assessment appointments.

### Case Study 1 - KP

In discussing her receipt of the invitation to use MotivATE, KP highlighted a potential contributing factor to the low uptake of the intervention, indicating that commonly she would discard additional pieces of paper that might come in the same letter. In this instance she did not, but it is possible that this view, that accompanying material with the invitation letter was superfluous, may have led participants to discard the letter inviting them to use MotivATE.

*KP: "... there was two or three pieces of paper in there, and I normally discard them but I didn't, I took the time to read them on this occasion."*

Having read the invitation KP's initial feelings towards MotivATE seemed mixed. The novelty of the approach generated interest, however there were concerns about whether or not the tool would be useful and that it may simply constitute an 'NHS tick box' exercise.

*KP: "I'd never had that with any other appointment so, umm, I was just interested to see if it was gonna be umm, tsch, something that was going to, that would encourage me, if it would give me any more information. Umm, where it was just a, kind of another NHS tick box, to be, you know full of legislation, or it was just a, whether it was actually going to be a helpful tool."*

However, despite these concerns, KP indicated that MotivATE proved to be a useful tool, particularly in the immediate run up to the assessment appointment. KP mentioned that she used MotivATE twice, firstly going through it quite quickly, in such a way that she did not take much in, but then returning to it in the days before her appointment as she found that MotivATE helped to keep her calm and in control.

*KP: "... it helped me feel a bit calmer before I got there and stuff."*

When asked whether she felt MotivATE contributed to her decision to attend the assessment, KP highlighted this as a potential contributor to her attendance.

*KP: " yeah I think it probably, because I was quite, really quite anxious the day before, umm, by, um, by kind of revisiting it ... it stopped me getting out of control in my mind and making it into something much bigger than it actually was."*

KP attributed this impact on her primarily to the more practical elements of MotivATE, including encouraging the user to think about their questions and make notes (though KP indicated she did not make actual notes, she suggested simply thinking through her answers was useful) and addressing possible preconceptions regarding the assessment. This she said helped reduce anxieties by focusing on the reality of the situation rather than what she called 'the fluffy stuff'; which she defined as the unnecessary concerns she had before the assessment, such as worries over '*the use of phrases and terminology that I'm not going to understand*' and the idea that '*it's going to be some big, dramatic, me sat in front of a panel of three doctors asking me questions*'.

*KP: "I think it lessened my anxieties because it, umm, it kind of, made it seem more practical and useful and kind of maybe tool based, rather than talking about all the fluffy stuff"*

Though her overall experience of MotivATE was positive, KP did have a number of suggestions for improvements. These primarily related to the design, particularly of the front page, which she felt was somewhat confusing in places with regards to the intent and focus of MotivATE, as well as the design and placement of the logos. She also indicated intervention could be updated to make it look less old fashioned, though she re-iterated that she felt the content of MotivATE was good.

*KP: "... it looks a bit old fashioned. The kind of, the font and the way it's written. But the actual content is good."*

Overall the experience of KP presents a positive picture of the impact of MotivATE when delivered prior to the assessment appointment, suggesting that in at least one case it successfully reduced participants' anxieties about the assessment appointment

and contributed to her decision to attend. However as noted above, improvements can be made to the design, as well as the way in which it is offered, which could indicate ways in which uptake could be improved in future iterations.

### Case Study 2 - ET

As with KP, ET noted the arrival of the MotivATE intervention letter along with the assessment letter, suggesting that this created a clear association between the two. In this case it appears that ET was already intending to go to her assessment appointment and that this intent carried over to the use of MotivATE.

*ET: "The invitation for my appointment at my invitation to use MotivATE came at the same time, erm, so I felt it kind of went hand in hand and if I was going to go to the interview I may as well use the MotivATE program"*

ET also had the similar concern to KP that the offer to use MotivATE indicated that she had been placed in a preconceived category rather than being treated as an individual. This presented itself as the feeling that the intervention would be a 'one size fits all' solution, simply representing a 'tick box' exercise rather than a genuine attempt to offer a useful and effective pre-treatment tool.

*ET: "One of my worries was that I was going to be put into a category and it kind of felt like I was already being categorised. I was already kind of in a, one size fits all tick box kind of situation."*

When discussing using MotivATE, ET presented a much more negative view of her experience than KP, suggesting that the approach taken by MotivATE felt patronising. ET felt that the intervention should have been much more direct, and that the current approach was too gentle and took too long, resulting in the feeling that it was wasting her time.

*ET: "I noticed it was kind of like easing me into it, and then it got to the specific stuff. And I felt kind of like, a bit patronized by that because I was like if you're going to ask me these questions, which I know you're in inevitably going to do because that's what the software is for like, I that's*



*what questionnaire thing is for. You might as well just ask me straight away rather than just have to make me go through all these questions"*

*ET "it was just it was kind of wasting my time ... it is just too long."*

Perhaps even more concerning was that ET reported that the exercises in MotivATE actually increased her sense of anxiety regarding the assessment, both by reinforcing her initial concerns of being arbitrarily placed in a category, and as a result of concerns that information she gave to MotivATE might be used to catch her out in the assessment, should what she, say, not completely match what she wrote down. As a result of this, when asked what impact MotivATE may have had on her decision to attend, ET responded that it had actually had a negative impact.

*ET: "I was putting in answers to things umm, that I assumed the person who was assessing me was going to read, I felt like I had to be careful what I would then say because I thought, what if I accidentally say something that doesn't completely marry up to what I said in my MotivATE thing"*

Despite this ET did note towards the end of the interview that she believed the concept behind MotivATE was a good idea, but that it needed more work and adjustment before she felt it was something that would be a benefit to users such as herself prior to the assessment appointment.

*ET: "I think MotivATE is a good idea. And I think it's got a good concept behind it, it just needs adjusting a little bit..."*

This gives a very different perspective to the experiences of KP and highlights how careful future iterations of MotivATE must be to not only be supportive of individuals in earlier stages of change, who are uncertain about attending their assessment, but to also ensure that it does not put off those who are more intent and ready to take that step.

### 3.4 Discussion

This initial research indicates that, at present, MotivATE does not improve people with eating disorders' attendance at initial assessment appointments. It is interesting to note that, despite the lack of apparent effect of the intervention, attendance rates at the clinic were higher during the research period than they were previously. Being up 6.5% from 81% attendance to 87.5%. This may suggest that other factors present during the study period may have impacted treatment attendance. For example, it is possible that knowledge among service staff that a new intervention was being offered to some patients may have positively influenced the overall service provided, such as the nature of interactions during the phone consultations. It is also possible that this may have been influenced by factors outside of the service, such as changes in local practices relating to the referrals of individuals with EDs or initiatives by local charities. However, without further research the true cause of this increase is unknown.

Secondary analyses, however, do give some insight into the potential impact of the intervention. Attendance was 9.5x more likely for those that registered with MotivATE than those that didn't, but registration with the intervention was low (33% of possible participants). This may suggest that the lack of overall impact in the study was not a result of the lack of impact of the intervention itself, but rather due to issues of uptake. However, it is worth noting at this point that the lack of a pre-post measure of motivation to change, as a result of the more naturalistic Zelen design, means that a distinct causal link for this effect cannot be certain. Indeed, it is entirely plausible that rather than increased use of MotivATE resulting in higher levels of attendance, this finding may be due to individuals with greater motivation to attend their initial assessment appointment also being inherently more motivated to engage with the intervention. As such, this result alone cannot be said to definitively demonstrate the positive impact of usage of MotivATE on treatment attendance.

The qualitative data collected as part of this study allows does allow for some further insight, with the two case studies conducted presenting conflicting views of the usefulness of the MotivATE intervention to participants who engaged with it. In the case of KP MotivATE does appear to have fulfilled its intended purpose; it helped to alleviate her anxieties, address her concerns and provided practical help to assist her in

attending her assessment appointment. However, ET related a much more negative experience, suggesting that the intervention felt patronising in its approach and re-enforced preconceptions that she would be 'put in a box' rather than treated as an individual, resulting in an experience that ET suggested actually had a negative impact on her intentions to attend her assessment appointment. One aspect that was common across both participants however were the concerns raised that MotivATE represented a 'tick box' exercise rather than a genuine and helpful tool; a concern that was alleviated for KP upon using MotivATE, but exacerbated for ET. This potentially represents a significant barrier to engaging with the intervention. If simply being invited to use the intervention causes concerns, then the way in which the intervention is presented at this point, and the way in which the invitation is made, needs to be carefully considered to avoid putting off potential users. This also highlights the difficulties in creating an intervention that works for everyone; what one person considers as gentle and supportive may be patronising to another, and indicates that a deeper understanding of how interventions can be better designed and delivered to alleviate these concerns may be vital to promoting engagement with them.

Indeed, problems with engagement are often encountered when rolling out online interventions (Doherty, Coyle & Sharry, 2012) and it has been noted that participants of internet interventions can exhibit lower levels of engagement than program developers originally envision (Eysenbach, 2005; Fleming et al., 2018). However, web-based interventions have been demonstrated to successfully encourage behaviour change for a variety of health behaviours and among a variety of populations (Heber et al., 2017; Watson et al., 2015; Wantland et al., 2004). Lack of engagement though may be a particular issue when dealing with people with EDs. Several recent studies of online motivational interventions for eating disorders similarly found issues with engagement and high dropout (Hötzel et al., 2014; Leung et al., 2013; Leung, Ma & Russell, 2013a; Lueng, Ma & Russell, 2013b). This issue has been attributed to the poor ability to attract and retain visitors of online interventions, relative to other modes of contact (Lin, 2007).

These findings however, do not rule out digital interventions as a potential approach to addressing this issue. Both participants in the case studies suggested that, whilst

MotivATE may not in and of itself be the solution, the underlying concept remained a positive one. Indeed, once registered, the majority of participants accessed several more than half of the MotivATE content, and a third visited more than once. The key issue faced by MotivATE, which was designed to promote treatment uptake, was itself a lack of uptake. This suggests that approaches addressing low engagement may in fact need be considered even earlier in the treatment pathway, and that simply offering new interventions to address this problem may not be enough. Rather the way in which these interventions, and indeed treatment more broadly, are presented may need to be more deeply considered.

Short et al. (2015) proposed a model of user engagement with digital interventions, drawing on work such as the Elaboration Likelihood Model (Petty, Barden, & Wheeler, 2009), Ritterband and Tate's (2009) model of internet interventions, O'Brien and Toms' (2008) conceptual model of user engagement with technology and the Persuasive Systems Design Model (Oinas-Kukkonen & Harjuma, 2009). This model suggests that interventions are most likely to engage users when they have been designed to match the user's characteristics, needs, skill level and expectations. Furthermore the use of persuasive design characteristics, such as tailoring, credibility and aesthetic design, helps to encourage engagement. These considerations may therefore need to be more deeply ingrained, both in future iterations of MotivATE and also in the design of digital interventions in general.

This study had a number of strengths that support the findings outlined above. The naturalistic nature of the design means that the research reflects the conditions found in practice. Similarly, conducting the study over one year eliminated the impact of seasonal fluctuations. A further strength of this research was the inclusion of qualitative interviews, which allowed for a greater insight into participants' perspectives of the intervention and its potential impact. The lack of recruitment to the interviews also provides useful feedback that reliance on email contact to recruit individuals from this population to an interview study appears to be insufficient, and more salient approaches should be favoured in future research.

Despite these strengths, this study did suffer from a number of limitations. Firstly, the use of only one site limits the applicability of the findings to general practice. This is

due to different practices having differing treatment approaches and procedures, such as opt-in programs or longer waiting times, which may impact the effectiveness of the intervention. A second limitation was the lack of a pre-post measure of motivation to change. This was not included due to naturalistic design of the study, however, without this it is not possible to ascertain if the intervention did improve motivation to change as intended. Improved attendance in those who registered for MotivATE may demonstrate increased motivation to change as a result of using MotivATE, or may suggest that those with a higher motivation to change were more likely to attend anyway and in turn more likely to engage with the intervention (Prochaska, 2013). A final limitation is a potential lack of power in the analysis of the primary research question. A post-hoc power analysis conducted in G\*Power indicated an achieved power of only .37 in our study. In order to successfully detect an effect at the level observed, at a power of .8 and an alpha of .05, a further power analysis suggests a required sample size of 2559 (OR = 1.35, Pr(Y=1 | X=1) H0 = 0.86). The clinical impact of an effect of this size however, would need to be considered.

This highlights a number of directions for future research. Specifically relating to MotivATE, it is clear that more research is needed to understand the impact that the intervention has on users. Which would be beneficial to be pursued from both quantitative and qualitative perspectives. This would allow for the investigation of not whether MotivATE improves outcome measures such as motivation to change, but also to better explore some of the personal perspectives and issues surrounding engagement. A better understanding of how to best engage people with eating disorders with interventions, both on and offline, as early as possible in the treatment pathway is also needed. At present this is not adequately understood, and as such future research would be beneficial to explore potential ways in which engagement and uptake might be improved.

In conclusion, in its current state MotivATE cannot be recommended as an intervention to address lack of engagement with eating disorder services. However, with further research and development this does not rule out the use of digital interventions as a potential approach to addressing this issue.

## **Chapter 4: People with eating disorders engagement with support: an online focus group study**

### **4.1 Introduction**

As discussed in previous chapters, lack of engagement with treatment is a known issue in relation to the treatment of eating disorders, with up to 35% of patients who are referred to an eating disorder service never accessing treatment (Waller et al., 2009; Leavey et al., 2011). Though qualitative investigation of this phenomenon is limited, previous research has suggested that low motivation to change amongst this population group may be a key factor (Geller et al., 2008), with online delivery of motivational interventions having been identified as a potential way to address this from the findings of the systematic review. However, there is evidence that many participants of internet interventions exhibit lower levels of engagement than program developers originally envision (Eysenbach, 2005; Fleming et al., 2018) and on average only 50% of participants adhere to online interventions (Kelders, Kok, Ossebaard & van Gemert-Pijnen, 2012). This presents a significant challenge when dealing with a population already characterised by low treatment engagement. Indeed one study investigating a novel web-based intervention for eating disorders found that only 63% of participants who registered for the program began using it (Lueng, Ma & Russel, 2013a). As noted previously, this was a particular issue in the delivery of MotivATE.

Despite this, there is a dearth of qualitative research that has been conducted to explore the issue of engagement with interventions amongst individuals with eating disorders, and in particular those delivered in an online setting. Previous qualitative research has identified a number of potential barriers to treatment engagement amongst people with eating disorders (Leavey et al., 2011). Leavey et al. (2011) identified two overarching themes relating to treatment non-attendance. The first, psychosocial factors, related to the complexities of participants' psychological difficulties as well as their personal relations with their eating disorder, whilst the second, service-related and practical problems, included expectations of the treatment offered, administrative errors, long waiting times, inflexibility, discontinuity of care, lack of childcare, distance, and inconvenient appointment times. However it is unclear how, if at all, these barriers apply in an online context. In particular the use of digital

health approaches offer improved practicality and accessibility, often offering patients greater flexibility in terms of who, where and when they can access support. It is possible that the reasons for lack of engagement with face to face services may differ from those that underlie the poor engagement levels that have been observed in online interventions for eating disorders (Lueng, Ma & Russel, 2013b). One recent study utilised think aloud protocols and semi-structured interviews that touched upon issues surrounding engagement as part of a usability analysis of a digital intervention for eating disorders (Nitsch et al., 2016). This research identified some similar barriers to engagement as Leavey et al. (2011), largely in the form of practical concerns relating to potential time commitments, as well as a number of intrinsic factors including severity of the eating disorder, curiosity, fun and trust. However, this was conducted as only a small part of the larger study, and lacks the in-depth analysis characteristic of a full qualitative investigation. These same limitations were present with the nested qualitative research carried out during the MotivATE trial, which were further compounded by the lack of uptake with that element of the study.

Utilising qualitative methods allows for the exploration of research questions that can provide an enlightening perspective on the topic at hand. Qualitative methodology covers a broad range of approaches and theoretical standpoints. It is more than simply a set of data-gathering techniques, but rather a way of approaching the empirical world (Rist, 1977). In its broadest sense it is related to research that produces descriptive data, that is to say people's own written or spoken words and observable behaviour, and is “concern[ed] with human experience in its richness” (Ashworth, 2003, pg 4).

#### *4.1.1 Qualitative Research Using the Internet*

Traditional qualitative research methods such as ethnographic or observational techniques, interviewing, and focus groups have been successfully adapted for use online (Kozinets, 2010; Murray, 1997; Murray & Sixsmith, 1998). Using qualitative methods in this context presents unique considerations (Silverman, 2016).

Perhaps the most prominent of these is the way in which language is presented. Unlike in traditional face to face methods, conducting qualitative research online means that all conversations take place remotely via a written medium. Whilst this does not inherently preclude a qualitative approach, indeed many qualitative analyses use written text as part of their data corpus, it does raise considerations about how the communication is understood. Online communication often uses informal representations of written language, such as abbreviations (BTW, GTG) and phonetic spellings (how r u?), which represent a novel way in which participants can present themselves in a social context. The role of emotion and social cues also needs to be considered, as these may be difficult to convey, or even be absent, when using this format. However, it has been suggested that participants may make up for the lack of direct non-verbal cues by increasing the amount of meaning and emotion that they communicate, with emotion being injected through the use of capital letters (I AM SHOUTING), punctuation marks (!, ?!), emoticons (:), :(, >()), and acronyms (BTW, LOL) (Williams et al., 2012).

Another unique element of online qualitative methods is the level of anonymity this affords the participants, which not only presents considerations in regards to identification, but may also affect a person's self-presentation, self-disclosure, and the relationships that they form (Bargh, McKenna, & Fitzsimmons, 2002). The anonymous format may generate more honest feedback, particularly in regards to negative comments (Chen & Hinton, 1999; Williams et al., 2012). Indeed, Deal and Hodson (1997) argued that using anonymous online focus groups can also: encourage "hesitant" participants to speak more freely; "moderate" more dominant respondents; and reduce the problem of participants speaking at once.

This anonymity, both for the participants and researcher, can act to reduce any unequal power relations that arise as a result of visible differences such as gender, race or age, both between the researcher and participants and between participants as a group (Illingworth, 2001). A potential downside of this is the impact it may have on the ability to build rapport (Illingworth, 2001). However, research has suggested that people are better able to form closer relationships with one another, and more quickly, in online situations (Bargh et al., 2002; McKenna, 2007; Whitty & Carr, 2006)



It has also been suggested that using online approaches can prove useful in accessing hard-to-reach groups (Turney & Pocknee, 2005) and limited populations (Murray, 1997). Due to the fact that the internet offers a global, or more specifically country wide, sampling pool (Mann & Stewart, 2000). The remote nature of this approach also reduces the burden on the participant as it allows them to take part anytime, anywhere, and when it is convenient for them (Lijadi & van Schalkwyk, 2015).

Finally, researchers questioned the data generated in online research studies suggesting that it is more difficult to validate the details obtained during data collection (Chen & Hinton, 1999). However, whilst this is true, this concern is somewhat mediated by the lack of need for transcription. As data collected online begins in written form, there is no need for transcription between oral and written formats, therefore increasing the accuracy of the transcripts and removing the potential for researcher error (Adler & Zarchin, 2002; Oringderff, 2004).

#### *4.1.2 This Research*

This research is an online qualitative exploration of how people with eating disorders perceive and engage support in both an online and offline context, including the specific example of the MotivATE online motivational intervention. In doing so contributions are made to an area of the literature where qualitative research is currently limited; that being the exploration of how people with eating disorders perceive and engage with support, particularly in an online setting. By exploring both offline and online settings in this research, it will be possible to examine differences in how these approaches to support are seen, and place any conclusions drawn regarding online tools in the context of wider support. Similarly, the research demonstrates the novel ways in which online methods can be used in qualitative research by giving participants access to MotivATE over the course of a one month asynchronous online focus group conducted over four phases. This allows for potential changes in participants perceptions of support as they move through the user journey to be identified. Thus providing a better understanding of how barriers to engagement as people with eating disorders move between considering support, first coming in contact with support and finally accessing support. Finally, the conclusions drawn from

the online focus group will allow for more nuanced interpretations of the findings from previous studies in this PhD through the examination of the MotivATE program from this qualitative perspective, as well as the examination of the potential impact and participants perspectives of visual design and aesthetics. This study will therefore provide a novel and interesting addition to both the PhD and the wider literature.

#### *4.1.3 Aims*

To gain a deeper understanding of how and why people with eating disorders engage, or fail to engage, with support in both an online and offline context including the specific example of a new online motivational intervention.

#### *4.1.4 Research Question*

What are people with eating disorders' experiences of seeking and engaging with support and how do they perceive and engage with a new online motivational intervention?

### **4.2 Methods**

#### *4.2.1 Design*

Asynchronous online focus group.

Online focus groups have been used for a broad range of topics in social science and health research (Adams, Rodham, & Gavin, 2005; Boshoff, Alant, & May, 2005; Williams & Reid, 2010). A focus group approach was chosen over the use of individual in-depth interviews in this instance for several reasons. Firstly focus groups are particularly useful when exploring people's experiences, opinions and feelings (Silverman, 2016), as this approach allows for interactions between the participants that spark discussions which generate opportunities for point-counterpoint discussion and resolution and highlight common trends (Barbour, 2005). This is particularly useful in a critical realist context as it allows for clearer development of contextual

interactions that frame the development of salient themes. Secondly, this approach allowed for the development of thoughts and experiences in relation to participants' perceptions and engagement with the online intervention in a more natural, organic and participant lead manner than can be afforded in individual interviews (Williams et al., 2012). This presented a particularly useful opportunity in this instance due to the exploratory nature of the research given the lack of literature currently available on this topic.

The use of a digital approach to addressing the research question, in particular the use of online recruitment, did present a limitation in that it presented a potential recruitment bias as individuals who are already more regular internet users, and as such may be more likely to have positive attitudes towards digital approaches to support. However, the decision to use online methods was made as it was felt that the benefits of this approach, as outlined below, outweighed this potential limitation.

Firstly, an online approach allowed participants to respond in the same format as they are experiencing MotivATE. Whilst offline support was also explored, this was mainly done to provide context and highlight any differences in perceptions towards online support. As such an online approach remained the most suitable in reflecting the key environment this research was investigating. Maintaining an online focus group also allowed for easily co-ordinated access to MotivATE amongst the whole group, which may have been difficult to achieve in an offline setting, as well as meaning that participants could readily engage in discussion and feedback. Further the decision to use online methods was made due to the increased levels of accessibility it afforded, a particular advantage when considering the low prevalence rates of those with eating disorders (BEAT, 2015). This approach was also deemed suitable for exploring issues relating to this population as it has been suggested that they may be more willing to take part online due to the anonymous format (Silverman, 2016), which may have a particular influence on those with body image pre-occupations (Williams & Reid, 2012). The anonymity of the online environment also allowed those who may not feel comfortable discussing their experiences of an eating disorder face-to-face to become involved in research (Kenny, 2005; Stewart & Williams, 2005).

From a practical perspective the one month period used in this study in order to simulate the user journey when accessing support, would place a particularly high burden on participants in an offline context. Using an online approach also removed the difficulty in having to co-ordinate a time in which all participants and the researcher are available to conduct the study, as well as mitigating the risk of last minute cancellations or distractions that might arise from participants needing to engage in the focus group from remote locations at a set time. Finally an asynchronous rather than synchronous approach was chosen as it allowed for more developed discussion, a key reason for the use of focus groups (Barbour, 2005; Lijadi & van Schalkwyk, 2015), without typing speed acting as a barrier to participation for any members of the group (Williams et al., 2012).

#### *4.2.2 Participants*

A heterogeneous community sample of 12 individuals experiencing an eating disorder were recruited. A sample size of 12-15 participants per focus group was deemed appropriate as it has been reported that this is the average size used in this type of research (Williams et al., 2012) and was expected to allow for a suitable level of group discourse. No particular eating disorder diagnosis was targeted for recruitment, as a broader look at how all people who have experience of living with an eating disorder was of interest to this research. Similarly, all participants were allowed to self-report how they identified their experience of an eating disorder rather than relying on official diagnosis or diagnostic tools, as this study did not wish to exclude participants who may be in the early stages of an eating disorder and/or had not yet accessed support.

A community sample was chosen as the research was exploring potential issues regarding engagement amongst a population known not to engage with treatment. Therefore limiting the sample to those currently referred to treatment may have intrinsically limited the study to a small proportion of those who have experienced an eating disorder as well as bias it towards those more likely to engage with treatment. By expanding into the wider community population, as well as offering the inherent anonymity afforded by the internet, it may be more likely that individuals who self-

identify as suffering from an eating disorder but are unwilling to engage with any treatment took part.

Participants were recruited online via advertisements placed and disseminated with charities and online communities where people with eating disorders were likely to come across them. These included advertisement posts on the websites of, as well as social media posts made by, the charities Men Get EDs Too and RestorED (formerly I\*EAT), as well as posts of eating support groups such as /r/eating\_disorders and research focused websites such as CallForParticipants.com. Finally a recruitment advertisement was also disseminated via the BU research newsletter. Recruitment material contained information regarding the reasons for the research and what would happen if participants took part, as well as the researchers email address which potential participants could use to display interest in the research and ask any questions. The bottom of the advertisement outlined how participants could take part, which involved clicking a link included in the advert that provided access to an online questionnaire which presented the participant information sheet and consent statements.

#### *4.2.3 Focus Group*

The focus group was conducted over the period of one month covering four distinct phases, each lasting one week. The first phase, which followed a brief opportunity for both the researchers and participants to introduce themselves, focused on participants' previous experiences of support as well as their attitudes and opinions towards support in both an on- and off-line context. In the second phase participants were shown a static image of the front page of the MotivATE intervention, with discussion focusing on participants' initial thoughts and expectations of the intervention and how this related to their previous experiences. This was followed by the third phase during which participants had the opportunity to use Motivate. For the purpose of this phase a new version of MotivATE, omitting all Kimmeridge Court contact information, was set up and hosted on the LifeGuide test server. This version of MotivATE included additional code as part of the registration page meaning that only usernames which match those provided by the participants were able to register.

Discussion during this phase did not include any questions from the researcher but instead took the form of an open forum that participants were invited to use as little or as much as they wished during the week. Finally during phase four participants were invited to give feedback on their experience of using MotivATE, as well as exploring how this impacted their feelings and attitudes towards online support for eating disorders. A full question schedule for each phase of the focus group can be found in appendix 3.

This timescale was chosen in order to simulate the user journey whilst still affording plenty of time for participant responses and discussion. The simulated user journey encapsulated the shift from considering support (phase one), first contact with support using a screenshot of the MotivATE front page (phase two), using support in the form of MotivATE (phase three) and finally after using support (phase four). This was done in order to explore potential shifts in participants' perceptions of support, and any potential barriers, as they moved through these phases.

#### *4.2.4 Procedure*

Once consent had been provided participants completed a series of demographic questions, including age, gender and short self-report questions regarding participants experience of an eating disorder (whether their experience is current or historic, whether they have ever attended treatment and what type of eating disorder) as well as allowing them to choose the username they will be identified by as part of the study.

Once a sufficient number of participants had been recruited a private forum was set up on the iTracks system, a bespoke online platform for conducting online qualitative research. This private forum allowed for different questions to be posted, to which participants and the researcher could respond in a forum style discussion under chosen usernames. A suitable start date was confirmed with all participants, before which they were provided with a link to the forum and directed to register using the username they had given previously. The participant information sheet was made available on the forum for participants, once again re-affirming the right to withdraw.

Once the focus group was completed the participants were thanked and debriefed via the forum.

#### *4.2.4 Ethics*

Ethical approval was provided by Bournemouth University (ID: 16484).

In line with the BPS Ethics Guidelines for Internet-mediated Research (British Psychological Society, 2013), a number of ethical considerations were identified. Consent was collected digitally via an online questionnaire using opt-in tick box statements following the presentation of the participant information sheet as part of the recruitment process. Participant information, including information on confidentiality and their right to withdraw, was presented as part of the consent process and again to all participants at the start of the online focus group to ensure this information was adequately communicated.

Participants were informed that they could remove themselves from the focus group discussion at any time by exiting the forum and were under no obligation to return. They were also informed that should they do this any posts they had made would remain in the discussion so as not to interrupt the responses of others.

Debriefing was done digitally within the context of the forum based discussion via a post made by the researcher at the end of the focus group. This provided a thank you for participating, a reminder of the study aims, a brief summary of the key discussion points and contact details for both the researcher and BEAT support groups.

The focus group was run using a private group on itracks.com, a bespoke online system designed specifically to run online focus groups. This system allowed for a secure and private discussion group, which could only be accessed on approval of the researcher. Participants were only identifiable to both the researcher and other participants by their chosen nickname, ensuring anonymity.

The use of online methods also presented a unique consideration in the form of identification. That is to say the internet offers such levels of participant anonymity it can be hard to ascertain that a person involved in the research is the same person at

different time points. This was addressed by asking participants to provide a username during the initial recruitment process, as part of the questionnaire that presents the participant information and consent. Participants were then directed to use these usernames when registering an account on itracks, allowing the researcher to ensure that only those who had consented to the study were involved in the discussion. These usernames were also used to register accounts to access the MotivATE program. This ensured that only the individuals who provided the username during the recruitment process were able to participate in the study and contribute under that pseudonym.

Another key ethical concern raised by this research was the involvement of a vulnerable and hard to reach population through the recruitment of individuals with eating disorders. Whilst this was somewhat mitigated by the fact that the focus group did not focus on experiences of eating disorders, but rather impressions of a digital intervention and barriers to engagement and uptake of support, there remained the potential for distress. In order to limit this participants right to withdraw from the discussion was made very clear, and was easy for the participant to achieve due to the remote online nature of the study, by simply exiting their web browser at any time. Participants were also provided with contact details for the B-EAT help lines, with B-EAT having been made aware of the research.

#### *4.2.5 Analysis*

Qualitative analysis was conducted using a thematic analysis (Braun & Clarke, 2006) informed by a critical realist perspective (Willig, 1999). As this research aimed to examine participant's wider experiences, functional relationships and interactions with support by taking a critical realist approach, rather than an a phenomenological perspective of individual's internal perspectives, this analysis was selected in favour of interpretive phenomenological analysis. The choice of discourse analysis was also rejected as, whilst a focus group format was used to facilitate discussion, this was done to encourage deeper and more developed responses from participants with a focus on the content rather than the language used. Based on this a grounded theory approach was strongly considered, as critical realist approaches have been successfully used in this form of analysis, however the use of a four week asynchronous focus group made



iterative and ongoing targeted recruitment in order to reach data saturation an impractical approach. As such it was deemed that thematic analysis was more appropriate for the nature of the research being conducted rather than what could be considered a form of grounded theory 'lite' (Braun & Clarke, 2006), as this allowed for adherence to a clearly codified method of analysis. Critical realism is consistent with a thematic analytic approach, which is not intrinsically related to any distinct epistemological position (Braun & Clarke, 2006).

The analysis took an inductive approach to understanding the research question, though coding was conducted with awareness of the critical realist perspective. This was chosen over a theoretical based approach, as previous research in this area is limited and the current study included a number of novel aspects, such as the method of data collection, the focus on online support and the examination of a specific intervention. As such the analysis was data rather than theory driven as the researcher did not want to limit the analysis to a predefined theory or expected set of themes as is done when utilising a deductive coding approach.

The analysis was framed within a broadly realist perspective, as the purpose of the research was to identify participants' direct experiences of engaging with support. As such the analysis focused on semantic content rather than latent information and the interpretation of meaning. A semantic approach identifies themes within the "explicit and surface meanings of the data and the analyst is not looking for anything beyond what a participant has said or what has been written" (Braun & Clarke, 2006, p. 13). In contrast, a latent approach "starts to identify or examine the underlying ideas, assumptions, and conceptualisations and ideologies that are theorised as shaping or informing the semantic content of the data" (Braun & Clarke, 2006, p. 13). A semantic approach is consistent with a critical realist epistemological position in that it limits over-use of subjective interpretation and focuses on identifying common semantic themes within and between participants.

Within this context critical realism proposes that each individual's experience of truth will be influenced by their own subjective construction of that truth. Truths therefore effectively gain weight, or saliency, by accumulating evidence, consistent with Buetow's (2010) conceptualisation of thematic analysis as 'saliency analysis'. Saliency

analysis identifies and keeps visible what stands out from qualitative data, by assessing the degree to which a code recurs, is highly important, or both. Codes of high importance are ones that advance understanding or are useful in addressing real world problems, or both. Thus saliency analysis can expose what is non-recurrent but potentially important to the aims of a study (Buetow, 2010).

The analysis was done in the six stages outlined by Braun and Clarke (2006), as informed by Buetow's (2010) saliency analysis. However it is noted that analysis is not a linear process. Instead, it is a more recursive process, and may involve movement back and forth as needed, throughout the phases (Braun & Clarke, 2006):

- Reading and re-reading the transcripts to becoming familiar with the data  
This involved repeated reading of the transcripts generated from the online focus groups, and as such no transcription of verbal data was required. This reading was done in an active way, searching for potential meanings and patterns in the data. The entire data set was read through at least once before coding began in order to begin identification of possible patterns.
- Generating initial codes  
This phase of coding involved identifying a semantic feature of the data in order to generate a code, which refers to "the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon" (Boyatzis, 1998: pg 63). These were used to organise the data into meaningful groups (Tuckett, 2005).
- Searching for themes  
When all the data had been initially coded and collated the next process was to re-focus the analysis at the broader level of themes. This was done within the context of saliency analysis, which involved identifying the recurrence and importance of each code and designating it as one of the following: (1) highly important and recurrent; (2) highly important but not recurrent; (3) not highly important but recurrent; (4) not highly important and not recurrent (Buetow, 2010). Themes were then generated from cells 1 and 3, with supporting evidence from cells 2 and 4. This helped to sort identified codes into potential

salient themes, and collate the salient coded data extracts within the identified themes. At this stage the relationship between codes, between themes, and between different levels of themes was considered, with the aim of developing a set of salient candidate main themes as well as sub-themes within them.

- Reviewing themes

This phase involved the refinement of themes generated in the previous phase at two levels. Level one involved reviewing at the level of the coded data extracts, meaning an examination of all the collated extracts for each theme whilst considering whether they appear to form a coherent pattern. Level two considered the validity of individual themes in relation to the entire data set, as well as whether the thematic map reflected the meanings evident in the data set as a whole. At this stage any additional data within themes that had been missed in earlier coding stages was identified and coded. Developed themes were also discussed with the PhD supervisory team in order to provide additional perspectives in regards to reviewing identified themes.

- Defining and naming themes

At this point in the process there was a final stage of refinement of themes through the use of a theme table before they were defined, which involved identifying the 'essence' of what each theme was about, and determining what aspect of the data each theme captured. In this context themes were considered in and of themselves as well as in relation to others. It was also identified whether a theme contained any sub-themes that might give more structure to that theme as well as demonstrate the hierarchy of meaning within the data.

- Final write up

The write up of the analysis aimed to provide a concise, coherent, logical, and interesting account of the story that the data tells, both within and across themes. These themes are reported in the context of the salience groups developed whilst searching for themes as part of a theme table. This is

supported by evidence of the themes within the data in the form of data extracts to demonstrate the prevalence of the theme.

#### *4.2.6 Reflexivity*

This research was primarily conducted by James Denison-Day (JD), and the analysis done by JD and Dr Ciaran Newell (CN), with review by Dr Sarah Muir (SM) and Prof Katherine Appleton (KA). This team represented a mix of researchers, both with a focus on eating disorders (JD, SM) and wider eating behaviours and health (KA), as well as practitioners (CN). This allowed for the discussion and review of emerging codes and themes to be conducted from a variety of perspectives within the field. However it is important to note that this did not include anyone with a lived experience of an eating disorder.

The particular focus of the research team in this context related to treatment engagement and motivation to change amongst individuals with eating disorders. This unavoidably influenced both the design of the question schedule as well as the perspective from which the analysis was conducted. Further to this JD, as the primary researcher, holds a particular interest in digital design, with this study having been conducted in conjunction with other research examining the role of aesthetics in digital health interventions for individuals with eating disorders. This again is likely to have influenced the nature of the work, as well as the interpretation of the findings.

### **4.3 Results**

Fourteen participants signed up to the focus group discussion, however one never accessed the discussion forum whilst another only gave a brief introduction and did not engage in any of the discussion. As such these two participants were not included in the analysis. The remaining 12 participants consisted of 11 females and 1 male aged between 18-54 years, however the majority of participants were aged 18-34 years. This represented a community sample of UK residents of whom 10 had attended an eating disorder service at some point in the past. Eleven participants felt that they

were currently suffering with an eating disorder, whilst one participant identified as being in recovery. When asked to self-describe their eating disorder seven participants highlighted at least some experience of anorexia nervosa, whilst four described experiences of bulimia nervosa. A further two had experiences of binge eating disorder and two of EDNOS. In several instances, as can be seen in table 4.1, these experiences were not mutually exclusive, with four participants highlighting experiences of more than one eating disorder

Table 4.1: Participant characteristics

Screen-name	Attended Treatment	Eating Disorder (Self Described)	Age	Gender
PP1	Yes	AN	25 - 34	Female
PP2	Yes	AN	25 - 34	Female
PP3	No	AN	18 - 24	Female
PP4	Yes	Previously AN, currently BN	25 - 34	Female
PP5	Yes	AN, BN	25 - 34	Female
PP6	Yes	AN, BN	18 - 24	Female
PP7	Yes	BED	25 - 34	Female
PP8	Yes	AN, EDNOS	25 - 34	Female
PP9	No	AN	18 - 24	Male
PP10	Yes	EDNOS	18 - 24	Female
PP11	Yes	BED	45 - 54	Female
PP12	Yes	BN	18 - 24	Female

Note: Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED), Eating Disorder Note Otherwise Specified (EDNOS)

The online focus group was successful in yielding rich data regarding participants' experiences. In total, participants contributed 181 posts of varying length. As has been noted by previous research using online focus groups (Williams & Reid, 2010) some participants contributed more to the discussions than others, with some choosing to contribute to every question whilst others responded only to those most relevant to

their experience. The more extended nature of the discussion also contributed to the varying levels of engagement from participants, with all 12 engaging with at least one question in the first week, whilst this dropped to eight in the second week and only five by the final week. The levels of group interaction amongst participants also varied, with half of participants simply replying to the researcher's questions whilst the other half quoted each other or replied to other's posts agreeing with a statement and then providing further elaboration based on their own experiences.

The thematic analysis identified two overarching themes: 'The role of online support' and 'Shifting opinions of online support'. In both of these instances these themes were characterised by tensions between positive and negative viewpoints, the interaction of which appeared key in defining both how participants viewed the role of online support in their treatment and recovery and their attitudes towards online support in general. Within these were nested a number of subthemes, 'Current issues with support' and 'Resolving issues with online support', and 'Feelings about online support', 'Impact of exposure to online support' and 'The role of design', respectively. The organisation of these themes and subthemes is outlined in table 4.2.

Table 4.2: Outline of identified themes and subthemes with supporting codes and extracts

Themes	Sub Themes	Description	Codes	Examples
The role of online support	Current issues with support	Participants concerns focused largely on practical issues with accessing support, such as long waiting times, not being taken seriously by doctors and difficulties in physically attending. However, in contrast to this once support had been accessed participants expressed positive opinions of support staff and the role of face to face contact.	<b>Not taken seriously; Frustration with support; Difficulty accessing support; Not ill enough; Sense of luckiness (getting support harder for others);</b> Pressure to recover; Delayed seeking help; <b><u>Connecting with people; Positive experiences of support; Family/friends for support</u></b>	"I knew what the warning signs were and for the first time actively asked for help but was not taken seriously" "I stopped going because it was difficult to get to" "I'm probably one of the lucky ones" "Everyone I ended up talking with was really nice"
	Resolving issues with online support	Early discussion around online support highlighted positive opinions regarding how this approach might address issues with offline support, such as providing easier accessibility and the ability to use online resources	<b>Online support before treatment; Online support is easier to access; Online support alongside offline support; Getting help when you need it; Using the internet for support; Online</b>	"You can get on the internet pretty much anywhere these days, so being able to get help whenever you need it is great" "It's a lot easier to just go on the internet than to actually have to go to someone to get

		<p>as and when they are needed.</p> <p>Similarly, concerns related to the potential loss of those elements of offline support that were seen as positive, in particular that online support might replace face to face contact.</p>	<p><b>support safer;</b> Using online support on a mobile</p>	<p>advice or talk about things"</p> <p>"I'm not sure I'd like it if it was intended to replace my current sessions"</p> <p>"I can't see how it could actually replace going and seeing someone face to face, but I wouldn't have anything against something I could use from home alongside that."</p>
Shifting opinions of online support	Feelings about online support	<p>Though the use of the internet to find information was prevalent, many hadn't previously considered that online resources could fulfil a more active support role. This idea produced concerns around the lack of depth and accountability that would be present in online support.</p>	<p><b>Not thought to use internet in a positive way; Negative feelings about online support; Online can be confusing; Online inherently different to offline support; Online support 'impersonal'; Online support lacks structure; Online support not easy to find; Online support</b></p>	<p>"It requires a lot of self discipline and I think there would be a concern for me if I was doing it right or not"</p> <p>"I've actually found looking at stuff online really helpful"</p> <p>"Just Googling stuff really"</p> <p>"I would never have considered it before"</p> <p>"I never thought of being myself &lt;online&gt; or joining a</p>



			<p><b>too easy to ignore; Hard to know what information to trust online; Positive views of online support;</b> Getting information</p>	<p>forum or that it can be a supportive place" "It just seems kind of impersonal to me" "I think I'd quite like it"</p>
	Impact of exposure to online support	<p>Initial exposure to online support had a limited positive influence on attitudes towards it, often generating a sense of interest. More significant changes in opinion however were reserved until after using the support.</p>	<p><b>Attitudes improved after using MotivATE; Positive first impression of MotivATE; Positive feedback on MotivATE; MotivATE is what is expected; Neutral first impression of MotivATE; Things MotivATE could do better;</b> Not right person for MotivATE; Videos a positive</p>	<p>"I feel quite excited by it. It's something I haven't tried before." "I'm pretty curious to see what is actually in it" "I guess I wouldn't really be able to decide until I've actually used it." "It's really made it a possibility for me. I hadn't really considered it before but I can definitely see how it could be good" "I liked it, more than I thought I would"</p>

	The role of design	Simple and easy to use but professional looking designs appear preferable in generating favourable opinions of online support, with the use of logos a particular consideration.	<b>Colours used for MotivATE;</b> <b>Simplicity of design; Impact of Design; Professionalism of design; Importance of content; Ease of use; Logos;</b> Activities in MotivATE	"It's nice and simple" "It feels a bit unprofessional compared to a lot of websites I've seen." "Having the logos clearly at the top is good too, it makes it feel more official."
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Notes: Cell 1 codes are highlighted in **bold**. Negative codes are underlined.

#### 4.3.1 Saliency Analysis

As can be seen in table 2 each of the subthemes was highly salient, with the majority of codes being derived from cell 1 of the saliency analysis (with the remainder shown being drawn from cell 3). This would suggest that the themes presented below give a meaningful window into participants' experiences and attitudes towards on- and off-line support.

#### 4.3.2 The role of online support

The role that online support and digital tools might play in supporting recovery from eating disorders was a key focus for discussion, particularly during the first week of the focus group. The way in which participants felt digital tools might support those with eating disorders was highly influenced by participants' previous experiences of offline support. This included both the ways in which they could envision digital approaches addressing perceived shortcomings in offline support, but also concerns regarding the impact that this might have on the aspects of offline support they had found most beneficial. This tension between what might be gained, but also what might be lost, seems key to how participants conceptualised online support as a potential part of the treatment pathway. This tension was captured in the two sub-themes that were identified within the overarching theme, which related firstly to 'current issues with support' and then from this 'resolving issues with online support'. By examining these two sub themes, and the interactions between them, it becomes clearer how participant's previous experiences framed their views of the role online support might play.

##### 4.3.2.1 Current issues with support

During early discussion regarding participants' previous experiences of support topics surrounding practical issues with accessing support arose as a common feature of the conversation. *"The centre is just so far away I can't always find the time to book in an appointment. Or if something comes up I sometimes have to cancel as I wouldn't be*

*able to make it in time"* (PP10). Indeed, difficulty in physically accessing support was even seen as a reason for discontinuing treatment once it had started, *"I stopped going because it was difficult to get to"* (PP6).

These practical concerns also extended to long waiting times, which were a common feature of participants experiences of seeking support. *"I was given a 7 month wait for help."* (PP5); *"There was a pretty serious wait before there were actually able to take me"* (PP7). This wait for support had a significant negative effect on some of the participants, creating stress and anxiety, as can be seen from the following extract:

PP2: *"Having to wait so long to actually see a proper professional was definitely unhelpful. It made me feel a bit panicked when they told me how long it would be the first time because I was really starting to struggle and at the time it was all about making sure I managed to finish my degree so I didn't really see what good they were if they couldn't really help me until I was almost finished anyway."*

Whilst these experiences of practical issues were not universal amongst the participants, the awareness of the limitations of support remained for those with more positive experiences. This could be seen from common references to a sense of 'luckiness', in that it was felt that their positive experiences were uncommon and that many people in similar situations found it harder to get the same experience of support that they did. *"I'm pretty lucky that there's one only an hour or so away from me, I know some people have to go a lot further"* (PP7); *"I was very lucky to have a doctor who listened and knew about the programme because I've told other people in my area to ask about it and their GP had never heard of it"* (PP4); *"I feel very lucky to have been given access to the service"* (PP11).

Other concerns revolved around fears that they would not be taken seriously, or that they would be considered to be 'not ill enough' to receive support. *"I spent a lot of time not really taking my eating issues seriously, largely because whenever I mentioned them to a doctor they just checked my weight and said I was fine."* (PP10); *"I doubt they'd take me seriously either anyway"* (PP3); *"I think doctors need to take it more seriously, at the moment they don't really seem to care until things get really serious."* (PP12). Previous experiences of many participants seemed to be that their condition

had to have progressed to a point of severity before they were taken seriously and given the treatment and support they needed, which unsurprisingly created concerns for how they will be treated in the future. *"Things did have to get pretty serious before anyone started talking about it seriously"* (PP8). In fact, as can be seen from the following excerpt, for some it was not until they were hospitalised that they actually received serious support:

PP5: *"I have been a long time eating disorder patient and tried to seek help after spiralling deeper into a severe relapse. I was given a 7 month wait for help. Ended up in Accident and Emergency with a heart issue two days later in ICU and only then did I get put through as an emergency referral to the Adult Eating Disorder Clinic. I knew what the warning signs were and for the first time actively asked for help but was not taken seriously. Makes me scared for the future should I ever need help to get me through a relapse."*

These issues also often combined with a sense of frustration with support, whether it be from friends and family, *"I know they try to be helpful but I think they just struggle to understand it... so it can get a bit frustrating sometimes"* (PP3), or professional services, *"The daily diaries and worksheets I have to complete frustrate me"* (PP11); *"I agree with PP11 that it can be quite overwhelming and frustrating"* (PP1). Amongst people that may already have reservations about support, these issues then serve to compound problems around delaying help seeking by increasing the sense of anxiety surrounding accessing services. *"It took a while for me to build up the courage to go"* (PP7); *"Even then it wasn't until near the end that I started looking for help"* (PP2).

Once support had been accessed however the general feelings of participants towards their experiences were positive, especially in regards to their interactions with people in support and the connections that they made throughout receiving support. *"I've been having outpatient appointments for a while now, which have been really good. The lady I work with is lovely."* (PP2); *"The staff there were good people, even if I didn't always appreciate what they were doing, and the therapist I work with has been really good for me"* (PP7); *"My only real experience in actually getting support for my eating disorder has been the outpatient centre I'm attending. That has been good, the woman I'm working with is nice and the support she's been giving me has been helping me"*

*move in the right direction"* (PP10). This highlighted the importance that aspects of offline support still played in participants' recovery, despite the barriers and issues experienced by some participants when attempting to access this support.

#### 4.3.2.2 Resolving issues with online support

As discussion progressed into topics surrounding online support, it became apparent that a major factor in the way in which participants thought about the role of online support lay in the ways in which it might address some of the short comings they had experienced with offline support. A key part of this revolved around the idea that online support would be easier to access, therefore reducing practical issues such as the need to physically attend a service. *"I think being able to do it from home would make it a lot easier"* (PP3); *"The fact that you can access it at any time without having to go anywhere would definitely make it easier"* (PP2). This also helped to address concerns about waiting times, meaning that support might be accessed when it is most needed. *"It is instant, out of hours and I find it very supportive"* (PP4); *"I like that its accessible. Being able to get on to it when you need it is great"* (PP10).

This sense of accessibility also extended to being able to get support in a timely manner without the concerns needing to be taken seriously by a healthcare professional. *"There's no pressure <online> to have to do anything and say the right thing"* (PP3). This was associated with a sense of increased safety around the online support that may not always be present offline. *"I guess it makes me feel safer than thinking about having to go to like a clinic or something like that"* (PP3). This element of safety also extended to participants interactions with others, such as family, friends or other non-healthcare professionals:

PP4: *"I would never have considered it before but recently I have made some friends on Facebook through a group I've joined. It's nice to be able to pick up my phone and chat to someone without the danger of them calling me or turning up round my house or telling my mum on me."*

The potential role of online support in increasing accessibility of treatment was also highlighted by the importance some participants placed on such support being

accessible via a mobile, therefore greatly increasing the number of places and how quickly it could be accessed. *"Having support on my phone everywhere and at any time would make it much easier to use"; "I would respond negatively if it wasn't manageable on my phone"* (PP4).

These positive views regarding how online support might address issues with offline support are however counterbalanced by concerns regarding what such an approach might take away from the positive aspects of offline support, primarily the contact and connection gained from seeing someone face to face. *"Even if I could get really great information or whatever on a computer it just wouldn't be the same as actually talking to someone about it"* (PP2); *"I don't think it has the depth that you get from seeing someone"* (PP10).

The impression that online support just wouldn't be the same as seeing someone face to face was highlighted by the fact that several participants indicated that they would not want online support to replace offline support, but rather that it should be delivered either before or alongside current support. *"I can't see how it could actually replace going and seeing someone face to face, but I wouldn't have anything against something I could use from home alongside that"* (PP7); *"If I was just given online support without any face to face support I don't think I would be happy"* (PP4). This complimentary role that online support might play is perhaps best summarised by the following excerpts:

PP7: *"I'm not sure I'd like it if it was intended to replace my current sessions, but I imagine it would be reassuring to know I have something official to access when I'm at home if and when I need it."*

PP2: *"If that was all I was getting I don't think I'd be happy, though I guess I've never really tried it properly. I know there's all this online stuff now for things like depression. I definitely would have preferred it to just being told I had to wait, but I would still need someone to actually talk to."*

#### 4.3.3 Shifting opinions of online support

Given the nature of the focus group, in that participants moved through four phases of considering online support (pre-use, first exposure, use and post-use), the second over-arching theme that became apparent from the data was the way in which participants opinions and attitudes changed, or did not change, through this process. As the discussion progressed clear changes in the way that participants discussed online support and the role it might have in treatment were evident. These shifting opinions will be discussed in terms of the three sub themes contained within the over-arching theme, including: 'Feelings about online support', which covers participants early discussions of their views towards online support; 'Impact of exposure to online support', which examines how participants' opinions and attitudes changes throughout the course of the study; and finally 'The role of design', which became an interesting area of conversation that appeared to be a factor in influencing how participants responded to the intervention used in the study.

##### 4.3.3.1 Feelings about online support

Despite the acknowledgements of the role that online support might play in recovery many participants indicated that they had not previously considered using the internet as a place to get support. *"I suppose I haven't really thought about it"* (PP7); *"I've never really considered it"* (PP8); *"I would never have considered it before"* (PP4). In fact for some participants the internet was considered as more of a negative space, and as such not somewhere they would immediately think of to go for support. As can be seen in the following excerpts:

*PP4: "I still think of the internet as this anonymous place where I can argue with people and buy drugs and research how best not to get caught out with my eating patterns. I never thought of being myself or joining a forum or that it can be a supportive place."*

*PP9: "I'm in the same position of PP4. The internet for me has always either been something to escape from my issues or somewhere full of people"*



*arguing and insulting each other. I never really thought of it as somewhere I could go and get support."*

Where participants had previously used the internet to support their recovery from an eating disorder the primary function this had played was in regards to getting access to information. This applied even for some of the participants who said they hadn't previously considered using the internet for support, suggesting that active online interventions are seen as distinct from gathering information about support online. *"I did look some things up on my computer before going to see my doctor if that counts?"* (PP7); *"I did look a few things up when I first started to realise I was struggling. I went on a few forums and the b-eat website was really good. But I never actually talked to anyone that way"* (PP2). The use of common sources of shared information online, such as Google and Facebook, also seemed to be a way in which participants used the internet to access helpful information by; *"Just Googling stuff really"* (PP3) or that they; *"Had a look at some Facebook pages"* (PP11).

However, whilst the use of the internet to gain information did not appear to be particularly uncommon amongst the participants, and despite the acknowledged role that online support might play as outlined above, attitudes towards more direct forms of online intervention were often negative. These negative opinions took on a number of different dimensions, ranging from practical concerns to more inherent worries about the nature of online support. These practical concerns included the very initial problem that participants worried online support was difficult to find, meaning that in order to access this type of support a person would need to be guided there by a professional and as such potentially still be vulnerable to the issues surrounding accessing support outlined above. *"The internet is a big place so unless you get pointed towards it I don't think I'd just stumble on it, so that means I'd either need to have been referred by someone or have seen something about it somewhere"* (PP8). And in the event that someone were to be able to find support online by themselves, participants expressed concerns regarding how they would know what information was trustworthy and of high quality, as well fears that online support could be confusing and that it may be hard to tell whether it would be directly applicable to them. This second aspect is perhaps particularly relevant to online information, given the global

nature of the internet, information that is found may not apply locally to the user, as can be seen in one of the following excerpt:

PP7: *"I do worry it can get a bit confusing. When I was looking I kept ending up on American websites and it was hard to tell whether what they were saying was relevant to me."*

This highlights the need for online support to not only provide high quality information and support, but to ensure that it clearly displays the source and relevance of this content to users. *"Because there is quite a lot out on the internet but you can't always tell what's actually good advice, so having it all in one place where you know you can trust it would be really good"* (PP3).

As well as these concerns about finding good quality and suitable support online, participants appeared uncertain about the actual nature of online support itself. Online support was seen as being inherently different to offline support, which, whilst having some benefits as outlined in the previous theme, did result in some negative attitudes towards how participants viewed it. One such concern was that online support would lack the structure and accountability of offline support, which a number of participants viewed as an important part of their recovery process. *"I've found in dealing with other issues that having a structure to my treatment and appointments is really important"* (PP10); *"Without sessions scheduled in and that sense that I've actually got to go and turn up, like I said before I'm just not sure I'd actually get round to using it. It would be too easy to forget or make excuses and not feel bad about it"* (PP8); *"I would need some form of accountability"* (PP11). This was tied in to feelings that without a strong sense of self-motivation online support would be too easy to forget or ignore, therefore reducing how effective it might be as a tool for recovery. *"I would find it too easy to drop out at the early stages if I had just started with online support I think"* (PP4); *"I think it would need some way to remind you to use it, like emails or something like that, so that it doesn't just get forgotten"* (PP8).

Finally, as was also partly covered previously, some participants thought online support would be too impersonal, and that it would lack the connection that was available face to face. *"I don't know, it just seems kind of impersonal to me"* (PP2); *"You just can't get the same personal connection with a computer"* (PP2).

This is not to say however that participants' views of online support were universally negative. These worries and concerns were expressed both alongside the potentially positive practical roles of online support outlined as part of the first theme, as well as more explicit expressions of positive opinions towards online support. *"It seems like a good idea"* (PP2); *"I certainly don't have anything against it, I think it's definitely useful with the internet to have so much information at your fingertips"* (PP7); *"It makes me feel quite excited"* (PP4); *"I think I'd quite like it."* (PP3). Though during the initial phases of the discussion concerns and worries were more predominant.

#### 4.3.3.2 Impact of exposure to online support

Following on from the above, the core factor of this theme was what then happened to participants attitudes and perceptions towards online support as the study progressed and participants had the opportunity to see, and then use, a novel online support website. At first contact, that is, when simply seeing the front page of the website, attitudes did seem to improve slightly. A number of participants began to express a marked interest in the intervention, suggesting that once presented with it they were willing to set aside some of their concerns in order to use it. *"It's made me interested to see what's inside it if that makes sense"* (PP10); *"I guess I'm pretty curious to see what is actually in it"* (PP2); *"I suppose I feel a bit better about it. Reading the front page makes me think it's the sort of thing that might be relevant to me, and I'm interested to see what the activities and advice are"* (PP7). For others the positive response was more marked. Particularly for those who had not tried, or even considered, online support previously as it seemed that this initial exposure made this a more real possibility for them.

PP4: *"I feel quite excited by it. It's something I haven't tried before."*

PP9: *"It's really made it a possibility for me. I hadn't really considered it before but I can definitely see how it could be good as I do spend quite a bit of time online, so it would be good to also be able to use it to get help."*

For a number of participants however when asked if seeing the website had impacted on their attitudes the response was limited, *"Not really much of an impact"* (PP2); *"No*

major change" (PP11); *"My feelings haven't changed. I still feel positive about it"* (PP4), with some suggesting that they would want to reserve judgement until they had a chance to use it. *"I guess I wouldn't really be able to decide until I've actually used it"* (PP3). This was also often linked to expectations, with responses suggesting that attitudes did not change when what they saw matched up with their previous expectations of online support, as can be seen in the following excerpts:

PP10: *"I don't think my feelings have changed really, and that's probably because it seems to cover most of the things I was expecting. So there's nothing there to really surprise me or disappoint me. Though I suppose that could change once I use it."*

PP2: *"Like [PP10] said I guess because it's pretty much what I was expecting, no real surprises."*

These expectations also appeared to be tied to participants perceptions of healthcare in general, in particular the NHS. *"It looks like the kind of thing I would expect from the NHS"* (PP8); *"It looks very NHS-y to me. How I felt about this would depend on how much faith I have in the system at the time. I swing from total faith to paranoid distrust"* (PP4).

For those participants that did go on to use the website, the general response was positive. Though some did not identify specifically with this intervention, for example because they felt they weren't the right person for it, *"I feel like the wrong target audience"* (PP5), as can be seen from the following excerpts, even for those that did not like MotivATE specifically the impact that using it had on their attitudes appeared to be positive:

PP3: *"I definitely think it's something I'd like to try if more stuff like this was available. I think actually using it has made me more confident about what I'd expect to find if I was to go and use other websites like this."*

PP2: *"I think I'm definitely more open to it. Maybe not this one exactly, but I can see how something like this would be quite useful for me."*

PP7: *"I'd say I'm feeling more positive about it. Using it re-enforced what I was thinking when I first saw it, that it isn't meant to replace my actual treatment and gave me a better idea of what it was all about. I started getting that impression when I saw the picture of it, but you can't really know for sure until you use it."*

PP9: *"Having not really thought about it before now I'm definitely all for it. I think having things like this that you could use from home whilst you are waiting to see someone would be really good."*

#### 4.3.3.3 The role of design

The final element of this theme was the way in which the design of the website appeared to be a factor in influencing participants' attitudes towards online support. To some degree this was represented directly in participants responses, *"I do like things to look nice and the poor design might put me off a bit"* (PP9); *"I think everything being clear and simple would make me more likely to use it"* (PP2); *"I think because it looks quite dated, I am expecting that I might be 'talked down to' a little bit with the information provided"* (PP11), however to a greater extent this was evident in the general feedback that participants gave.

A particular element of the design that appeared several times in the discussion was references to its simplicity, often being highlighted as a positive aspect of how participants viewed the website. *"It's nice and simple"* (PP10); *"As I said before, I think it's simple and clear"* (PP2); *"I like it. It's calm and simple"* (PP7). However this simplicity could also lend itself towards negative views of the intervention if taken to the extent that the design was seen to be oversimplified, and as such somewhat boring. *"It could maybe have a bit more too it though. I'm not sure what, but maybe it's a bit too simple?"* (PP2). This suggests that the way in which the design is presented needs to be carefully considered as it can result in both positive and negative responses from users in their judgements of the intervention.

This impact of the simplicity of the design also extended to more practical concerns such as how easy the website is to use, which in turn also appeared to be an

influencing factor in participants attitudes towards the online intervention. When asked what might influence their decision to use online support ease of use was highlighted as a key factor. *"How easy it is to use would probably be the main thing"* (PP2); *"Clear guided pathway to find your way around the website"* (PP11); *"Did it have the sort of things that would be helpful to me? And if so were they easy to find and use?"* (PP7). When given a chance to see and use the intervention this concept of ease of use appeared to be tied to judgements of simplicity, as the simple design meant that the user pathway through the intervention was clear, as can be seen from the following excerpts:

PP7: *"I like it. It's calm and simple. Not too flashy. The little bit of introduction is nice to let you know the sort of thing you can expect once you sign up and the big arrow button makes it pretty obvious what to do to continue."*

PP2: *"I think everything being clear and simple would make me more likely to use it, as I can see exactly what it is and how to get in."*

A second aspect of the design that appeared to influence participants' judgements was the professionalism of the design. In the context of this study, perceptions that the intervention was not professionally made resulted in negative judgements towards it. *"It honestly does not look very sophisticated"* (PP5); *"I thought it'd be a little more polished"* (PP2); *"It doesn't seem that well made though, my first impression is that it's a bit cobbled together"* (PP9); *"The font makes it look quite 'home-made'"* (PP11). This seemed to be particularly evident when participants compared the intervention to what they expected of online support. *"To be honest the design isn't great. It looks very dated and not really up to the standards I'd expect to see in a modern website elsewhere on the internet"* (PP9); *"It feels a bit unprofessional compared to a lot of websites I've seen"* (PP3).

This lack of professional design appeared to detract from what might otherwise have been positive attitudes towards the intervention, something that potentially had wider implications for participants' general views towards online support. This impact was particularly evident in relation to the use of logos in the website. In general the use of noticeable logos, such as that used by the NHS, was seen as a positive feature of the

website, engendering a greater sense of trust towards the intervention. *"I like that it's got the logos at the top, that makes it feel like you can trust it"* (PP3); *"Having the logos clearly at the top is good too, it makes it feel more official"* (PP10). However the way in which this was done as part of the design, in that the *"NHS Logo looks like it's been stuck on as an afterthought and isn't actually part of it"* (PP11), had a potentially detrimental effect on this.

PP7: *"It's got the logos and information I would want if I was coming across it on the internet for the first time, but I think it would be better if it looked a bit more professional."*

The final aspect of the design that was commonly referenced was the use of colour, with participants responding favourably to their use within the design. However, this appeared to be for different reasons with one participant stating they liked it because it was *"bright and cheerful"* (PP11), whilst another because the colours were *"quite calm and clear"* (PP10). This would suggest that the use of colour is something that users may notice about online support, however it appears that the same colour scheme can evoke different reactions in different people, meaning it may be difficult to ascertain what colour schemes are most suitable.

Though the design of the website did appear to be a significant factor in influencing participants attitudes towards the intervention used in this study, it is worth noting that the content also played a key role for those that actually used the website. *"I think it was pretty good. There was definitely some useful stuff there I hadn't come across before"* (PP3); *"It's better than most of the websites I've seen, because it does more"* (PP7). Of particular note was the multi-media and interactive elements of the intervention, which were highlighted repeatedly as positive aspects of the intervention. *"I really liked all the videos"* (PP2); *"I think the fact it highlights that it will be personal advice and has activities and quizzes makes me think it will be quite interactive, which I think is good"* (PP10). These more interactive elements seemed to have a particular influence by increasing the sense of connection with the website, which appeared for some participants to help assuage concerns over the loss of interaction that comes from using online rather than offline support:

PP2: *"I definitely think having the videos in there helped change my mind a bit. They made it feel more personal, like there was a bit of interaction there. It's still not the same as actually getting to talk to someone, but it's not as cold and impersonal as I was first expecting."*

Indeed, when asked what they felt would make the intervention more engaging, it is these elements of interaction that participants wanted to see more of:

PP3: *"Maybe doing a bit more of the same? Like being able to choose your stage was good, so maybe it could also go through the different eating disorders and let you choose which one you think applies to you so you can get more information about it?"*

PP2: *"Maybe if it had more activities, or things to help you keep track of your recovery. That would be quite useful and would probably make me come back to use it more often."*

PP7: *"It could give more feedback. I liked the way the questionnaire gave you information based on your answers, it would be nice to have more of that."*

#### **4.4 Discussion**

This research highlights the complexity of attitudes towards online support amongst individuals' with eating disorders. These appear to be strongly influenced by previous experiences of support seeking in an offline context, with common trends relating to barriers in accessing support often colouring perceptions of the support seeking experience. This in turn presents a clear role for online support to potentially address these issues by providing greater levels of accessibility. Despite this the general attitude to participants towards online support was initially quite negative. Though a potential role was acknowledged it was largely overshadowed by concerns regarding issues such as accountability, depth and the potential of losing access to offline support all together. This suggests that whilst offline support was often seen as difficult to access, the beneficial role that it played once these initial barriers had been



overcome was highly valued. This appears to support the service related and practical barriers identified by Leavey et al., (2011).

It is possible that this ambivalence towards online support was in part a result of lack of exposure to these types of interventions, as several participants reported that not only had they not used online support previously, but they had not even considered that the internet might be utilised as a supportive space. The opportunity to see and use an online intervention for eating disorders therefore presented a chance for participants to engage with this mode of support and explore how this affected their attitudes towards it. On the whole this exposure appeared to have a positive impact. Indeed, building up to using the intervention, both during initial discussions and upon seeing the front page, seemed to generate interest amongst participants in trying online support. However most reported a desire to reserve judgement until after having actually used it. This meant that the initial reaction of seeing the intervention for the first time was often somewhat reserved with more meaningful changes being discussed only after the intervention had been used. These changes however were generally positive, even for those who did not feel that MotivATE was specifically appropriate for them, suggesting that simply being exposed to online support may have a positive impact of users attitudes.

This shift in attitude appeared to be influenced to some degree by both the content and the design of the intervention, with participants who used it reporting generally positive responses to the content, but at times more negative attitudes towards the design. The lack of professionalism was noted several times by participants as something that detracted from their opinions of the intervention, in particular in relation to the logos, which was a point raised during the interviews conducted as part of the MotivATE trial. Here several participants mentioned that the inclusion of relevant logos, such as the NHS logo, helped to build trust in the intervention, but the way in which these had been implemented detracted from this. Trust is known to play a key role in fostering engagement with commercial websites (Grabner-Kräuter & Kaluscha, 2003), being linked to metrics such as willingness to buy and intentions to return, as well as in the way users evaluate health information websites (Sillence et al., 2004). Additionally it has been suggested that improved website aesthetics can lead to

greater levels of website trust in early judgements (Lindgaard et al., 2011), of which the use of logos may therefore play a key part.

Conversely the simple way in which the intervention had been designed and portrayed information, particularly on the front page, was seen as a positive. This made it easier for participants to understand the purpose and role of MotivATE as well as ensuring access to it was easy and clear. Indeed, this would appear to support work conducted by Lazard et al. (2015) who found that design simplicity influenced the perceived ease of use, and by extension the perceived usefulness, of patient portal websites. It is worth noting however that the subtheme relating to design is likely to have been influenced by the interview schedule, as a number of questions did directly relate to this area. This is not to say that such factors did not play a role in influencing participants' attitudes, but that discussion of this topic may have arisen less organically than in other areas, which must be acknowledged when considering the strength of the evidence.

This research benefited from a number of strengths. The use of a longer approach to the discussion that moved through several phases allowed for a closer replication of what participants might experience in a more naturalistic setting when using online support, moving through the stages of consideration, first impressions, use and reflection. This allowed for a discussion that covered the full breadth of the user journey rather than picking one area and attempting to explore it in isolation. Similarly conducting the focus group online meant that participants engaged with both the intervention and the discussion in the form that it is intended to be delivered; that is over the internet in their home environment where it can be engaged with in their own time. This again means that the experience of participants in the study is a closer reflection of real life uses of digital support, thus allowing for a more meaningful discussion of their thoughts and experiences.

However, the use of an online focus group was not without its limitations. Firstly conducting the discussion over such a long time period meant that the study did suffer from drop out, with all 12 participants engaging with at least one question in the first week, whilst this dropped to eight in the second week and only five by the final week. This may have influenced the responses given later in the focus group, as it is possible

that participants who remained engaged with the study may have done so due to having more positive attitudes towards the intervention than those who did not. Additionally this high rate of dropout suggests that the use of a long discussion period, particularly when working with a population who are often difficult to engage, may need to be more carefully considered in future research. The nature of the software used to conduct the discussion also led to some limitations in the nature of the discussion as responses were organised by user rather than purely chronologically. As such when a user, or the researcher, made more than one response to a question this appeared alongside their original comment, regardless of where this may have been in the flow of conversation. This made including follow-up questions more difficult, and detracted from group based discussions. Finally, as mentioned in the previous discussion regarding the selection of this approach, the use of a digital methodology, in particular in the recruitment of participants, may present a potential bias by favouring individuals who were already internet users and therefore may have had more positive attitudes towards online support. However, given the critical attitude towards online support presented by many of the participants it is suggested that this potential bias does not appear to have unduly skewed the discussion. Indeed, it was interesting to note that many participants had not considered that the internet could present a potentially positive resource in regards to seeking support.

These findings do however support some of the points highlighted by the case studies presented as part of the MotivATE trial, in particular in relation to the design and the placement of the logos, as well as issues highlighted by previous research. This raises aesthetics as a potential contributing factor to lack of engagement with the MotivATE intervention, especially when coupled with what may be particularly low, or even negative, expectations amongst people with eating disorders towards online support. The apparent lack of familiarity with online approaches to support also needs to be considered, as this may potentially contribute to negative attitudes as potential users may not know what to expect from these types of interventions. It is therefore imperative that such interventions address these concerns effectively at the initial contact point, both by clearly presenting the content and purpose of the intervention and supporting this with a simple and professional design. As such future research would benefit from further exploring the concerns that people with eating disorders

have in regards to online support and how they feel that these concerns could best be addressed. This would mean that steps can be taken as soon as possible in the delivery of online interventions in order to potentially reduce non-engagement. Additionally, a greater understanding of the impact that exposure to online support has on attitudes would be highly beneficial. As, if lack of exposure represents a potentially modifiable barrier to engaging users with web-based interventions, this may inform future approaches to offering online support.

In conclusion people with eating disorders do appear to have a concept of the potential role that online support has to play in the recovery process, however the delivery of interventions may be complicated by lack of user experience with online interventions and negative attitudes towards online support. The design and delivery of these interventions therefore needs to be carefully considered in order to address this and ensure that potential users engage with the support being offered.

## Chapter 5: The Role of Aesthetics in User Intentions Towards Digital Health Interventions

### 5.1 Introduction

The recent shift towards utilising technology in the development and delivery of interventions presents a novel opportunity in the treatment of eating disorders. A wealth of evidence indicates that computer based guided self-help can be a valuable means of treating patients with common mental health problems (Cuijpers, Donker, van Straten, Li & Andersson, 2010). Positive outcomes have suggested that these programs can be as effective as face-to-face treatments (Cuijpers et al., 2010) and has resulted in them being recommended as a treatment choice for depression in recent National Institute for Health and Clinical Excellence guidelines (NICE, 2009). Digital approaches have been shown to be effective and acceptable to users for providing preventative, adjunctive or post-treatment interventions for EDs (Fichter et al., 2012). Indeed, using digital technology to address issues in health care is a current priority of the NHS (Young & Wilkins, 2013)

However, whilst the effectiveness of web-based interventions has been demonstrated in controlled experimental settings, problems with engagement are commonly encountered in translating these results into practice (Doherty, Coyle & Sharry, 2012). This has been attributed to the lack of 'stickiness'; the ability to attract and retain internet visitors of online interventions, relative to other modes of contact (Lin, 2007). This could potentially be a major pitfall for online self-help, as there is evidence that many participants of internet interventions exhibit lower levels of engagement than program developers originally envision (Eysenbach, 2005; Fleming et al., 2018) and on average only 50% of participants adhere to online interventions (Kelders, Kok, Ossebaard & van Gemert-Pijnen, 2012). One study investigating a novel web-based intervention for EDs found that only 63% of participants who registered for the program began using it (Lueng, Ma & Russel, 2013a). Indeed, as was shown in previous chapters, this same issue was potentially a key contributor to the lack of impact of MotivATE.

### 5.1.1 Visual Design in Human Computer Interaction (HCI)

Aesthetics can be regarded as an "immediate pleasurable subjective experience that is directed toward an object and not mediated by intervening reasoning" (Moshagen & Thielsch, 2010, p. 690). An aesthetic impression occurs immediately at first sight, rather than being the result of a long lasting cognitive analysis (Leder, Belke, Oeberst, & Augustin, 2004). This places it within the same timeframe as judgements made by users about the website as a whole, as it has been demonstrated that evaluations of online information are made quickly, with viewers judging websites within 50 milliseconds or less (Lindgaard et al., 2006; Tuch et al., 2012).

Indeed, with the HCI field there is a significant body of evidence to support the role of aesthetics in improving user ratings such as usability, trustworthiness and intention to return. Research from commercial fields suggests that design aesthetics may be a significant contributor to the way in which users make judgements about websites (Moshagen & Thielsch, 2010), with the beauty of the website being a key factor in users' online experiences, evaluations and repeated visits (Schenkman & Jonsson, 2000). In fact, aesthetics have been shown to influence a wide range of factors relating to how a user interacts with a website, including usability (Lee & Koubek, 2012; Sonderegger & Sauer, 2010), first impressions (Thielsch & Hirschfeld, 2012; Tuch et al., 2012), intentions to revisit or recommend (Mahlke, 2002; Thielsch, Blotenberg & Jaron, 2014) and disposition to buy (Parboteeah, Valacich & Wells, 2009; Porat & Tractinsky, 2012). Indeed, in relation to commercial fields, Parboteeah, Valacich, and Wells (2009) found that the aesthetic quality of an e-commerce website affected consumers' urge to buy impulsively online, whilst Cai and Xu (2011) found that perceived website aesthetics positively affected online consumers' shopping value. This would appear to confirm that, all else being equal, an aesthetically pleasing website is generally more highly valued by online consumers.

This principal also appears to apply when users are not intending to purchase something, with Jiang, Wang, Tan and Yu (2016) demonstrating that aesthetic principles had significant impacts on perceived utility and attitudes towards business portal websites. With perceived aesthetics actually playing a larger role on

participants' attitudes toward the websites than perceived utility when shown them for the first time.

The process by which individuals make these judgements can be conceptualised using an adapted Technology Acceptance Model (TAM; Van der Heijden, 2003), which adopts the well-established causal chain of beliefs -> attitude -> intention -> behaviour, known as the Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975). In this context it has been proposed that aesthetics may influence users' beliefs and attitudes towards a website, subsequently influencing their intentions and behaviours (Van der Heijden, 2003).

The original version of the Technology Acceptance Model was put forward by Davis et al. (Davis, 1989; Davis, Bagozzi & Warshaw., 1989). This initial model of technology acceptance built on the TRA by proposing two key beliefs that relate specifically to information system usage. The first was 'perceived usefulness', defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, pg320). Whilst the second was 'perceived ease-of-use', which Davis defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, pg320).

Taylor and Todd (1995) proposed further developments to how we model technology acceptance by introducing principles derived from the Theory of Planned Behaviour (TPB), an extension of the TRA developed by Ajzen (1991) which makes the addition of perceived behavioural control as a determinant factor for behaviour. However, whilst these new models did produce a greater goodness-of-fit they only marginally increased the amount of variance in usage behaviour already explained by TAM from 34% to 36% (Taylor & Todd, 1995).

Davis, Bagozzi and Warshaw (1992) made a further addition to the TAM by introducing the concept of perceived enjoyment to explicitly model the role of intrinsic motivation, which they defined as "the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis, Bagozzi & Warshaw, 1992, pg 1113).

Finally Van der Heijden's (2003) adaptation further developed the TAM model by introducing the concept of aesthetics in the form of a new construct which they termed 'perceived visual attractiveness', which was defined as the degree to which a person believes that the website is aesthetically pleasing to the eye. This resulted in a final adapted TAM model as shown in figure 5.1.

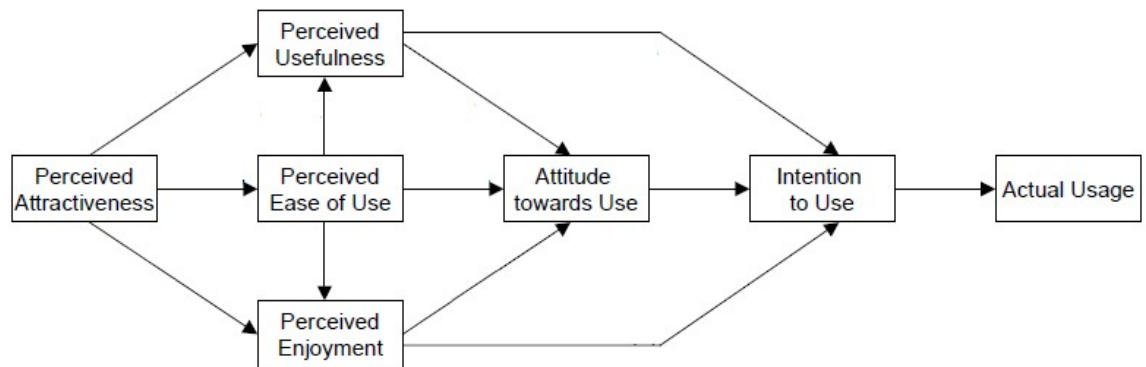


Figure 5.1: Adapted TAM conceptual framework (Van der Heijden, 2003)

Whilst this begins to establish a potential role for aesthetics in promoting user engagement, the majority of aesthetics measures have only been partly developed and not fully validated (Bargas- Avila & Hornbæk, 2011), with the notable exceptions of the measures developed by Lavie and Tractinsky (2004), and Moshagen and Thielsch (2010; 2013).

Lavie and Tractinsky (2004) suggest that users' aesthetic perceptions consist of two dimensions: classical aesthetics, which pertains to traditional aesthetic notions, and expressive aesthetics, which is manifested by designers' creativity and expressive power. However, the meanings of these two dimensions are quite vague, and it remains unclear about specific elements that designers need to focus on to increase a website's aesthetic appeal (Lindgaard, Fernandes, Dudek & Brown, 2006).

The Visual Aesthetics Website Inventory (VisAWI) developed by Moshagen and Thielsch (2010; 2013) further builds upon this model by assuming four facets of website aesthetics: Simplicity, Diversity, Colourfulness and Craftsmanship.



- Simplicity refers to the perceived clarity and structure of the layout of a website.
- Diversity refers to the inventiveness and dynamic nature of the layout.
- Colourfulness comprises aspects of colour composition, choice and combination.
- Craftsmanship refers to the topicality, sophistication and the professionalism of the design.

The VisAWI was designed and validated based on seven studies that included a total of 2027 participants (Moshagen & Thielsch, 2010). A preliminary version of the measure, originally consisting of 96 items, was created based on an analysis of prior research on websites aesthetics as well as an expert survey. As a result of testing, these items were reduced down to a final set of 18, which were spread across the four facets outlined above as determined via exploratory and confirmatory factor analyses. This resulted in the structural model for website aesthetics presented in Figure 5.2.

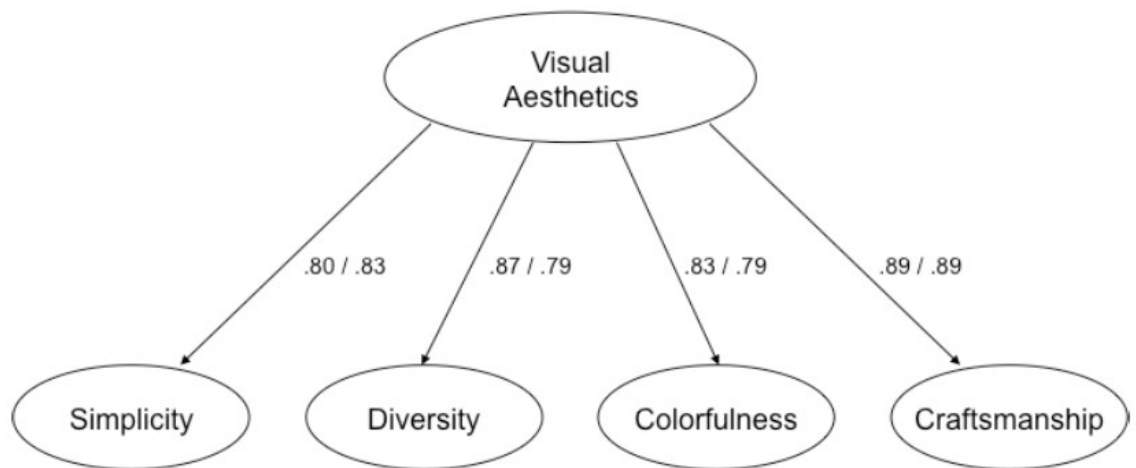


Figure 5.2: Structural model of the VisAWI (Moshagen & Thielsch, 2013)

Finally, Jiang et al. (2016) have also recently proposed a model for understanding website aesthetics based on the Beardsley framework of aesthetic design (Beardsley, 1981), which they sought to expand for use in the digital age. They identified five key

elements of visual aesthetics - unity, complexity, intensity, novelty, and interactivity. However, whilst they have successfully validated a model using these aesthetics principles, at the time of this research a fully validated measure was yet to be developed.

### 5.1.2 Visual Design in Digital Health

It has recently been suggested that the role of peripheral cues, such as aesthetic appeal, may help to enhance engagement in the initial stages of an online intervention (Short, Rebar, Plotnikoff & Vandelanotte, 2015). However, despite the developments in theory relating to website aesthetics outside of the clinical and health fields outlined above, little research has been done to apply these principles to digital health interventions. It has been proposed that visual design may play a role in promoting positive judgements and engagement with digital health interventions, and that the power of design has not been used to its full potential (Ludden, van Rompay, Kelders & van Gemert-Pijnen, 2015). However, it cannot simply be assumed that the findings of aesthetics research in commercial HCI fields can be directly applied to digital health, as these two domains represent distinctly different roles to potential users, and are intended to fulfil very different needs. Further to this, the journey by which users come into contact with these differing classes of websites, and their reasons for do so, are notably different, with many digital health interventions being offered as part of treatment pathways by health professionals rather than through organic search or advertising. Studies have shown that users have distinct mental models for different kinds of websites (Roth et al., 2010), and that user preferences and attitudes differ depending on the nature and purpose of the website being used (Papachristos & Avouris, 2013). Indeed, Papachristos and Avouris (2013) found that when rating websites metrics such as visual appeal and novelty played a key role in judgments of web design websites, whilst higher ratings of healthcare websites were associated with visual appeal, usability and credibility.

This idea of credibility, strongly linked to the concept of trust, is a particular factor that may differ between commercial and digital health websites. As whilst trust is known to play a role in fostering engagement with commercial websites (Grabner-Kräuter &

Kaluscha, 2003), it is often not included as a mediating factor in developed models of user engagement, such as the adapted TAM conceptual framework presented by Van der Heijden (2003). In relation healthcare however, an area that relies strongly on trust to foster treatment engagement, it is proposed that improving trust in digital health interventions may be an important factor in facilitating engagement (Lee & Lin, 2009; O'Malley, Sheppard, Schwartz, & Mandelblatt, 2004; Safran et al., 1998). Particular due to the fact that, as seen in the previous research, this sense of trust may potentially be lacking in perspective users. Indeed, early evidence does suggest that perceptions of trust do indeed influence the way in which users evaluate health information websites (Sillence et al., 2004), and trust in online health information was also found to be a significant predictor of online health activities (Hou & Shim, 2010). Additionally it has been suggested that improved website aesthetics can lead to greater levels of website trust in early judgements (Lindgaard et al., 2011), making this a potentially modifiable barrier to user engagement that can be addressed through the use of improved visual design.

However within the digital health fields, whilst there were calls as early as 2009 (Ritterband & Tate, 2009) to consider determinants of user engagement when designing online interventions, few studies have incorporated this into their conceptual framework. Theories offering insight into how to foster user engagement in online interventions have been largely ignored, an oversight which may explain why issues with user engagement, such as low use of intervention features, few logins, and poor retention rates are consistently reported in the literature (Davies et al., 2012; Kelders, Kok, Ossebaard, & Van Gemert-Pijnen, 2012). This presents a significant issue for digital health interventions. Whilst evidence indicates that computer based guided self-help can be a valuable means of treating patients with common mental health problems (Cuijpers, Donker, van Straten, Li & Andersson, 2010), these positive outcomes may be limited, or even entirely negated, if such interventions are unable to attract users and properly engage them with the treatment.

A growing body of literature does exist around the topic of aesthetic design in relation to health information websites, as well as the factors that may drive those seeking online health advice. Indeed, in a survey of 333 users of an online patient portal Lazard et al. (2015) identified simplicity as a predictor of perceived ease of use. Evidence also

suggests that design elements play a role in user trust of these websites, which acts as a significant mediator to the valuations users then make (Lindgaard et al., 2011; Sillence et al., 2004), as well as having been shown to mediate treatment compliance (Lu et al., 2018). This would appear to reflect best practice in the development of physical instruments for communicating health information, such as patient leaflets and drug information, in which simple, easily accessible designs are preferred (Koo, Krass & Aslani, 2003; NHS Shetland, n.d.). This has resulted in growing research interested in developing guidelines for how health information may best be presented online (Lazard & Macket, 2015). However, low quality remains an issue in this area (Eysenbach et al., 2002), with recent research identifying the need for improvement in the aesthetics in the online communication of nutritional information (Lazard et al., 2017). This has begun the exploration of the potential role that aesthetics has to play in the clinical and health fields, yet the literature remains limited, with no direct investigation having been done as to the potential role visual aesthetics may have in addressing issues of uptake and engagement with more active web-based digital health interventions.

### 5.1.3 This Research

As such this study will examine how aesthetics may potentially influence intentions and perceptions towards an online intervention. This will be done in order to identify both the role that visual aesthetics might play in driving uptake of web-based interventions as well as which elements of visual design might be most important to consider when developing future interventions. This will be conducted amongst both individuals with eating disorders and the general population. The inclusion of two population groups will allow for an exploration of the role of aesthetics not only in improving uptake of a web-based intervention for individuals with eating disorders, but also allow for a greater impact of the work by exploring whether these principles might apply to the wider population. This will also present insights as to whether there are any potential differences in this area between the general and eating disorder populations. This may be the case as the eating disorders population is one for which low levels of motivation and engagement is a particular issue (Waller et al., 2009) and

changes in visual perception, particularly in relation to the body, are a common element of the condition (Urgesi et al., 2012), both of which may influence user responses to visual aesthetics.

This research seeks to make a novel and important contribution to the literature by applying the TAM to a clinical context, furthering our understanding of how individuals perceive and consider engaging with clinical interventions at first contact and the role that visual aesthetics plays in this process in comparison to websites in more commercial fields. This research will also explore the potential utility of including the facet of 'perceived trust' to the TAM in understanding user engagement in a digital health context. By exploring differences in responses between individuals with eating disorders and the general population the research also contributes to the literature by highlighting variations in the ways that people with different conditions may perceive and engage with digital health. More specifically, it also allowed for an in-depth examination of differences in the way people with eating disorders may respond to and be influenced by visual aesthetics in comparison to people without an eating disorder. This then helps to demonstrate the importance of visual design in the development of effective and engaging digital health tools, as well as starting to pick apart key elements and the role they play for different populations, in order to work towards addressing issues with uptake and engagement that are commonly observed with digital health intervention. Whilst it is not expected that this research will generate specific design guidelines for use in the development of digital health interventions, establishing the importance of visual aesthetics, and the processes that underlie it, is a key step. However, understanding the potential variance in the roles of different facets may allow for more general advice pertaining to which aspects of visual design may be most important; information that will be particularly applicable to the future development of the MotivATE intervention.

#### *5.1.4 Aims*

To investigate the role of the visual aesthetics of an online eating disorders intervention in user initial impressions and intention to use the intervention.

### *5.1.5 Primary Research Question*

How do the aesthetics of a web-based eating intervention impact initial perceptions of the intervention and intentions to use it?

### *5.1.6 Secondary Research Question*

Do individuals with eating disorders differ from the general population in the way the aesthetics of a web-based eating intervention impacts their initial perceptions of the intervention and intentions to use it?

## **5.2 Method**

### *5.2.1 Design*

A mixed design (3x9) online questionnaire study using repeated measures for nine different design stimuli (the original design plus eight demonstrating either positive or negative aspects of four aesthetics facets [Simplicity, Diversity, Colour & Craftsmanship]) across three independent groups:

- A) People with an eating disorder shown stimuli referring to eating disorders (ED-ED).
- B) People from the general population shown stimuli referring to eating disorders (GP-ED).
- C) People from the general population shown stimuli referring to general health (GP-H).

This study utilised three conditions as it was unclear whether the most appropriate comparison within the general population would be to present the same stimuli, which risked having a lower relevance, or a more widely relevant set of stimuli, which would potentially lower the level of control.

The independent variables for this study therefore were group allocation and design stimuli, with the dependent variables being the facets of the VisAWI and adapted TAM.

### *5.2.2 Participants*

Six hundred and one participants with normal, or corrected to normal, vision and no colour blindness were recruited using online recruitment materials via sources such as the BU participant mailing list, SONA (the internal university recruitment platform), posts on research orientated web forums, conferences and eating disorders charities such as B-EAT, RestorED and Men Get Eating Disorders Too. Recruitment via B-EAT was in the form of an advertisement on the B-EAT website and a recruitment email sent by B-EAT to their mailing list of individuals interested in participating in research. This recruitment target was selected with the aim of recruiting 200 participants to each condition, based on suggested numbers of participants for conducting structural equation modelling (Boomsma & Hoogland, 2001; Hoogland & Boomsma 1998; Kline, 2005). However, it is worth noting that smaller sample sizes of 100-150 participants have been considered acceptable (Ding, Velicer, & Harlow, 1995; Tabachnick & Fidell, 2001), meaning that should participants not be perfectly evenly allocated to each group sufficient numbers for all analyses should still be achieved.

### *5.2.3 Design Stimuli*

Along with the three conditions outlined above, the second independent variable for the research was the visual aesthetics of the MotivATE front page which was manipulated based on the Visual Aesthetics Website Inventory (VisAWI; Moshagen & Thielsch, 2010). The VisAWI was chosen as the aesthetics measure for this research over other approaches such as the model devised by Lavie and Tractinsky (2004) or more qualitative approaches as it provides a clearly defined and measurable model for website aesthetics that can be separated into four distinct facets as well as a validated measure for assessing them. These four facets are; Simplicity (how clear the website is), Diversity (how interesting the website is), Colourfulness (how pleasant the colour palette is). Craftsmanship (how professionally designed the website is).

These were used to generate static visual stimuli based on the MotivATE intervention's home page. Each of the stimuli were designed to either exemplify (positive stimuli), or fail to exemplify (negative stimuli), each of these visual facets. This resulted in nine

stimuli; the original 'Base' version of the home page and a positive and negative version for each of the four facets. In order to separate the aesthetics of the intervention from other factors such as content and usability, which have also been shown to contribute to users initial impressions (Thielsch & Moshagen, 2014), the content of each image was kept the same and static images were chosen rather than interactive web-pages. More detail on each of these facets, as well as how they were implemented in the design of the individual stimuli, is outlined below:

### Simplicity

Simplicity is “a combination of elements that results in ease in comprehending the meaning of a pattern” (Ngo & Byrne, 2001). This facet deals with how clearly and structured the layout of the website is perceived, and includes and combines aspects such as unity, homogeneity, clarity, orderliness and balance (Moshagen & Thielsch, 2010).

Simplicity can be most easily realised by optimising, or reducing, the number of elements on screen at any one time as well as by aligning points to ensure clear presentation (Ngo & Byrne, 2001). As such the ‘Simplicity Negative’ design was created by creating a separate visual element from each distinct content element (ie creating a separate context box for every sentence and/or statement) and placing these in such a way that none of these elements clearly aligned in order to create a visual effect that was confusing and difficult to follow. Conversely the ‘Simplicity Positive’ design utilised only three elements to contain all of the content, which were organised in a clear 2:1 format (ie two half width elements side by side, with one full width element below).

### Diversity

Diversity is a factor that is related to visual complexity and visual richness. Additionally, it comprises aspects dynamics, novelty, and creativity. In other words, this facet addresses how dynamic of layout is, as well as perceptions of the inventiveness of the design.



Diversity can be applied into websites by creating interesting, novel and creative elements which positively arouse the user and creates aesthetic experiences. In this context the 'Diversity Negative' design was created by removing all individual design elements and simply presenting the content in one continuous stream in the centre of the page. On the other hand the 'Diversity Positive' design used a range of different design elements in a variety of ways, including a clearer page title, presenting text in an overlay on the page image, using differing font sizes to highlight text and alternative placement of the logos.

### Colourfulness

Colourfulness, as the name suggested, comprises of all colour-related aspects of aesthetic perception including composition, choice, placement and combination in the design of the website.

Colours can arouse physiological, cognitive, and emotional reactions (Elliot & Maier, 2007; Kim et al., 2003). Those reactions can be positively affected by choosing the colors appropriately. For example, cool colours (blue-white) combinations are perceived as significantly more appealing than warm colours (red-orange) combinations (Coursaris, Swierenga & Watrall, 2008). As such the colour based designs for this study followed these suggestions, with the 'Colourfulness Positive' design using a soft blue background with darker blue and white foreground elements, whilst the 'Colourfulness Negative' design used shades of red, yellow and orange.

### Craftsmanship

Craftsmanship relates to the skilful and coherent integration of all relevant design dimensions in relation to up-to-date design principals as if website is not designed with modern methods and technologies, there is a great probability that its appearance seems outdated to user (Moshagen & Thielsch, 2010). As such this facet refers to the topicality, sophistication and the professionalism of the design.




In this context the 'Craftsmanship Negative' design was created by basic, blocky design elements presented in a haphazard way, with little consideration of positioning or alignment, as well as poorly integrated logos and buttons. In contrast the 'Craftsmanship Positive' design utilised much sharper lines in the design elements, including redesigned header and footer, title and buttons, in order to give it a more modern feel. In addition, design elements were placed with much greater consideration for location and alignment, including improved integration of the logos and buttons.

A full set of screenshots of the final designs can be found in appendix 5.

#### *5.2.4 Stimuli Piloting*

The validity of these design stimuli, meaning their ability to elicit high or low VisAWI scores for their intended facet, were assessed in two rounds of pilot testing. In round of testing twenty participants from the general population, the minimum number of participants recommended when using the VisAWI by Thielsch and Moshagen (2015), were presented with each of the designs online in a random order and asked to rate each using the VisAWI measure. Mean scores for each facet were then generated and compared between positive and negative designs to ensure that the designs generated a suitable range of scores for each target facet of the VisAWI. Where positive and negative stimuli did not elicit at least a 2.5 point difference for their intended facet (with the positive design scoring above 5 and the negative design scoring below 3) in the first round of pilot testing, adjustments were made to the designs with the full set once again being tested in the second round. This resulted in the following set of images and associated aesthetics scores. Full details of these pilot tests can be found in appendix 4.

Table 5.1: Table showing the score means and SDs of each VisAWI facet for each of the stimuli designs, with updated designs for Diversity Positive, Craftsmanship Positive and Colour Positive, as well as the difference and SE between the positive and negative designs for each facet.

<b>Image</b>	<b>Facet - Mean (SD)</b>	<b>Image</b>	<b>Facet - Mean (SD)</b>	<b>Difference (SE)</b>
<p><b>Base</b></p> 	<p>Simplicity: 4.53 (0.87)</p> <p>Diversity: 3.39 (1.11)</p> <p>Colour: 5.04 (1.06)</p> <p>Craftsmanship: 3.6 (1.19)</p> <p><b>Total: 4.14 (0.95)</b></p>			
<p><b>Simplicity Negative</b></p> 	<p>Simplicity: 1.95 (0.89)</p> <p>Diversity: 2.82 (1.28)</p> <p>Colour: 3.98 (1.08)</p> <p>Craftsmanship: 2.41 (1.17)</p> <p>Total: 2.79 (0.97)</p>	<p><b>Simplicity Positive</b></p> 	<p>Simplicity: 5.35 (0.88)</p> <p>Diversity: 3.80 (1.09)</p> <p>Colour: 5.53 (0.79)</p> <p>Craftsmanship: 4.39 (1.12)</p> <p>Total: 4.77 (0.78)</p>	<p><b>3.40 (0.25) **</b></p> <p>0.98 (0.36)</p> <p><b>1.55 (0.24) **</b></p> <p><b>1.98 (0.31) **</b></p> <p><b>1.98 (0.23) **</b></p>
<p><b>Diversity Negative</b></p>	<p>Simplicity: 3.80 (1.08)</p>	<p><b>Diversity Positive</b></p>	<p>Simplicity: 4.73 (1.06)</p>	<p>0.93 (0.38)</p>



**Diversity:**  
2.24 (1.10)

**Colour:**  
4.63 (0.99)

**Craftsmanship:**  
2.86 (1.19)

**Total:**  
3.38 (0.93)



**Diversity:**  
5.05 (1.25)

**Colour:**  
5.43 (0.70)

**Craftsmanship:**  
4.45 (0.87)

**Total:**  
4.91 (0.87)

**2.81 (0.34) \*\***

0.80 (0.29)

1.59 (0.34) \*\*

1.53 (0.30) \*\*

**Colour Negative**



**Simplicity:**  
3.18 (1.12)

**Diversity:**  
2.79 (1.12)

**Colour:**  
1.46 (0.67)

**Craftsmanship:**  
2.43 (0.93)

**Total:**  
2.46 (0.85)

**Colour Positive**



**Simplicity:**  
4.74 (1.08)

**Diversity:**  
4.11 (1.32)

**Colour:**  
5.90 (0.58)

**Craftsmanship:**  
4.23(0.85)

**Total:**  
4.74 (0.76)

1.56 (0.38) \*\*

0.80 (0.40)

4.44 (0.22) \*\*

1.80 (0.29) \*\*

2.28 (0.29) \*\*

**Craftsmanship Negative**

**Simplicity:**  
2.52 (1.40)

**Craftsmanship Positive**

**Simplicity:**  
4.77 (1.18)

2.25 (0.44) \*\*



Diversity:  
2.78 (1.39)

Colour:  
4.49 (1.00)

Craftsmanship:  
**2.21 (1.67)**

Total:  
3.00 (1.22)



Diversity:  
4.63 (1.27)

Colour:  
5.54 (0.66)

Craftsmanship:  
**5.29 (1.26)**

Total:  
5.06 (0.97)

1.85 (0.46) \*\*

1.05 (0.30) \*

**3.08 (0.44) \*\***

2.06 (0.37) \*\*

Note: \*p < .002, \*\*p < .001

The target facet for each of the stimuli is highlighted in bold.

### *5.2.5 Dependent Variables*

This study examined seven dependent variables which were derived from the adapted Technology Acceptance Model (TAM) developed by Van der Heijden (2003). The TAM was chosen for the purposes of this study as it provided a detailed model of user intentions and usage of digital systems, which gave a conceptual framework to allow investigation not only of whether aesthetics influences user intentions but also how it does so. Van der Heijden's (2003) adapted version of the TAM was specifically chosen as it not only related the TAM directly to websites, it also included perceived attractiveness in the model, which directly relates to this study's focus on aesthetics.

The adapted TAM contains seven elements; perceived attractiveness, perceived usefulness, perceived ease of use, perceived enjoyment, attitudes towards use, intention to use and actual usage. This study included outcome measures for all elements of the adapted TAM with the exception of actual usage, as this study examined initial impressions of static designs rather than users' experiences of active systems, meaning that no actual usage of the intervention took place. The measurement of intention to use differed from previous studies into website aesthetics, as earlier outcomes relating to behavioural intentions have tended to focus more on purchasing intentions (Goode & Harris, 2007) or intentions to revisit or recommend (Thielsch & Moshagen, 2014), whilst this study sought to measure intentions to register with the intervention.

In addition to these, trust of the intervention was also included as previous research has suggested that improved website aesthetics can lead to greater levels of website trust in early judgements (Lindgaard et al., 2011; Sillence et al., 2004), which may be an important factor in online clinical and health interventions. As previous findings regarding the barriers to engaging with services, particularly in relation to EDs, suggest that a sense of mistrust of these services is a key factor (Leavey et al., 2011) this may act as a mediating factor in promoting uptake.

This resulted in the following seven dependent variables:

- Perceived attractiveness,
- Perceived trust of the intervention,

- Perceived usefulness,
- Perceived ease of use,
- Perceived enjoyment,
- Attitudes towards use,
- Intention to use (including a measurement of intention to register)

### 5.2.6 Measures

The Short Visual Aesthetics of Websites Inventory (VisAWI-S; Moshagen & Thielsch, 2013) was used in place of the full VisAWI to produce visual aesthetics scores for each of the stimuli. The short version of the VisAWI was used in order to reduce the burden on participants and has been deemed appropriate as the stimuli have already been validated using the full VisAWI measure as part of the pilot studies outlined above. Additionally the VisAWI-S is also a validated measure that has strong correlation with the full measure ( $r = .91$ ; Moshagen & Thielsch, 2013). The VisAWI-S consists of the following four items, one for each facet, measured on a 7-point likert scale anchored from strongly agree to strongly disagree:

- Simplicity, *'Everything goes together on this site'*
- Diversity, *'The layout is pleasantly varied'*
- Colour, *'The colour composition is attractive'*
- Craftsmanship, *'The layout appears professionally designed'*

This study also included several items from the TAM measure developed by Van der Heijden, (2003), with responses on 7-point likert scales, anchored from strongly agree to strongly disagree, for the following dependent variables:

- Perceived attractiveness, *'Overall, I find that the site looks attractive'*, *'The layout of the site is attractive'* and *'The colours that are used on the site are attractive'*
- Attitude towards use, *'I have a positive attitude towards this site'* (this has been adapted from the original by replacing the word 'portal' with 'site')
- Perceived ease of use, *'I think this is a user-friendly site'*

- Perceived usefulness, '*I find this website overall a useful site*' (this has been adapted from the original by replacing the word 'portal' with 'site'), '*I find that this site adds value*' and '*The information on the site is interesting to me*'
- Perceived enjoyment, '*I find this website overall an entertaining site*' (this has been adapted from the original by replacing the word 'portal' with 'site')
- Intention to use, '*I intend to visit the site frequently*' (this has been adapted from the original by replacing the word 'portal' with 'site')

The original adapted TAM measure (Van der Heijden, 2003) included 14 items, however one (*How intensive do you browse the site?*) was removed from the final analysis by Van der Heijden (2003). Of the remaining 13 questions four items (*'It is easy to navigate around the site'*, *'I can quickly find the information that I need'*, *'I browse the site for pleasure'* and *'Browsing this portal is an agreeable way of passing time'*) were not included as they imply access to the full website in regards to usage and navigation which is not possible with static images.

Finally two additional measures were included. The first, adapted from Coyle & Thorson (2001), was an additional measure of intention to use relating to intention to register with the intervention, as the focus of this study was on uptake rather than intention to return. The second related to perceived trust of the intervention, which was adapted from Gefen et al., (2003):

- Intention to use (Intention to register), '*It is likely that I would register with this website*' (adapted from Coyle & Thorson, 2001)
- Perceived trust of the intervention, '*I feel that this website is trustworthy*' (adapted from Gefen et al., 2003)

Single measures for several of the dependent variables were deemed appropriate as single item measures have been shown to be reliable, sensitive and valid in relation to assessing website constructs (Christophersen & Konradt, 2011; Sauro, 2013).

An ordered ranking approach was also considered as an appropriate alternative to likert scales, but it was felt that the number and complexity of the stimuli would make it difficult for participants to accurately rank them.



In addition to these items, the questionnaire also included the following demographic questions:

- Use of Online Self-Help, '*Have you ever used the internet for health related advice?*', '*Have you ever used health related online self-help?*'
- Experience of an Eating Disorder, '*Do you currently suffer with an eating disorder?*', '*Have you ever suffered in the past with an eating disorder?*' (These have been created by breaking down the final question of the Eating Disorder Screen for Primary care), '*Have you ever attended an eating disorder service?*' (Optional).
- Eating Disorder Diagnosis, '*How would you describe your experience of an eating disorder (e.g Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder etc.)?*' (This question is optional and will only be asked if the participant answers yes to the first of the above questions).
- Age, '*What is your age?*'
- Gender, '*What is your gender?*'
- Nationality, '*Do you currently live in the UK?*'
- Language, '*Is English your first language?*'
- Computer Use, '*How often do you use a computer?*', '*How many hours per week do you spend on a computer?*'

The opening question regarding a current experience of an eating disorder was used to assign participants to either condition A, if the answer was 'yes', or conditions B or C if the answer was 'no'. The question regarding previous experience of an eating disorder was only asked if the answer to the first question was 'no', whilst the question relating to diagnosis will only be asked if the answer is 'yes'.

Age and gender data were collected as standard demographic information in order to check for any potential variations in responses. Nationality and language were collected as the MotivATE intervention is being designed for use within the NHS, and as such this study wishes to check any potential differences in response between British and non-British residents. Finally data relating to computer use and the use of online self-help was collected as this may affect the degree to which participants engage with an online intervention and thus impact their responses.

### 5.2.7 Questionnaire Piloting

The questionnaire was piloted using a think aloud study, in which five participants (Virzi, 1992; Nielsen, 2000) were asked to complete the questionnaire in relation to the designed stimuli whilst vocalising their stream of thought. This allowed for the identification of any question items that were potentially unclear or confusing and resulted in a number of minor alterations to the questions outlined above.

Firstly the question '*I find that this site adds value*' was found to be confusing to participants, and as such was removed from the questionnaire. Participants also noted some difficulty in answering the questions '*How many hours per week do you spend on a computer?*', due to the need to try and calculate their average usage time. In order to remedy this, an indication of the average daily usage time was added to each answer. Finally the researcher noted that, amongst the general population, the inclusion of a question relating to eating disorders had the possibility of impacting participants perceptions of the website and how they might relate to it. In order to attempt to control for this the introductory text was made clearer, in order to better frame each condition in the correct context, and two additional questions relating to general health have been included in an attempt to mask the target question relating to eating disorders. These two questions are as follows:

- '*Do you currently have any issues with your health?*'
- '*Have you ever had any issues with your health?*'

Full details of the think aloud pilot study can be found in appendix 5, whilst a full copy of the final questionnaire can be found in appendix 6.

### 5.2.8 Procedure

Online recruitment material contained a link directing participants to the study. Upon accessing the questionnaire participants were presented with a participant information sheet followed by consent statements. Consent was collected digitally prior to the participant starting the questionnaire using an opt-in tick box statement following the presentation of the participant information sheet.

Following consent participants were asked to complete the demographic questions listed above, with those indicating that they are currently experiencing an eating disorder being assigned to condition A whilst those who do not will be randomised to conditions B or C. Following assignment to a condition participants were shown some introductory text that framed the questionnaire. For condition A this asked participants to imagine they had been directed to the interventions they would see following referral by a GP prior to attending an eating disorder service, whilst those in conditions B and C were be asked to imagine they have been directed to the interventions following referral by a GP to improve their health. Participants were then asked to complete the 16 measures (4 VisAWI-S subscales and 12 likert scales) for each of the nine stimuli. Each stimuli was present on a separate page with the questionnaire items displayed below. The order in which the stimuli were presented, as well as the question order for each stimuli, was randomised to control for any potential order effects.

On completion of the questionnaire participants were shown a debriefing page outlining the study. In addition to this the debriefing for condition A also included links to eating disorder support resource provided by B-EAT.

### *5.2.9 Analysis*

The analysis of the data was conducted in three phases.

In the first phase the data was explored for outliers, normality and issues of multicollinearity.

In phase two the secondary research question was explored first using a 3x9 mixed MANOVA in order to ascertain any potential differences in responses between conditions. The secondary research question was analysed before the first in this instance as this had a potential impact on which conditions would be included in the final models. As this analysis sought only to explore potential differences in responses between groups, with-in subjects outputs are not reported. Where significant variations in responses were found follow up analyses were conducted in order to identify the nature of the differences between groups, which in turn informed how the

data was organised for the third phase of the analysis. During this phase additional exploratory MANOVA analyses were conducted to explore potential differences in responses between individuals providing different responses to the initial demographic questions. For the purposes of this analysis, 'other' and 'prefer not to say' responses for gender were removed, as were 'Once a week' for computer use and '0 to 1 hours' for computer time as these categories had very few responses that resulted in uneven groups. Similarly, age responses were collated to create a 45+ group. As repeated testing was conducted, potential inflating the type 1 error rate, Bonferoni's adjustment was made resulting in a critical value of  $p \leq .006$  in order to achieve an overall alpha level of 0.05.

The primary research question was then addressed in this third phase using linear mixed models, with confirmatory analysis being conducted on the final model using cumulative link mixed models. Mediation within this final model was also explored.

Previous researchers have suggested that despite the ordinal nature of likert scales, given certain criteria, such as wide enough responses scales (greater than 5), large enough numbers and normal distribution of responses this data can be treated as quasi-continuous and that parametric tests are robust for the use of such data (Norman, 2010; Lubke & Muthen, 2004). As the data in this study fulfilled this criteria, parametric testing was adopted.

All analyses were conducted using the IBM SPSS statistics package 23, except for cumulative link mixed models which were conducted in R studio using the 'ordinal' package.

#### *5.2.10 Ethics*

Ethical approval was granted by Bournemouth University (ID: 13583)

The primary ethical concern raised by this research was the involvement of a potentially vulnerable and hard to reach population through the recruitment of individuals with eating disorders. It was necessary to recruit participants from this population due to the primary focus of the website included in the study being to

improvement in motivation amongst individuals with eating disorders. It was therefore of particular interest how this population interacts with the website and whether this differs from the general population. The risk of this was mitigated by the fact that this population is still capable of providing informed consent and that this questionnaire will not explore any deeper topics surrounding eating disorders as this is not the focus of the research. Participants were only asked to confirm if they currently or previously had experienced an eating disorder and if so whether they had ever attended treatment and how they would label their experience, with the final two questions both being optional. As such, it was not expected that the questionnaire had the potential to cause distress. Furthermore any participant that indicated that they were currently experiencing an eating disorder was directed to the B-EAT help lines for support as part of the debrief.

Recruitment with individuals with eating disorders did require the co-operation of gatekeepers, including charities such as B-EAT and online eating disorder support forums. No financial incentive or remuneration was offered for participation in this study, however study credit was offered to student participants recruited via SONA with these participants also being given additional information as part of the debrief to aid the completion of their research diaries.

Consent was collected digitally prior to the participant starting the questionnaire using opt-in tick box statements following the digital presentation of the participant information sheet.

## **5.3 Results**

### *5.3.1 Phase One*

In total 601 participants were recruited to the study, of which 379 (63%) were female. The majority of participants were younger, with around half falling into the age range 18-24 years and a further quarter falling into the 25-34 year age bracket. The participant sample were high tech users, with almost all participants using a computer everyday or more than once a day, with most averaging computer usage of between 10 to 40+ hours a week. This technology use was also reflected by the fact that 81%

reported having sought health advice online, whilst half had actively engaged with online self-help. The sample was largely UK based, with English as their first language. Full details of participant characteristics, both as a full sample and for each condition, are shown in table 5.2.

Table 5.2: Table showing participant characteristics, both in total and per condition

	<b>ED-ED</b>	<b>GP-ED</b>	<b>GP-H</b>	<b>Total</b>
	N = 109	N = 235	N = 257	N = 601
Age	18 - 24: 69	18 - 24: 163	18 - 24: 174	18 - 24: 406
	25 - 34: 35	25 - 34: 51	25 - 34: 60	25 - 34: 146
	35 - 44: 4	35 - 44: 12	35 - 44: 14	35 - 44: 30
	45 - 54: 0	45 - 54: 5	45 - 54: 6	45 - 54: 11
	55 - 64: 1	55 - 64: 1	55 - 64: 3	55 - 64: 5
	65 - 74: 0	65 - 74: 2	65 - 74: 0	65 - 74: 2
	75 - 84: 0	75 - 84: 0	75 - 84: 0	75 - 84: 0
	85 or older: 0	85 or older: 0	85 or older: 0	85 or older: 0
		No response: 1	No response: 1	
Gender	Male: 17	Male: 82	Male: 99	Male: 198
	Female: 86	Female: 144	Female: 149	Female: 379
	Other: 4	Other: 2	Other: 2	Other: 8
	Prefer Not To Say: 2	Prefer Not To Say: 1	Prefer Not To Say: 1	Prefer Not To Say: 4
Accessed Online Advice	Yes: 88	Yes: 194	Yes: 205	Yes: 487
	No: 21	No: 41	No: 52	No: 114
Accessed Online Self-Help	Yes: 61	Yes: 109	Yes: 128	Yes: 298
	No: 48	No: 126	No: 129	No: 303
Previously Had An	N/A	Yes: 24	Yes: 24	Yes: 48
		No: 211	No: 233	No: 444

Eating Disorder				N/A: 109
Attended	Yes: 54	Yes: 9	Yes: 6	Yes: 69
An Eating Disorder Service	No: 55	No: 15	No: 18	No: 88
		N/A: 211	N/A: 233	N/A: 444

Self Reported Eating Disorder	Anorexia Nervosa: 44	Anorexia Nervosa: 11	Anorexia Nervosa: 8	Anorexia Nervosa: 63
	Bulimia Nervosa: 22	Bulimia Nervosa: 5	Bulimia Nervosa: 6	Bulimia Nervosa: 33
	Binge Eating Disorder: 13	Binge Eating Disorder: 1	Binge Eating Disorder: 2	Binge Eating Disorder: 16
	EDNOS/OSFED: 17	EDNOS/OSFED: 2	EDNOS/OSFED: 3	EDNOS/OSFED: 22
	Other: 10	Other: 4	Other: 5	Other: 19
	No response: 3	N/A: 212	N/A: 233	No response: 3 N/A: 445

From The UK	Yes: 93	Yes: 172	Yes: 188	Yes: 453
	No: 15	No: 61	No: 69	No: 145
	Missing: 1	Missing: 2	Missing: 0	Missing: 3

English As First Language	Yes: 93	Yes: 193	Yes: 214	Yes: 500
	No: 16	No: 40	No: 43	No: 99
		No response: 2		No response: 2

Computer Use	Once a month or less: 0	Once a month or less: 0	Once a month or less: 0	Once a month or less: 0
	Once a week: 0	Once a week: 0	Once a week: 1	Once a week: 2
	Several times a week: 4	Several times a week: 12	Several times a week: 13	Several times a week: 29
	Every day: 59	Every day: 81	Every day: 96	Every day: 236

	Several times a day: 46	Several times a day: 141	Several times a day: 147	Several times a day: 334
Computer Time Per Week	0 to 1 hours: 0	0 to 1 hours: 0	0 to 1 hours: 1	0 to 1 hours: 1
	2 to 4 hours: 5	2 to 4 hours: 15	2 to 4 hours: 14	2 to 4 hours: 34
	5 to 6 hours: 6	5 to 6 hours: 15	5 to 6 hours: 19	5 to 6 hours: 40
	7 to 9 hours: 8	7 to 9 hours: 19	7 to 9 hours: 21	7 to 9 hours: 48
	10 to 20 hours: 28	10 to 20 hours: 41	10 to 20 hours: 48	10 to 20 hours: 117
	21 to 40 hours: 40	21 to 40 hours: 75	21 to 40 hours: 90	21 to 40 hours: 205
	Over 40 hours: 22	Over 40 hours: 69	Over 40 hours: 64	Over 40 hours: 155
		No response: 1		No response: 1

Of the seven dependent variables explored in this study three, (attractiveness, usefulness and behavioural intentions) were examined using multiple measures. Reliability analyses were conducted for these variables, resulting in Cronbach's Alphas of .898, .852 and .913 respectively. This represents a high level of reliability for each set of measures (Nunnally, 1978), and as such a single compound measure was generated for each dependent variable for use in the final analysis.

Normality was checked for each of the recorded variables, both collectively and for each condition, with Kolomogorov-smirnov statistics suggesting that data was non-normal. However, as this data used a reasonably large sample Q-Q plots, kurtosis and skewness were individually checked. In each instance Q-Q plots closely matched the expected normal, and kurtosis and skewness were found to be well within acceptable limits of  $\pm 2$ , suggesting an acceptable level of normality in the data despite the



indicated test statistic (Trochim & Donnelly, 2006; Field, 2009; Gravetter & Wallnau, 2014).

The correlation matrix displayed in table 5.3 indicates a meaningful pattern of correlations amongst the dependent variables, with no correlations exceeding 0.9 suggesting no issues with multicollinearity (Verma, 2015). However, other researchers have suggested that correlations exceeding .7 (Dormann et al., 2013) may indicate concerns for issues of multicollinearity, and as such tolerance and VIF statistics were checked for all variables with a tolerance of less than .2 and/or a VIF higher than 5 being taken as an indicator of multicollinearity (Rogerson, 2001).

Attractiveness was shown to have a very high level of collinearity (Tolerance = .085; VIF = 11.727). As such the compound VisAWI score (mean score of Simplicity, Diversity, Colour and Craftmanship) was also checked for correlation against the measure of attractiveness. A Pearson correlation coefficient found a very strong relationship between the VisAWI measure and perceived visual attractiveness ( $r = 0.945$ ,  $n = 5409$ ,  $p < .001$ ). As this, in combination with the potential issues of collinearity, suggested that both measures were targeting the same concept, the attractiveness measure was removed in favour of the more detailed approach of using the four facets of the VisAWI. In addition concerns regarding collinearity were also identified for the measure of Attitude (Tolerance = .181; VIF = 5.537), and as such this measure was also removed from the following analysis. In order to assess normality and correlations between all responses from participants for each variable, data for these criteria were assessed using a long data format.

Table 5.3: *Correlations between study variables*

	Simplicity	Diversity	Colour	Craftsman- ship	Attractive- ness	Ease Of Attitude Use	Useful- ness	Enjoy- ment	Behav- -iour	Trust	
Simplicity	1	.708**	.670**	.786**	.833**	.796**	.789**	.696**	.635**	.737**	.761**
Diversity		1	.610**	.758**	.812**	.760**	.703**	.664**	.671**	.691**	.686**
Colour			1	.625**	.841**	.703**	.599**	.613**	.562**	.618**	.647**
Craftsmanship				1	.832**	.787**	.752**	.680**	.658**	.763**	.758**
Attractiveness					1	.863**	.783**	.736**	.708**	.781**	.791**
Attitude						1	.787**	.775**	.711**	.796**	.808**
Ease Of Use							1	.717**	.629**	.721**	.775**
Usefulness								1	.710**	.799**	.743**
Enjoyment									1	.722**	.638**
Behaviour										1	.758**
Trust											1

\*\* . Correlation is significant at the  $p < .01$  level

Multivariate outliers were assessed using Mahalanobis distance with a critical value of 31.26, based on  $p < .001$  with 11 degrees of freedom. This identified 24 outliers (participant IDs: 3, 8, 14, 22, 41, 93, 150, 155, 221, 248, 249, 272, 309, 321, 358, 367, 382, 401, 439, 447, 448, 454, 488 and 520). In line with recommendations by Aguinis, Gottfredson and Joo (2013) these outliers were further explored. As all data was collected digitally it is unlikely that outliers resulted from incorrectly inputted data. Similarly, as participants were allocated to conditions and randomised automatically as part of the online questionnaire, it is also unlikely that outliers resulted from data being collected from participants in incorrect conditions. As this was a self-report questionnaire it is possible that outliers resulted from either incorrect information being provided by participants leading to allocation to the wrong condition, or from the purposeful entry on non-representative responses. However, demographic information for these outliers was similar to the general data set and they were reasonably distributed across groups. Subsequent analyses of data with and without these outliers also found no meaningful differences to analysis assumptions or outcomes. As such, this was not deemed sufficient reason to remove what could potentially be meaningful and interesting data. All results reported below are therefore derived from data sets including these recorded outliers.

### *5.3.2 Phase Two*

#### Assumptions

A two way (3x9) mixed MANOVA was conducted to assess whether there were any differences in responses across stimuli between the three conditions. Mauchly's Test of Sphericity indicated that the assumption of sphericity was violated for each of the dependent variables, as such the greenhouse-geiser correction was used. Similarly Box's M (11080.01) was significant at  $p < .001$ , suggesting unequal covariance matrices between groups. However, Box's M is known to be highly sensitive in regards to variances in large datasets, with previous researchers suggesting that a MANOVA conducted with greater than 30 participants per condition is robust to violations of this assumption (Allen & Bennett, 2010). As such the test was continued but Pillai's trace

was reported rather than Wilke's Lambda to ensure robustness of conclusions (Tabachnick, Fidell & Osterlind, 2012).

## Results

Results from the MANOVA indicated that there was a trend towards a statistically significant difference in participants' responses between all three conditions ( $F(18, 1182) = 1.563, p = .062$ ; Pillai's Trace = 0.047, partial  $\eta^2 = .02$ ). Univariate analyses found no significant differences for any individual measure. This would suggest that this trend was not the result of a strong effect of any individual measure, but was instead present only at the multivariate level. Similarly post-hoc analysis found no significant differences between individual groups for any of the outcome measures by themselves. Due to violations in assumptions of equality of variances, Games-Howell's test was used.

The analysis did however highlight a significant interaction effect for responses between stimuli for each condition ( $F(144, 10256) = 1.309, p < .05$ ; Pillai's Trace = 0.303, partial  $\eta^2 = .15$ ). This would suggest that whilst participants in the different groups may have given different responses, the way in which these responses varied between stimuli was also clearly different between the three conditions. Univariate analyses found this to be true for each of the measured variables at a  $p < .05$  level.

In order to further explore these potential differences between individual groups at the multivariate level three follow up mixed MANOVAs were conducted comparing responses for conditions ED-ED and GP-ED, ED-ED and GP-H, and GP-ED and GP-H respectively. Similarly to the primary analysis the assumptions of sphericity and equal covariances were violated in each instance, so the corrections outlined above were used.

These analyses found significant multivariate group differences between conditions ED-ED and GP-ED ( $F(9, 334) = 2.208, p < .01$ ; Pillai's Trace = 0.056, partial  $\eta^2 = .06$ ) but no stimuli by condition interaction. However no significant differences were found between conditions ED-ED and GP-H or GP-ED and GP-H for either condition or stimuli by condition effects. Follow up mixed MANOVAs found no differences in responses between self-reported eating disorder types ( $F(44, 564) = 0.949, p = .569$ ; Pillai's Trace

= 0.276, partial  $\eta^2 = .07$ ), nor differences between the general population and those who had reported previously having had an eating disorder ( $F(9, 482) = 1.498, p = .145$ ; Pillai's Trace = 0.027, partial  $\eta^2 = .03$ ). As such final models were produced from pooled responses from groups ED-ED and GP-H, with the data from the GP-ED group being removed to ensure that any potential variations in responses did not impact on the final models.

The final exploratory analysis of impact of demographic variables found multivariate effects for Age ( $F(27, 1656) = 1.917, p = .003$ ; Pillai's Trace = 0.091, partial  $\eta^2 = .03$ ), though no univariate effects were identified.

### *5.3.3 Phase Three*

#### Assumptions

As stated above, as a result of the findings of the phase two analysis, models were produced from pooled responses from groups ED-ED and GP-H. A penalised likelihood approach was used to find the best model fit in regards to covariance structure and random effects with a smaller Bayesian Information Criterion (BIC) score difference greater than two being used to suggest a more accurate model fit to the data (Seltman, 2012).

The appropriate fit of random intercept and slope models including participant and design as random effects was explored, using AR1, Diagonal, Compound Symmetry and Huynh-Feldt covariance structures. Each model produced a similar pattern of results, with the BIC indicating that a random slope model for design plus intercept using an AR1 covariance structure and design repeated statement offered the best model fit. Final models were run using both restricted maximum likelihood (REML) and maximum likelihood (ML) estimations, which resulted in matching patterns of results and very similar fixed effect estimates. As such ML models are shown for ease of comparison between models with differing fixed effects (Zuur et al., 2009).

## Results

Using the above analysis design, four models were examined to explore the role of aesthetics on participants' behavioural intentions. The first examined the direct influence of simplicity, diversity, colour and craftsmanship on behavioural intentions. The second model added the TAM factors of ease of use, perceived enjoyment and perceived usefulness as covariates. The third model added the final variable of trust as an additional covariate. A final simplified model was then produced including only the significant predictors from model 3. As each model contained several fixed effects, bonferoni corrected critical p-values were used in each case to assess whether predictors made a significant contribution to the model. The results of the four models are shown in table 5.4.

Table 5.4: *Linear mixed models for predictors of user behavioural intentions*

Model	Parameter	Estimate	Std. Error	Sig.	95% Confidence Interval		
					Lower Bound	Upper Bound	
One	Intercept	.577	.048	.000	.482	.671	
	<b>Fixed Effects</b>	Simplicity	.237	.013	.000	.212	.262
		Diversity	.118	.012	.000	.094	.141
		Colour	.092	.011	.000	.071	.113
		Craftsmanship	.293	.013	.000	.267	.319
		Repeated	.125	.032	.000	.076	.207
	<b>Random Effects</b>	Intercept + Stimuli [subject = Participant]	.319	.029	.000	.266	.382
<b>Model Information Criteria</b>	AIC	7443.926					
	BIC	7492.725					
Two	<b>Fixed Effects</b>	Intercept	-.218	.047	.000	-.310	-.126
		Simplicity	.110	.013	.000	.085	.134

	Diversity	.020	.011	.065	-.001	.042
	Colour	.038	.010	.000	.019	.058
	Craftsmanship	.191	.012	.000	.168	.215
	Ease Of Use	.092	.013	.000	.067	.117
	Usefulness	.339	.016	.000	.306	.371
	Enjoyment	.157	.013	.000	.131	.183
	Repeated	.166	.019	.000	.133	.208
	<b>Random Effects</b>					
	Intercept + Stimuli [subject = Participant]	.182	.016	.000	.152	.216
	<b>Model Information Criteria</b>					
	AIC	6552.662				
	BIC	6619.760				
<b>Three</b>	Intercept	-.242	.046	.000	-.333	-.151
	Simplicity	.092	.013	.000	.067	.117
	Diversity	.016	.011	.125	-.005	.038
	Colour	.024	.010	.014	.005	.043
	Craftsmanship	.158	.012	.000	.134	.182
	Ease Of Use	.059	.013	.000	.033	.084
	Usefulness	.293	.017	.000	.260	.325
	Enjoyment	.158	.013	.000	.133	.184
	Trust	.153	.014	.000	.126	.180
	Repeated	.148	.019	.000	.115	.190
	<b>Random Effects</b>					
	Intercept + Stimuli [subject = Participant]	.185	.016	.000	.156	.220
	<b>Model Information Criteria</b>					
	AIC	6432.774				
	BIC	6505.973				

		Intercept	-.217	.045	.000	-.307	-.128	
		Simplicity	.100	.012	.000	.076	.124	
	<b>Fixed Effects</b>	Craftsmanship	.168	.012	.000	.145	.190	
		Ease Of Use	.058	.013	.000	.032	.083	
		Usefulness	.300	.017	.000	.267	.332	
		Enjoyment	.166	.013	.000	.141	.190	
		Trust	.159	.014	.000	.132	.185	
<b>Four</b>			Repeated	.150	.019	.000	.117	.192
		<b>Random Effects</b>	Intercept + Stimuli [subject = Participant]	.184	.016	.000	.155	.219
<b>Model Information Criteria</b>	AIC		6437.921					
	BIC	6498.919						

As can be seen from table 5.4 whilst each of the aesthetics measures do significantly predict behavioural intentions towards the intervention when considered by themselves, inclusion of the TAM measures, results in only a trend towards significance for diversity, though all other measures remain significant. The addition of trust in model three further reduces the effect of diversity, though again all other measures remain significant. In addition to this it can be seen that including the TAM measures in the model, as well as additionally adding the measure of trust, presents a better model fit. Finally removing the non-significant (when using a bonferoni corrected critical p-value of 0.006) measures of diversity and colour from the model appears not only to have no negative effect on the model fit as shown by the AIC, but when considering the BIC actually gives a better fit than when it is included. Additionally, in each model the random effects are significant, suggesting that correlations between participants response to each of the stimuli accounted for a significant portion of the variation in each model.



Table 5.5: Linear mixed models for each element in the mediation diagram

Model (Dependent Variable)	Parameter	Estimate	Std. Error	Sig.	95% Confidence Interval		
					Lower Bound	Upper Bound	
<b>A</b> <b>(Usefulness)</b>	<b>Fixed Effects</b>	Intercept	1.935	.047	.000	1.841	2.028
		Simplicity	.263	.013	.000	.238	.288
		Craftsmanship	.272	.012	.000	.248	.296
	<b>Random Effects</b>	Repeated	.491	.013	.000	.467	.517
		Intercept + Stimuli [subject = Participant]	.400	.033	.000	.340	.470
<b>B (Ease Of Use)</b>	<b>Fixed Effects</b>	Intercept	1.073	.045	.000	.984	1.161
		Simplicity	.486	.015	.000	.456	.516
		Craftsmanship	.310	.015	.000	.281	.338
	<b>Random Effects</b>	Repeated	.766	.020	.000	.727	.806
		Intercept + Stimuli [subject = Participant]	.150	.017	.000	.120	.188
<b>C</b> <b>(Enjoyment)</b>	<b>Fixed Effects</b>	Intercept	1.463	.053	.000	1.359	1.567
		Simplicity	.208	.016	.000	.177	.239
		Craftsmanship	.317	.015	.000	.287	.346
	<b>Random Effects</b>	Repeated	.767	.020	.000	.728	.807
		Intercept + Stimuli [subject = Participant]	.387	.034	.000	.326	.460
<b>D (Trust)</b>	<b>Fixed Effects</b>	Intercept	1.126	.047	.000	1.034	1.217
		Simplicity	.353	.015	.000	.324	.382
		Craftsmanship	.401	.014	.000	.373	.429

		Repeated	.693	.018	.000	.658	.729	
	<b>Random Effects</b>	Intercept + Stimuli [subject = Participant]	.238	.023	.000	.197	.288	
<b>E (Behavioural Intentions)</b>		Intercept	-.217	.045	.000	-.307	-.128	
		Simplicity	.100	.012	.000	.076	.124	
		Craftsmanship	.168	.012	.000	.145	.190	
		Ease Of Use	.058	.013	.000	.032	.083	
		Usefulness	.300	.017	.000	.267	.332	
		Enjoyment	.166	.013	.000	.141	.190	
		Trust	.159	.014	.000	.132	.185	
		Repeated	.150	.019	.000	.117	.192	
		<b>Random Effects</b>	Intercept + Stimuli [subject = Participant]	.184	.016	.000	.155	.219

In order to present a more detailed explanation of the observed impact on behavioural intentions the mediating effects of the final model were explored. A structural equation modelling approach was considered in order to develop a full path model, however the nature of that data, due to the use of single items as well as the high level of complexity that would be introduced to such a model as a result of repeated measures, meant that a simpler approach to visualising mediation was adopted using repeated mixed models as presented in table 5.5. In each case random effects and covariance structure were standardised, and a maximum likelihood estimation was used, in order to ensure that fixed effects coefficients were comparable. The resulting diagram shown in figure one therefore represents a 'collage' of models presented in table five in order to give a clearer depiction of the relationship between model factors, but does not constitute a model in and of itself. As such no model fit statistics are reported.

Figure 5.3: Mediation diagram of effects on behavioural intentions

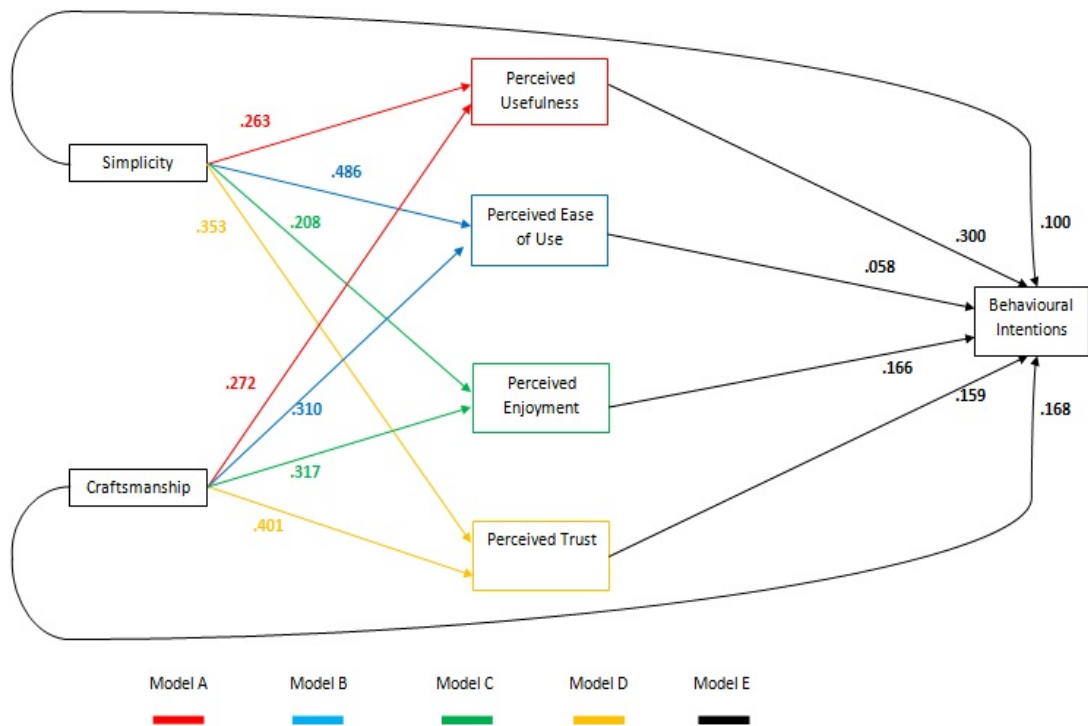


Figure 5.3 shows the resulting mediation diagram based on the TAM model proposed by (Van der Heijden, 2003), with the addition of 'perceived trust', and visual attractiveness broken down into the two facets found to have a significant effect on behavioural intentions (simplicity and craftsmanship). Attitude is not included in the diagram as it was removed earlier in the analysis as a result of issues with multicollinearity. As can be seen from the diagram simplicity appears to have the strongest effect on perceived ease of use, whilst having relatively little effect on perceived enjoyment. Finally, craftsmanship appears to have the strongest overall effects, with the largest of these focusing on perceived trust and perceived ease of use.

Perceived trust seems to provide a useful addition to the model, with significant effects on behavioural intentions both directly and as a mediator for factors of visual attractiveness.

Finally, in order to both confirm the final model presented by the linear mixed model approach and provide more detail of the effects of each measure a cumulative link mixed model was conducted. The results of this model are presented in table 5.6.

Table 5.6: *Cumulative link mixed model for predictors of user behavioural intentions*

<b>Response</b>	<b>Estimate</b>	<b>Std. Error</b>	<b>z value</b>	<b>Sig</b>
Simplicity: Disagree	0.591	0.187	3.153	**
Simplicity: Somewhat Disagree	1.107	0.197	5.619	***
Simplicity: Neither Agree Or Disagree	1.268	0.216	5.865	***
Simplicity: Somewhat Agree	1.557	0.220	7.089	***
Simplicity: Agree	1.934	0.248	7.785	***
Simplicity: Strongly Agree	2.042	0.324	6.304	***
Craftsmanship: Disagree	0.464	0.151	3.069	**
Craftsmanship: Somewhat Disagree	0.985	0.170	5.797	***
Craftsmanship: Neither Agree Or Disagree	1.484	0.196	7.574	***
Craftsmanship: Somewhat Agree	1.930	0.200	9.654	***
Craftsmanship: Agree	2.380	0.230	10.369	***
Craftsmanship: Strongly Agree	2.964	0.298	9.939	***
Ease Of Use: Disagree	0.578	0.225	2.566	*
Ease Of Use: Somewhat Disagree	0.904	0.238	3.795	***
Ease Of Use: Neither Agree Or Disagree	0.992	0.245	4.042	***
Ease Of Use: Somewhat Agree	1.168	0.254	4.599	***
Ease Of Use: Agree	1.697	0.286	5.945	***
Ease Of Use: Strongly Agree	1.771	0.382	4.632	***
Usefulness: Disagree	2.732	0.533	5.129	***
Usefulness: Somewhat Disagree	3.529	0.530	6.654	***

Usefulness: Neither Agree Or Disagree	4.448	0.535	8.309	***
Usefulness: Somewhat Agree	5.400	0.542	9.959	***
Usefulness: Agree	7.194	0.575	12.521	***
Usefulness: Strongly Agree	10.111	0.746	13.561	***
<hr/>				
Enjoyment: Disagree	0.994	0.220	4.518	***
Enjoyment: Somewhat Disagree	1.670	0.226	7.400	***
Enjoyment: Neither Agree Or Disagree	2.183	0.237	9.233	***
Enjoyment: Somewhat Agree	2.464	0.251	9.811	***
Enjoyment: Agree	3.274	0.297	11.012	***
Enjoyment: Strongly Agree	3.943	0.478	8.253	***
<hr/>				
Trust: Disagree	1.262	0.212	5.944	***
Trust: Somewhat Disagree	1.787	0.232	7.692	***
Trust: Neither Agree Or Disagree	2.126	0.247	8.594	***
Trust: Somewhat Agree	2.684	0.256	10.484	***
Trust: Agree	3.065	0.288	10.647	***
Trust: Strongly Agree	3.779	0.406	9.307	***

Note: \*p < .05, \*\*p < .01, \*\*\*p < .001

As can be seen from table 5.6 the cumulative link mixed model supports the findings of the linear mixed model, with significant effects for each of the predictor variables. For the measures of usefulness, enjoyment and trust highly significant effects are found at every level of the scale, suggesting that any increase in these measures has a significant impact on user's behavioural intentions towards the intervention. Simplicity, craftsmanship and ease of use however show weaker, though still

significant, effects at the lower end of the scale. Suggesting that whilst still beneficial, judgements of these factors need to move beyond the very lowest levels before having their strongest impact on behavioural intentions.

#### **5.4 Discussion**

This research provides evidence to support the role of aesthetic design in promoting user engagement with online interventions, in particular the roles of simplicity and craftsmanship. In this context craftsmanship was highlighted as having the greatest influence of these facets on user behavioural intentions towards the intervention, which relates to the level of professionalism and sophistication of the design. This was found to have particularly strong influence on both perceived trust and perceived ease of use of the intervention, suggesting that the perception of greater care and skill in the design not only makes it seem easier to use but also heightens the user's sense that the intervention is reliable and of high quality. The next most influential design facet was simplicity, which again had a particular influence on judgements of perceived ease of use. This would seem to have a prima facie rational to it, with simpler designs being more accessible to the user. However, it is worth noting that perceived ease of use actually had the smallest, though still significant, impact on behavioural intentions. With the largest being perceived usefulness, which was in turn improved to roughly equal degrees by increases in both simplicity and craftsmanship. As such whilst perceived ease of use might be the easiest factor to improve through the introduction of better aesthetic design, it is worth considering that other factors that might relate to perceived usefulness, such as the use of relevant content and the impact the intervention has on the user (Davis, 1989; Van der Heijden, 2003), remain important considerations in the development of digital interventions.

The model generated by this research also supports the inclusion of perceived trust as a predictor of behavioural intentions towards digital interventions in a clinical setting. Trust has been a known factor in the development of commercial websites, as a result of the impact of trust on factors such as purchase intentions and user appeal (Lee & Yurchisin, 2011; Lindgaard et al., 2011), and has been indicated as playing a role in the selection of online health information (Sillence et al., 2004). However the inclusion of

this as a factor in a model of user engagement with active digital health interventions presents a novel addition to the literature, and highlights the importance of building user trust not just through the use of positive aesthetic features, in particular ensuring high levels of simplicity and craftsmanship, but in all aspects of the design process. Indeed, in regards to the provision of online health information, the quality of content has been shown to strongly influence patient trust (Lu et al., 2018) and Sillence et al. (2004) identified a number of contributing factors including both design elements, including a clear layout (simplicity), and content features such as informative, unbiased and simple content, relevant illustrations and the presence of discussion groups and frequently asked questions. Further to this it is worth noting that in each instance the actual effect of the aesthetic and TAM facets was relatively small. This would suggest that whilst still a significant factor in influencing user behavioural intentions towards digital health interventions, it is only one of a number of factors that must come together in order to create an intervention that users are most likely to engage with.

These findings support the application of the adapted TAM framework put forward by Van der Heijden (2003) to digital health interventions, as well as the addition of the role of perceived trust as suggested by Sillence et al. (2004). This provides an effective structure to facilitate future understanding of how users of online interventions perceive and engage with these digital tools and the factors that developers need to consider in order to promote engagement. More specifically the relationship between simplicity and perceived ease of use identified by Lazard et al. (2015) in relation to online patient portals was also supported by this research, suggesting that this may be a widely applicable pathway for improving user experiences of online clinical websites. However, whilst this research does present an initial framework that incorporates aesthetic considerations into the design pathway, more practical recommendations in regards to what features intervention designers should aim to implement in order to achieve high levels of simplicity and craftsmanship are still needed. Indeed, this remains a limitation of the wider literature in this field. Whilst a great deal of research has been conducted in applying various versions of the TAM to a range of areas and demonstrating the relative importance of the different facets (Holden & Karsh, 2010), considerably less consideration has been given to the development of guidelines to assist designers in achieving high user ratings in these areas. There are some notable

exceptions to this trend, for example Oinas-Kukkonen and Harjuma's (2009) persuasive system design model detailed a variety of program features and how they can be utilised in the design of persuasive digital technologies. However more literature of this type is needed.

In regards to the secondary research question some differences were found in the responses between individuals with eating disorders and the general population. However these differences were only present at the multivariate level, indicating that this observation was not as a result to differences in responses to any particular variable but instead a complex variation in responses across all elements of the questionnaire. This makes it difficult to assess exactly how the two populations differ in their judgements of digital health interventions. Furthermore, follow-up analysis indicated that these differences were only present when the two populations were responding to stimuli that related to eating disorders (between conditions ED-ED and GP-ED). This may suggest that differences in responses were due to the relevance of the content in the stimuli rather than as a result of any quality or characteristic relating to the individual. In other words, there does not appear to be a difference in responses between people with eating disorders and people from the general population when the stimuli was relevant to them (referring to eating disorders or health for each group respectively), but responses did differ between these populations when both were shown stimuli that referred to eating disorders (relevant to one group but not the other). However, any conclusions that might be drawn from this are further complicated by the lack of an observed effect between conditions GP-ED and GP-H, which, if the relevance of the content was the sole cause of the observed differences might have been expected.

This does however raise interesting questions in regards to a topic that has not been explored before - the potential differences in the way in which people with eating disorders and the general population might view and engage with online support and ensuring that recommendations for the design of digital interventions for people with eating disorders address this. As, at present, low engagement represents a significant issue with online support targeted at people with eating disorders (Hötzel et al., 2014; Leung et al., 2013; Leung, Ma & Russell, 2013a; Leung, Ma & Russell, 2013b), including MotivATE. Indeed, recent work by Taylor et al. (2018) who found that whilst roughly



200,000 people with, or at risk of, an eating disorder engaged with an American based National Eating Disorders Association's online screening tool less than 10% opted to engage with self-help or guided self-help digital programs. This research begins to address this by developing a model of design and user engagement that explicitly includes individuals with eating disorders, however further research is needed to understand whether fundamental differences in the use of these technologies do exist between people with eating disorders and the general population and, if so, what exactly these differences are and how they can be incorporated into the design of targeted online support.

A key strength of this research was the controlled nature of the design. By using specifically designed stimuli that covered a range of design features, as opposed to previous research that relied primarily on examples taken from websites in current usage, the impact of a wider range of user responses was explored. This allowed for a clearer picture of the role that different aesthetic principles play in the development of user judgements towards digital interventions. The inclusion of different populations, as well as comparisons of different content relating to these populations, also allowed for a more subtle exploration of both the wider applicability of the model generated by this research as well as the potential interplay between design and content.

However, this research did suffer from a number of limitations. Perhaps the most notable of these was the nature of the questionnaire used to record participant responses. Whilst the use of largely single item measures is supported as a viable approach to assessing user attitudes towards websites, and was chosen in order to reduce the cognitive load on participants as a result of the repeated design, the nature of this data did prohibit more in-depth structural analysis of the model. This was somewhat mediated through the use of confirmatory analysis of the final model, but future research using more robust measures to allow for a full structural equation modelling approach of the data to confirm the mediated model is recommended. In addition, future research would potentially benefit from the involvement of professional website designers in the development of the stimuli. As, whilst the stimuli used in this study did successfully generate a range of responses, the positive stimuli failed to access the highest responses from participants, suggesting that these could be improved. However, this may be contingent on further research in order to identify

exactly what aspects users perceived to exemplify the highest levels of each aesthetic facet.

Indeed, whilst this study provides initial evidence for a model of the role of aesthetics in improving digital health interventions, further research is needed in a number of directions in order to both confirm these findings and improve their usefulness to clinicians and developers. Firstly, this research only links the role of aesthetics at improving users' behavioural intentions towards the intervention. Whilst the relationship between behavioural intentions and actual behaviour has been well established (Fishbein & Ajzen, 1975), further research demonstrating actual differences in user engagement with digital health interventions as a result of changes in the aesthetic design is required in order to fully establish this effect. Furthermore, as mentioned above, at present the model is only able to tell us that simplicity and craftsmanship are important aspects of design that developers should address when producing digital interventions. However, it is not able to provide a great deal of practical information in regards to how positive judgements of these facets can be achieved. As such further research is also required in order to ascertain exactly what designs constitute positive implementation of each of the key aesthetic facets so that practical recommendations can be made to future developers.

The current research does provide a number of novel and clinically relevant insights. Firstly, further developing the TAM model proposed by Van der Heijden (2003) allows for a more nuanced insight into the role of visual aesthetics on behavioural intentions, as well as how these factors interact with more established elements of the model. Secondly, the addition of perceived trust to the model builds on the potential importance of this factor as highlighted by previous research and identifies it as an important consideration in the development of digital intervention. Thirdly, in extension to this, the direct application of this model of digital health interventions demonstrates the importance of design considerations in the development of these interventions. Finally, the direct relevance of this model to individuals with eating disorders presents a key step in attempting to address issues with low engagement with online support amongst this population.

## **Chapter 6: The role of exposure and design on people with eating disorders' attitudes towards online support**

### **6.1 Introduction**

Whilst the model presented in the previous chapter highlights the role that aesthetics plays in the formation of user judgements and behavioural intentions towards digital health interventions, this does not necessarily presuppose that these factors will directly impact on user engagement. Though such a link is implied by the TAM (Van der Heijden, 2003), a lack of direct evidence of this in the previous research represents a distinct limitation. As such, a final study was conducted to extend this work by applying the principles highlighted in the model presented in chapter 5 to a study that includes a direct behavioural outcome. Additionally, by refocusing specifically on individuals with eating disorders, this research will also explore one of the other potential barriers highlighted during the focus group - the role of people with eating disorders' attitudes towards online support and the impact that exposure may have on this. In doing so, this final piece of research sought to draw together some of the key points highlighted by the previous work and directly examine their impact and interactions with user engagement with a digital health intervention amongst individuals with eating disorders.

#### *6.1.1 Aims*

This research aims to examine the impact on attitudes and engagement of two different designs of an online intervention for eating disorders developed using the principles identified in the aesthetic model.

#### *6.1.2 Primary Research Question*

Does an improved aesthetic design of an online intervention result in higher levels of engagement?

### *6.1.3 Secondary Research Question*

Do attitudes towards online support change after exposure to an online intervention?

## **6.2 Method**

### *6.2.1 Design*

A 2x2 mixed design comparing intervention design (Low/High) between groups and time (Pre/Post) within groups. Dependent variables were engagement, as measured by the point at which participants chose to exit the intervention, and attitudes towards online support. This design was selected as it allowed for the examination of both the effect of aesthetic design on user engagement in the between groups setting, as well as the impact of exposure to digital interventions on user attitudes and the influence that design might have on this.

### *6.2.2 Participants*

Participants were a community sample of 108 individuals over the age of 18 who had, or had previously had, an eating disorder. This recruitment target was chosen as the result of a power calculation conducted using GPower to detect a medium effect size for the primary research question based on a power of .80. As noted previously this final study refocused the research on individuals with eating disorders in order to investigate directly the impact of both design and exposure on engagement and attitudes amongst this population. As doing so provided the best opportunity to generate clear recommendations not only for the future development of MotivATE, but also for digital interventions for eating disorders in a more general sense. Participants were recruited using online recruitment via research and support forums such as Call For Participants, onlinepsychresearch.com, and the reddit groups r/eating\_disorders and r/eatingdisorders. Where required gatekeeper and/or moderator approval was acquired before recruitment materials were posted. This material included a brief introduction to the research, details of the inclusion criteria

and study content, followed by a link to the online participant information sheet and consent form, followed by the study itself.

### *6.2.3 Randomisation*

Participants were randomly allocated to each condition automatically using simple randomisation via a php code string that used a random number generator to assign condition. The code used can be found in appendix 7.

### *6.2.4 Conditions*

A reduced form of the MotivATE intervention (Muir et al., 2017) was used in this study, which included a front section introducing the intervention, as well as two modules (modules two and three) which included tailored motivational information and exercises based on the transtheoretical model of change. All references to the assessment appointment were also removed from the content of each module. This reduced version of MotivATE was developed in order to be more suitable for the community sample used in this study. Two different visual designs of the intervention were used, low and high, each containing the same content. The 'Low' condition used a design based on the original version of MotivATE with minor changes made in order to reduce the levels of simplicity and craftsmanship. For example moving elements on each page out of alignment or clustering elements together. The 'High' condition adapted the design to more closely match the craftsmanship positive image used in the previous study, as well as utilising the colour scheme used in the colourfulness positive image. These designs were not pilot tested as they were based on designs that had already been thoroughly examined in the previous research. Screenshots of the design used in each condition can be found in appendix 8.

### *6.2.5 Measures*

Engagement with the intervention was assessed by examining the point at which participants chose to exit the intervention. Participants were given the option to exit the intervention on the front page, at the end of module one, and finally on completion of module two. Where a participant exited the study at a point other than these predefined options their point of exit was considered to be the last point they had passed.

Attitudes towards online support were assessed using a novel measure including 24 questions. These questions were derived from the previously conducted focus group study exploring people with eating disorders' attitudes towards support. This was achieved by identifying codes within the subthemes 'Current issues with support', 'Resolving issues with online support' and 'Feelings about online support'. Codes from the subthemes 'Impact of exposure to online support' and 'The role of design' were not included as these areas represented the independent variables being explored in this study. Quotes relating to each code were then identified from the focus group transcript, which were then used to formulate one question relating to each code with positive and negatively phrased questions being balanced equally for the measure as a whole. Details of the question items and associated themes, subthemes, codes and quotes can be found in table 6.1. All items were designed to be responded to on a 7 point likert scale, anchored from strongly disagree to strongly agree (with negative items negatively scored). The final aggregate attitudes score was then generated as the mean score across all items.

Table 6.1: Table outlining the construction of the attitudes towards online support measure

Theme	Subtheme	Code	Question	Pos/	Focus Group Quote
				Neg	
The role of online support	Current issues with support	Pressure to recover	Online support would put less pressure on me.	Pos	There's no pressure to have to do anything and say the right thing
The role of online support	Current issues with support	Frustration with support	Online support would just be another thing I'd need to deal with.	Neg	It just seems like another thing I'd need to deal with
The role of online support	Current issues with support	Frustration with support	Being offered support online would make me feel undervalued and fobbed off.	Neg	If it was the only thing I would feel undervalued and fobbed off
The role of online support	Current issues with support	Pressure to recover	Online support would allow me to work through stuff at my own pace.	Pos	If you could do it when it suits you, you could work through stuff at your own pace
The role of online support	Current issues with support	Connecting with people	Online support would make me feel less alone.	Pos	It makes you feel less alone
The role of online support	Current issues with support	Pressure to recover	Having support online would be less stressful.	Pos	Definitely less stressful
The role of online support	Resolving	Getting help	Having support online would	Pos	Having support on my phone

support	issues with online support	when you need it	mean I could access it anywhere.		everywhere and at any time would make it much easier to use.
The role of online support	Resolving issues with online support	Online support safer	Using online support would make me feel safer than having to see someone face to face.	Pos	It makes me feel safer than thinking about having to go to like a clinic
The role of online support	Resolving issues with online support	Getting help when you need it	Online support would mean I could get help whenever I needed it.	Pos	Help whenever you need it
The role of online support	Resolving issues with online support	Online support is easier to access	It's easier to get support online than to have to go to someone.	Pos	It's a lot easier to just go on the internet than to actually have to go to someone
The role of online support	Resolving issues with online support	Online support safer	I don't feel like the internet is a safe place to get support.	Neg	I still think of the internet as this anonymous place where I can argue with people and buy drugs and research how best not to get caught out with my eating patterns.
The role of online support	Resolving issues with	Online support alongside	I would not like online support to replace face to face	Neg	I'm not sure I'd like it if it was intended to replace my current



	online support	offline support	support.		sessions
Shifting opinions of online support	Feelings about online support	Not thought to use internet in a positive way	I don't consider the internet as being something I could use to get support.	Neg	It hasn't occurred to me until recently that it can be used in a helpful way
Shifting opinions of online support	Feelings about online support	Online support 'impersonal'	Getting support online seems impersonal.	Neg	It just seems kind of impersonal to me
Shifting opinions of online support	Feelings about online support	Online inherently different to offline support	You just can't get the same personal connection online.	Neg	You just can't get the same personal connection with a computer
Shifting opinions of online support	Feelings about online support	Online support too easy to ignore	Online support would be too easy to ignore.	Neg	I think it would just be too easy to ignore
Shifting opinions of online support	Feelings about online support	Online inherently different to offline support	I can't see how online support would have the same depth as talking face to face.	Neg	I don't think it has the depth that you get from seeing someone
Shifting opinions of online support	Feelings about online support	Positive views of online support	Online support seems like a good idea.	Pos	<It> seems like a good idea
Shifting opinions	Feelings about	Online support	With online support I worry I	Neg	There would be a concern for me

of online support	online support	lacks structure	wouldn't be doing it right.		if I was doing it right or not
Shifting opinions	Feelings about	Online can be	Online support would be	Neg	I do worry it can get a bit
of online support	online support	confusing	confusing.		confusing
Shifting opinions	Feelings about	Negative	Online support would not be	Neg	Not everyone needs the same
of online support	online support	feelings about	able to adapt to my needs.		information or the same type of
		online support			support
Shifting opinions	Feelings about	Getting inform	The internet is a good place to	Pos	Looking stuff up online seemed
of online support	online support	ation	find information about		like a good place to start
			recovery and support.		
Shifting opinions	Feelings about	Positive views	I would be interested in using	Pos	I'm still pretty interested to see
of online support	online support	of online	online support.		how it works
		support			
Shifting opinions	Feelings about	Positive views	I would find online support	Pos	One place where you know you
of online support	online support	of online	trustworthy.		can trust it would be really good
		support			

Finally this study also included the same demographic questions used in the previous research, which included the following:

- Use of Online Self-Help, '*Have you ever used the internet for health related advice?*', '*Have you ever used health related online self-help?*'
- Experience of an Eating Disorder, '*Do you currently suffer with an eating disorder?*', '*Have you ever suffered in the past with an eating disorder?*' (These have been created by breaking down the final question of the Eating Disorder Screen for Primary care), '*Have you ever attended an eating disorder service?*' (Optional).
- Eating Disorder Diagnosis, '*How would you describe your experience of an eating disorder (e.g Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder etc.)?*' (Optional).
- Age, '*What is your age?*'
- Gender, '*What is your gender?*'
- Nationality, '*Do you currently live in the UK?*'
- Language, '*Is English your first language?*'
- Computer Use, '*How often do you use a computer?*', '*How many hours per week do you spend on a computer?*'

A full list of the demographic questions, with response options, can be found in appendix 9.

#### 6.2.6 Procedure

Upon accessing the study participants were presented with the participant information sheet and consent statements. This was followed by the demographic questions outlined above.

Participants were then asked to complete the attitudes towards online support questionnaire, after which they were randomised to have access to either the high or low design of the intervention and had the opportunity to use it to the extent that they wish. After choosing to exit the intervention on either the front page, or after either

the first or second module, participants were asked to complete the attitudes questionnaire a second time before being presented with a digital copy of the debriefing sheet.

### *6.2.7 Analysis*

Point of exit data relating to the primary research question was analysed using chi-squared. Attitudes questionnaire data relating to the secondary research question was analysed using a 2x2 mixed ANOVA. Finally, an additional exploratory analysis extended this through the examination of differences in pre and post mean attitude scores based on point of exit using a 3x2 mixed ANOVA. All analyses were conducted using IBM SPSS Statistics 23.

### *6.2.8 Ethics*

Ethical approval was granted by Bournemouth University (ID: 18663).

This work presented no additional ethical considerations over and above those presented in the previous chapter. However, consideration was given to the content of the reduced form of the MotivATE intervention used in this study in order to ensure that it was applicable and useful to a wider, community based population, as well as making certain the language used was appropriate for users at differing stages of change.

## **6.3 Results**

In total 108 participants were recruited to the study, of which 91 (84%) were female. Of these, three did not complete the final attitudes measure and as such were removed from the analysis of the secondary research question. As with the previous research the majority of participants were younger, with almost all under the age of 35 years. The participant sample were high computer users, with almost all participants using a computer everyday or more than once a day, with most averaging computer

usage of between 10 to 40+ hours a week. The sample was largely UK based, with English as their first language. Full details of participant characteristics, both as a full sample and for each condition, are shown in table 6.2.

Table 6.2: *Participant characteristics, both in total and per condition*

	<b>Low Design</b>	<b>High Design</b>	<b>Total</b>
	N = 54	N = 54	N = 108
Age	18 - 24: 39	18 - 24: 34	18 - 24: 73
	25 - 34: 12	25 - 34: 19	25 - 34: 31
	35 - 44: 0	35 - 44: 1	35 - 44: 1
	45 - 54: 3	45 - 54: 0	45 - 54: 3
	55 - 64: 0	55 - 64: 0	55 - 64: 0
	65 - 74: 0	65 - 74: 0	65 - 74: 0
	75 - 84: 0	75 - 84: 0	75 - 84: 0
	85 or older: 0	85 or older: 0	85 or older: 0
		No response: 1	
Gender	Male: 4	Male: 5	Male: 9
	Female: 47	Female: 44	Female: 91
	Non Binary: 0	Non Binary: 3	Non Binary: 3
	Prefer Not To Say: 3	Prefer Not To Say: 2	Prefer Not To Say: 5
Accessed Online	Yes: 43	Yes: 40	Yes: 83
Advice	No: 11	No: 14	No: 25
Accessed Online	Yes: 27	Yes: 30	Yes: 57
Self-Help	No: 27	No: 24	No: 51
Attended An	Yes: 32	Yes: 37	Yes: 68
Eating Disorder Service	No: 23	No: 17	No: 40

Self Reported Eating Disorder	Anorexia Nervosa: 21 Bulimia Nervosa: 14 Binge Eating Disorder: 3 EDNOS/OSFED: 8 Other: 8	Anorexia Nervosa: 20 Bulimia Nervosa: 5 Binge Eating Disorder: 4 EDNOS/OSFED: 12 Other: 13	Anorexia Nervosa: 41 Bulimia Nervosa: 19 Binge Eating Disorder: 7 EDNOS/OSFED: 20 Other: 21
From The UK	Yes:36 No: 18	Yes: 37 No: 17	Yes: 73 No: 35
English As First Language	Yes: 46 No: 8	Yes: 49 No: 5	Yes: 95 No: 13
Computer Use	Once a month or less: 0 Once a week: 0 Several times a week: 3 Every day: 24  Several times a day: 27	Once a month or less: 0 Once a week: 0 Several times a week: 0 Every day: 23  Several times a day: 31	Once a month or less: 0 Once a week: 0 Several times a week: 3 Every day: 47  Several times a day: 58
Computer Time Per Week	0 to 1 hours: 0 2 to 4 hours: 2 5 to 6 hours: 1 7 to 9 hours: 5 10 to 20 hours: 10 21 to 40 hours: 21 Over 40 hours: 15	0 to 1 hours: 0 2 to 4 hours: 2 5 to 6 hours: 0 7 to 9 hours: 3 10 to 20 hours: 9 21 to 40 hours: 26 Over 40 hours: 14	0 to 1 hours: 0 2 to 4 hours: 4 5 to 6 hours: 1 7 to 9 hours: 8 10 to 20 hours: 19 21 to 40 hours: 47 Over 40 hours: 29

### 6.3.1 Research Question One

Table 6.3: Frequency distributions of point of exit from the intervention for each condition

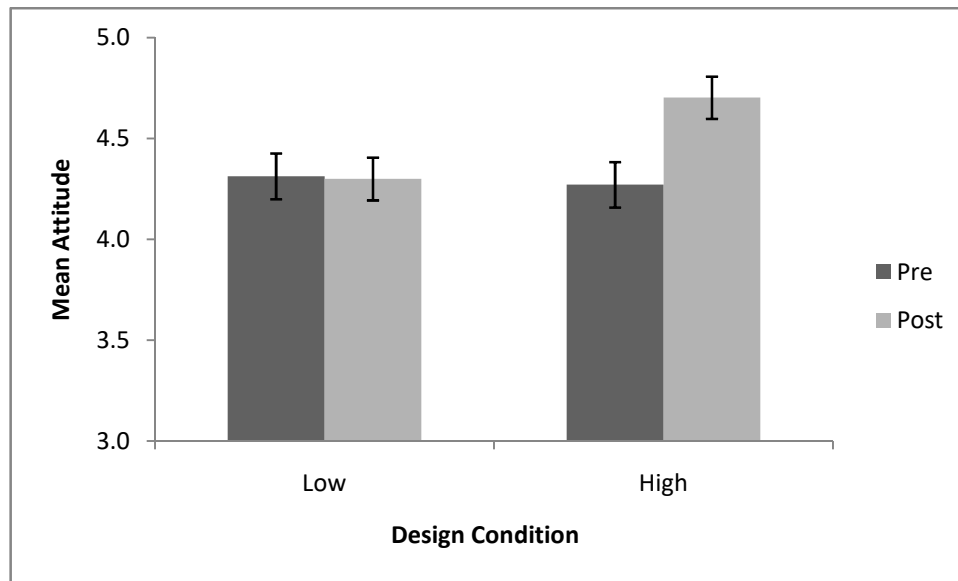
		Point Of Exit				
		Homepage	Module 1 End	Module 2 End	Total	
<b>Design</b>	<b>Low</b>	<b>Count</b>	22	14	18	54
		<b>Adj. Res.</b>	2.5	0	-2.3	
	<b>High</b>	<b>Count</b>	10	14	30	54
		<b>Adj. Res.</b>	-2.5	0	2.3	
<b>Total</b>			32	28	48	108

Table 6.3 shows the number of participants that exited the intervention at each of the three time points for each condition. The pattern of engagement was significantly different between the two conditions ( $\chi^2 (2) = 7.5, p = .024$ ) with the adjusted residuals indicating that participants were equally likely to exit midway through the intervention (at the end of Module 1), but significantly more likely to use the full intervention, and conversely less likely to exit on the homepage, when using the version in the 'high' design condition. This is based on the statistical significance of an adjusted residual greater than +/- 2 (Agresti, 2007; Sharp, 2015).

### 6.3.2 Research Question Two

Normality was checked for the attitudes measure at both the pre and post time points, both collectively and for each condition, with Kolomogorov-smirnov statistics suggesting that data was normally distributed. This was confirmed by examining the Q-Q plots, kurtosis and skewness which each indicated a normal distribution. This indicated that parametric testing was appropriate and as such a 2x2 mixed ANOVA was conducted. Box plots highlighted two outliers in the data (ID: 59 & 81), which were removed as inclusion in the data set resulted in violation of the assumption of homogeneity of variances.

Figure 6.1: Mean attitude score pre-post exposure to the intervention for each condition (Low N = 52; High N = 51).



Note: Error bars are standard error from the mean.

The results of the 2x2 mixed ANOVA indicated both a significant effect for time ( $F(1, 101) = 14.558, p = .000$ ; partial  $\eta^2 = .13$ ) as well as a time x condition interaction effect ( $F(1, 101) = 16.426, p = .000$ ; partial  $\eta^2 = .14$ ), but no significant differences between the two groups ( $F(1, 101) = 1.829, p = .179$ ; partial  $\eta^2 = .02$ ). As can be seen from figure 6.1 there appeared to be no changes in attitudes as a result of exposure to the low design intervention ( $t(51) = -0.179, p = .859$ ), however attitudes towards online support did increase significantly for participants who used the high design intervention ( $t(52) = 5.529, p = .000$ ).



Figure 6.2: Mean pre and post attitude scores based on point of exit from the intervention (N = 103).



Note: Error bars are standard error from the mean.

Box's M (17.099) was significant at  $p = .011$ , however, as this test is known to be highly significant a critical  $p$  value of .001 is often recommended (Hahs-Vaughn, 2016) and as such was considered acceptable. As can be seen in figure 6.2, the point of exit from the intervention was seen to be associated with both pre ( $F(2, 100) = 5.367, p = .006$ ; partial  $\eta^2 = .10$ ) and post ( $F(2, 100) = 5.120, p = .000$ ; partial  $\eta^2 = .18$ ) attitude scores. However there was no time (pre/post) by exit point interaction ( $F(2, 100) = 0.899, p = .410$ ; partial  $\eta^2 = .02$ ), suggesting that increase engagement with the intervention did not result in greater changes in attitude scores.

#### 6.4 Discussion

This study confirms the core premise of the previous research in highlighting that improved aesthetic design directly impacts on user engagement. The results indicated that changes in design resulted in significant differences in the ways in which participants engaged with the intervention. Subsequent analysis indicated that whilst

changes in design had no impact on the number of participants that choose to exit the intervention at the midpoint, after using just one of the two modules, those who were given access to the 'High' design were significantly less likely to exit the intervention on the homepage and more likely to use the intervention all the way to the end. This suggests that not only does improved design serve to engage users at the initial point of contact, it also encourages users to stick with the intervention once they have begun using it.

This supports the previous research conducted as part of this PhD, by demonstrating a clear behavioural link to changes made to the aesthetic design of a digital intervention. Furthermore, it provides support for the utility of the model presented in the previous chapter, as the applications of principles to heighten the facets identified as part of that research have been shown to result in positive changes in user behaviour. This work also provides further support for other work within the literature, including a number of proposed models of user engagement which include aesthetics as a key factor. These include the adapted TAM (Van der Heijden, 2003), that was the basis of some of the previous research, but continued to build on this by providing a greater level of detail as to the specific aesthetic facets that have the greatest impact when incorporated into the TAM model. This also relates to the proposed model of user engagement put forward by Short et al. (2015), which also includes aesthetics as a potential modifier of user engagement. Both of these models highlighted aesthetics as just one factor among several that need to be considered in order to ensure that digital technologies are engaging to users. This position is not challenged by this research. As, whilst it highlights the importance of considering aesthetic factors when designing digital interventions, this needs to be considered alongside the effort commonly placed on content and design features (Oinas-Kukkonen & Harjumaa, 2009).

In regards to the second research question regarding the effect of exposure of user attitudes towards online support, the identification of a significant effect for pre/post differences initially suggests that exposure to digital interventions does have a positive impact on attitudes. However, a closer examination of the results shows that this positive impact was only present when the participant was exposed to the 'High' design intervention, with no changes in attitude resulting from use of the 'Low' design variant. This would suggest that the quality of the intervention that users are exposed

to is a key factor in their changing attitudes. However, this could either be a direct result of the design or mediated by the fact that a better design leads to greater levels of engagement, which may in turn be associated with increased attitude scores. Based on the TAM it would be expected that participants' attitudes were improved early in their exposure to the intervention, which then resulted in increased engagement, rather than the other way round. As this would follow the attitude -> intention -> behaviour pattern posited by the TRA (Fishbein & Ajzen, 1975). This would appear to be supported by the results, as further exploratory analysis of the relationship between engagement and attitude found a significant relationship between a participants attitude both before and after exposure, and the point at which they exited the intervention. As such, the data suggests that a higher attitude towards online support at the outset of the study was likely to lead to more engagement with the intervention, with this higher attitude then maintained after use. Furthermore, when not accounting for differences in design, the lack of an interaction effect between the point of exit from the intervention and changes in pre/post indicates that greater levels of exposure to the intervention do not have an impact of users attitudes towards online support in general. The finding that exposure had a positive impact on attitudes towards online support therefore seems to centre around early changes in attitudes as a result of exposure to well designed interventions, rather than being a more widely applicable principal.

This further supports the importance of considering a positive aesthetic design in the development of digital health interventions for people with eating disorders. As this not only appears to have a positive impact on their engagement with the intervention itself, but also has a knock on effect on their attitudes towards online support in general, which in turn proves beneficial to engagement with continued online support moving forward. These findings concur somewhat with the sub-theme regarding the impact of exposure identified during the online focus group study in chapter four. However, participants in the discussion appeared to indicate that they preferred to reserve judgement until after more extensive use, something which was not apparent from the findings of this study. This may be due to the way in which aesthetics judgements are made, which are often very quick (Leder, Belke, Oeberst, & Augustin, 2004; Moshagen & Thielsch, 2010), especially in relation to web based content

(Lindgaard et al., 2006; Tuch et al., 2012), but which may be slower when considering the health information content of the intervention (Sillence, Briggs, Harris & Fishwick, 2007). As this work only examined the impact of aesthetic design, whilst controlling for changes in content, more research is required in order to explore this discrepancy.

This research did suffer from a number of limitations. As noted above, the lack of mid-point measures makes it difficult to fully assess the relationship between attitude and aesthetics. Such a measure was not included due to the primary focus of the research being on the direct effect of aesthetic design on engagement. In this instance the addition of further measures in the middle of a participant's use of the intervention may have acted as a confound to their engagement. This is therefore something that might be investigated in future research. As this would allow the researcher to gain a better insight into interactions between aesthetics and attitudes in order to best understand how aesthetic principles might best be implemented. A second limitation of this research was the lack of a measure of aesthetics. However, as the designs of the interventions used came about as the result of previous research in this PhD, it was judged that there was sufficient confidence in the difference between the two to address the research question. This was borne out by the fact that an effect was found, with no variables other than the design having been manipulated.

However, the research did have several strengths. A key strength was the inclusion of a direct behavioural measure of engagement. This allowed for the development of the previous research, which had only included behavioural intention measures, in order to clearly demonstrate the impact of aesthetics on engagement. Further to this the incorporation of a measure of participants attitudes towards online support pre-post allowed for further investigation of some of the issues highlighted as part of the qualitative research. Primarily whether exposure to online interventions has an impact on people with eating disorders' attitudes towards online support. Whilst this might be further explored in more depth in future research, this does highlight that attitude towards online support may be a modifiable barrier to engagement with digital interventions amongst this population.

In conclusion, this research highlights the importance of considering design aesthetics in the development of digital interventions for people with eating disorders in order to

both encourage user engagement and improve attitudes towards online support. Whilst this retains issues with the previous research in this area in that it cannot provide specific design recommendations, this work does clearly demonstrate that the application of the model in the design process has beneficial outcomes for users of digital interventions targeting individuals with eating disorders. However, as noted previously, more research is recommended in order to develop clear and practical guidelines for intervention designers to effectively implement the model. Additionally, further work is needed to explore more deeply the relationship between aesthetics and content and the impact this may have on user judgements and attitudes towards online support amongst individuals with eating disorders.

## Chapter 7: Final Discussion

### 7.1 Discussion

This PhD aimed to assess the impact of MotivATE on treatment attendance and to contribute to its continued development in order to attempt to address issues with lack of treatment engagement that have been noted in relation to individuals with eating disorders (Leavey, Vallianatou, Johnson-Sabine, Rae & Gunpath, 2011; Muir et al., 2017; Waller et al., 2009). This was done across four phases of research which have been presented in the previous chapters.

Phase one examined the evidence surrounding the ability of treatment interventions to increase motivation to change amongst individuals with eating disorders, with a focus on the role of motivational interventions in this context, via a systematic review. Despite a number of recent reviews in the area (Bonder & Mantler, 2015; Knowles, Anokhina & Serpell, 2013; Macdonald et al., 2012) disagreement remained within the literature regarding the effectiveness of specifically motivational interventions and their role in the treatment of eating disorders. By framing the question of the effectiveness of these specific interventions within the broader question of the impact of treatment as a whole, this review made steps towards consolidating the conflicting views presented by previous reviews. As a result the review supported the findings of Knowles, Anokhina and Serpell (2013), in that specifically motivational approaches were not shown to be more effective at increasing motivation to change than other common treatment approaches such as CBT. However, given that these approaches were also found to be effective, and often contain motivational elements themselves, in this context this does not suggest a lack of effectiveness in regards to motivational approaches. This is supported by the fact that these motivational approaches were found to be more effective at increasing motivation to change over approaches such as self-help or psycho-education, as well as showing promise as a potentially effective approach when delivered as a digital intervention (Hötzel et al., 2014; Leung et al., 2013; Leung, Ma & Russell, 2013a; Leung, Ma & Russell, 2013b).

This then provided support for the previous work that had been done prior to the commencement of the PhD by the research team that had developed MotivATE as a

potential tool for improving motivation to change in people with eating disorders as a means of improving treatment engagement (Muir et al., 2017). As such phase two sought to continue this work by assessing the impact of offering MotivATE to service users on attendance at initial assessment appointments at an outpatient eating disorders service centre. This randomised control trial identified a number of issues, both with the methodological approach of the study, particularly in relation to the nested qualitative study, as well as with the MotivATE intervention itself. In regards to the methodology, issues with recruitment to the nested qualitative study suggest that the approach taken to recruitment, this being the use of automated emails, lacked the necessary salience to attract interest in the study, particularly amongst a population know to be difficult to engage (Leavey et al., 2011). Whilst steps were taken at the mid-point of the study to remedy this, via the inclusion of a more accessible follow-up email, which did result in the recruitment of two participants, this failed to adequately address the issue. As such it is suggested that future research in this area may wish to adopt a more active recruitment approach to studies of this nature such as direct contact via phone or post.

In regards to the MotivATE intervention itself, the randomised control trial found that, in its present state, offering access to MotivATE to service users prior to their initial assessment did not have a significant impact on attendance. However, a more detailed examination of the data highlighted that this may have been a result of lack of engagement with the intervention, as opposed to issues with the content that had been developed. Of those offered access to MotivATE, only one in three registered for an account. The case studies presented as part of the nested qualitative study highlighted a number of potential possibilities for the cause of this lack of engagement; including similar salience issues with the way in which the intervention was offered (via a letter along with the invitation to the assessment appointment), general attitudes towards support amongst individuals with eating disorders, and issues with the design of the intervention itself.

Phase three therefore sought to extend this qualitative work via an online focus group study exploring both people with eating disorders perceptions and feedback on MotivATE, as well as their experiences and attitudes towards support more generally. This work was framed within a critical realist perspective and delivered in this context

in the form of Buetow's (2010) conceptualisation of thematic analysis as 'saliency analysis'. This allowed for a more semantic approach to the data; exploring themes within the explicit and surface meanings of the data in order to construct a more direct understanding of how participants viewed their interactions with support, particularly in an online context. The themes identified from this supported the general approach taken by MotivATE, as participants appeared to see a role for online support in addressing limitations with more traditional, offline, avenues of support. In particular practical issues such as long waiting times and access issues, consistent with those identified by Leavey et al. (2011), were seen to be areas that online support might be able to address. However, concerns were highlighted regarding the ways in which online support might detract from the actual treatment process, with issues such as reduced contact, lower levels of accountability and being able to fully understand online support being highlighted. This meant that despite tools such as MotivATE being recognised as having a potentially beneficial role to play, the general attitude towards online support appeared negative. It is of note however that attitudes appeared to improve as the study continued, and participants had the opportunity to engage with the intervention. This once again provided further support to the quality of the content of MotivATE, and suggested that exposure may act as a modifiable barrier to engagement with online support. Additionally, the discussion seemed to suggest that the design of the intervention appeared to play a role in these shifts in opinion. However, significant caveats were attached to these observations due to two key points. Firstly, attrition during the study meant that only five of the original twelve participants were still engaging in conversation by the final week. It should be noted that the shift in nature of the conversation may have been due to these five having potentially been those with the highest attitudes from the start of the study, rather than as a result of changes due to exposure to the intervention. Secondly, the researcher's own interest in aesthetics design may have influenced the nature of the discussion and the analysis, potentially resulting in the prominence this aspect had in the results. Finally, the use of online recruitment methods presents a potential source of bias as it is possible that those recruited represented individuals with greater levels of internet use than the rest of the target population, and as such may have had more positive attitudes towards digital health interventions. However, it is worth noting that



despite this potential bias, the discussion elicited as part of this research still included a range of potential concerns and negative attitudes towards digital support approaches.

Phase four sought to expand on the points highlighted in the qualitative research, and to examine them more quantitatively to assess whether they may indeed have any impact on user engagement. As such this research focused on attempting to model the role of aesthetics in promoting engagement with digital health interventions and to explore the effect that this, along with exposure, might have on people with eating disorders attitudes to online support. The focus on aesthetics was chosen not just as a result of the findings of the focus group study, but also due to the significant amounts of literature that link the importance of design aesthetics in more commercial fields to metrics such as usability (Lee & Koubek, 2012; Sonderegger & Sauer, 2010), first impressions (Thielsch & Hirschfeld, 2012; Tuch et al., 2012), intentions to revisit or recommend (Mahlke, 2002; Thielsch, Blotenberg & Jaron, 2014) and disposition to buy (Parboteeah, Valacich & Wells, 2009; Porat & Tractinsky, 2012). However this importance has only more recently begun to receive research focus in relation to digital health (Lazard et al., 2017; Lazard & Macket, 2015; Lindgaard et al., 2011; Morrison et al., 2018; Sillence et al., 2004). As such this phase of the research sought to explore how these aesthetic principles, based on Moshagen and Thielsch's (2010; 2013) four facet VisAWI approach, might relate specifically to digital health interventions within the commonly applied framework of the TAM (Holden & Karsh, 2010; Van der Heijden, 2003).

From this phase of the research both simplicity and craftsmanship were identified as key predictors of participants behavioural intentions towards digital health interventions. Suggesting that simple, professionally made websites stand the best chance of engaging users. This serves to provide insights that might be utilised by intervention designers to help address the engagement issues commonly found when delivering digital interventions (Eysenbach, 2005; Kelders, Kok, Ossebaard & van Gemert-Pijnen, 2012), particularly to individuals with eating disorders (Hötzel et al., 2014; Leung et al., 2013), including in the continued development of MotivATE. However it is worth noting that, at this point this work is not yet able to outline clear

and practical recommendations of how this might be achieved, meaning that more research is required in order to fully realise the potential impact of this line of work.

In addition, this research explored the utility of including a measure of perceived trust when modelling technology acceptance in relation to digital health. Trust has been shown to be a key mediator of treatment compliance (Lu et al., 2018) and has itself been shown to be impacted by design features (Lindgaard et al., 2011; Sillence et al., 2004). As such it seemed a meaningful addition to the research, and was shown to make a significant contribution to the model, acting as a particular moderator for the effect of craftsmanship on user behavioural intentions. The final model then presents a significant development on that proposed by Van der Heijden (2003), and gives a specific insight into the factors associated with the acceptance and behavioural intentions towards digital health technologies.

The final piece of research in this PhD sought to then apply this model to demonstrate both its ability to generate a behavioural change in relation to engagement, as well as to include an exploration of the issue of exposure that was identified in the qualitative research. This was achieved by designing two variants of MotivATE, one which exemplified the concepts identified in the model and one that did not. The research then assessed to what extent people who had, or had previously had, an eating disorder engaged with the two interventions when given the opportunity to use them. From this it became apparent that the use of a 'higher' design, as suggested by the model, did have a positive impact on the degree to which people with eating disorders engaged with the MotivATE intervention. Furthermore, the inclusion of a measure of attitude towards online support both before and after using the intervention indicated that there may indeed be some positive impacts of exposure on user attitudes, but that shifts occurred in the early stages of use and at least in this instance were contingent on the positive design of the intervention. It is worth noting however that as design was the only variable manipulated as part of this study, this does not preclude the possibility that differences in content, particularly in relation to the provision of health information, may also result in shifts in attitudes (Sillence, Briggs, Harris & Fishwick, 2007). This then represents another area of future research, once again investigating the relationship between design and content, in relation to the

impact this may have on improving user attitudes towards online support, particularly amongst the eating disorder population.

This phase of research also explored potential differences in the ways people with eating disorders perceive and engage with digital interventions in comparison to the general population. This was investigated as the particularly low levels of motivation to change and engagement which have been noted in relation to individuals with eating disorders (Waller et al., 2009) means that the way in which interventions need to be designed to engage them may differ from the general population. This is potentially compounded by the fact that changes in visual perception, particularly in relation to the body, are a common element of the condition (Urgesi et al., 2012), which may in turn impact the way in which people with eating disorders view aesthetics more generally. A potentially confounding factor to this aspect of the research was the nature of the content of the intervention; as it was unclear whether the most suitable comparator for the eating disorder condition would be to expose people from the general population to the exact same stimuli, discussing eating disorders, or something more relevant to them by using content that discussed health more generally. Therefore the study opted to explore both options in an attempt to address this issue. The findings suggested that there may indeed be subtle differences in the way that people with eating disorders and the general population respond to digital health interventions. However, these differences were both subtle and complex, being present only at the multivariate level across the entire set of measures used, as well as only being present in specific circumstances; follow up analysis found differences in responses between people with eating disorders and people from the general population shown stimuli that related to eating disorders, but not those shown stimuli relating to health, suggesting this was not simply a difference between the two populations. Similarly, no differences were found between the two general population groups, suggesting that the noted differences were not just a result of reactions to the content. Further research is undoubtedly required not only to properly understand the nature of the effect, but to fully establish that a practical difference does indeed exist, as the noted effect size of this difference was very small (partial  $\eta^2 = .06$ ). As such it is suggested that, until firmer evidence can be provided to indicate otherwise, designers

of digital interventions for people with eating disorders should make effective use of guidelines developed for more general digital health interventions.

In summary this research contributes to the literature regarding engagement with digital health interventions, particularly in relation to engaging people with eating disorders with online support and the role that aesthetic design can play in doing this. The importance of aesthetic design is an area of research that has received considerable amounts of attention in commercial fields (Thielsch & Hirschfeld, 2012; Tuch et al., 2012), but which is only more recently being highlighted as an area of particular interest in the development of digital health. This work therefore supports recent calls made by other researchers in regards to both the need for improvements in the aesthetic design of digital health related websites (Lazard & Mackert, 2015) and the need for the development of clear and accessible guidelines for developers to achieve these improvements (Valizadeh-Haghi, S., Moghaddasi, H., Rabiei, R., & Asadi, 2017). Whilst guidelines have been produced regarding the use of content features with a focus on interactivity and perceived usability (Morrison, Yardley, Powell, & Michie, 2012; Oinas-Kukkonen & Harjumaa, 2009), these approaches assume that the user is already engaging with the intervention. Furthermore, many current theories and strategies regarding visual design focus on the communication of health information (Lazard & Macket, 2015), often with a focus on simplification (Jensen, 2012). This work therefore attempts to provide a more cohesive model of the role of visual aesthetics in engaging potential users at the initial point of contact, as well as applying this theory more directly to digital health interventions. Within this context it is recommended that digital health interventions are designed with a focus on simplicity and craftsmanship, particularly in regards to the intervention landing page (the first page that users will see). It is also suggested that designers carefully consider the way in which the design of their interventions can be used to foster user trust; for example through careful consideration of the design and placement of logos.

More specifically this work makes a number of recommendations for the future development of MotivATE. Primarily these relate to changes in the aesthetic design of the intervention, particularly as part of the front page, in order to promote improved uptake and engagement. Based on both the generated model and the finding of the final study it is recommended that future iterations of MotivATE utilise a design similar

to that used in the 'High' condition of the final study, which included: a more centralised, simplified design with more clearly defined sections to the front page; the use of sharper lines, improved alignment of page features and better integration of institutional logos to demonstrate improved craftsmanship; small changes to the colour scheme to make the design more cohesive. Alongside this it is suggested that further patient and public engagement work be done in relation to the logo, as this was highlighted during qualitative work as a potential aspect of the design that could be improved but which the scope of this PhD was unable to explicitly cover. Following this a secondary pilot should be conducted in order to assess both whether the changes in design have an impact of uptake and engagement in a clinical setting and if so whether this in turn produces a positive result in regards to MotivATE's impact on attendance at initial assessment appointments. As part of this follow up study further qualitative research can be conducted, utilising a more salient recruitment approach, such as the use of letters or phone calls, in order to attempt to overcome the recruitment issues faced in the initial randomised control trial. This will allow for a more detailed insight into how users engage and perceive the new version of MotivATE as well as potentially identify further areas for development, as this should continue to be an iterative process going forward in order to continue to ensure that MotivATE meets user needs (Yardley, Morrison, Bradbury, & Muller, 2015).

It should be noted that this work did suffer from a number of limitations. Firstly the focus on online methodologies, as well as online recruitment approaches, throughout the research process may have influenced the type of participants recruited to many of the studies by drawing largely from individuals already engaging with the internet. As this research was largely interested in factors relating to lack of uptake with digital interventions, the inclusion of more low, or even non, internet users may have provided valuable insight. As such it must be considered that those who are not high internet users may potentially have different, or simply additional, barriers to engagement with digital health interventions. However, this choice was made as it allowed the research to be conducted within the online environment that it was seeking to investigate, therefore hopefully giving it a more naturalistic dimension. Secondly this work could have benefited from a greater level of interdisciplinary coordination, particularly through the involvement of professional web and graphic

designers. Whilst the researcher did have experience in this field, the involvement of individuals with greater, and potentially more up to date, design experience may have allowed for a greater quality and variety of design stimuli used in the research. As such a more collaborative approach is a clear recommendation for future research in this field.

## **7.2 Conclusions**

This PhD has utilised a range of methodological approaches to both investigate the impact of offering MotivATE to improve attendance at initial assessment appointments, and, following the lack of noted effect, to explore factors primarily relating to design and aesthetics, which might be modifiable in order to address highlighted issues with uptake. The individual research questions put forward by this work, along with the identified research conclusions, are outlined below.

### *7.2.1 What evidence is there that treatment interventions increase motivation to change amongst individuals with eating disorders?*

The results of the systematic review present strong evidence that motivation to change increases due to treatment. Whilst the evidence remains inconclusive with regards to the effectiveness of approaches targeted at motivation over and above established interventions such as CBT, the use of brief, single session motivational interventions do appear to provide benefits over other low intensity approaches such as self-help or psycho-education. However, their use in treatment needs to be carefully considered in relation to other available options.

This research contributes to the existing literature by presenting a more nuanced and unified understanding of the current research relating to improving motivation to change in individuals with eating disorders; in particular supporting the potential role of brief motivational interventions early on in the treatment pathway. The review also provided preliminary evidence for the use of online tools as a potential approach to

improving motivation to change, which supported the rationale for the development of the MotivATE intervention explored in the remainder of the PhD.

### *7.2.2 Does adding MotivATE to usual care increase attendance at an adult eating disorders outpatient service?*

The findings of the Zelen randomised control trial indicated that in its current state, MotivATE did not have a significant impact on attendance at assessment. Follow-up analysis did highlight a possible correlation between engagement with the intervention and increased treatment attendance, with figures showing overall lack of uptake suggesting this as a possible reason for the lack of observed effect. However it must be noted that the lack of a pre-post measure of motivation means that it is not possible to draw causal conclusions from this link, however qualitative feedback from users did suggest that in principal the MotivATE intervention represented an acceptable approach to service users.

This research therefore made significant contributions to the development of MotivATE, covering the 'evaluation' phase of the intervention mapping process outlined by Bartholomew, Parcel and Kok (1998), by exploring the effectiveness of MotivATE in a clinical context. In a broader context, this research also contributes to the literature surrounding the use of motivational interventions, particularly in an online context by highlighting potential strengths and weaknesses of this approach, such as apparent issues with uptake and engagement. Furthermore, from a methodological perspective, it highlighted the need for more salient recruitment approaches to the qualitative arms of such research, as the use of an automated email system integrated with the intervention itself was found to result in poor levels of uptake with the nested interview study.

### *7.2.3 What are people with eating disorders' experiences of seeking and engaging with support and how do they perceive and engage with a new online motivational intervention?*

The online focus group found that whilst people with eating disorders do identify a potential role within treatment for online support such as MotivATE, especially in relation to addressing practical concerns such as limits on the accessibility of offline support, this is limited by negative attitudes towards these approaches which may contribute to low uptake. Further discussion suggested that factors such as previous exposure and effective design may serve to help mitigate these negative attitudes, highlighting aesthetic design as a potentially modifiable barrier to engagement with online support.

This research therefore furthers our understanding of people with eating disorders' experiences and perceptions of seeking support, particularly in online contexts, as well as addressing user experiences of MotivATE, in order to compliment the work conducted in the clinical trial. Thus, a deeper understanding of the interaction between users and MotivATE in the context of engagement is presented, allowing for a more nuanced contribution to the literature, as well as highlighting possible areas for continued development of the intervention. Insights were also provided into potentially modifiable barriers to engagement with online support amongst individuals with eating disorders, allowing for the development of future research exploring ways to address these issues. Furthermore, this study also utilised a lesser used design, adopting a longer-term online approach to simulate the user pathway experienced in a real-world context.

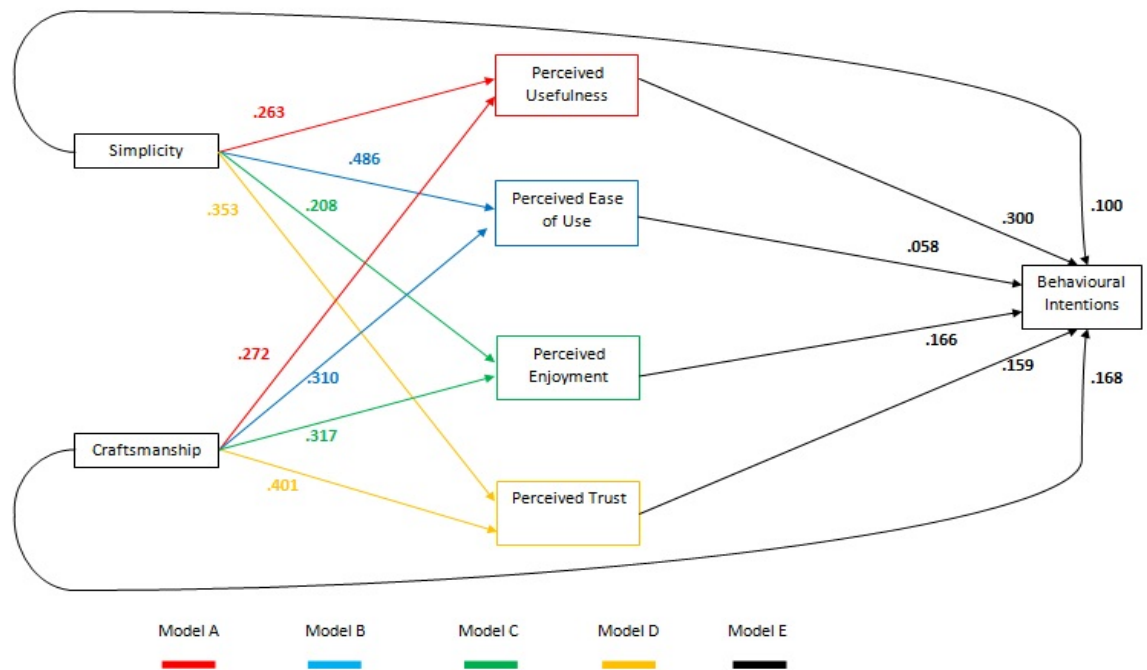
### *7.2.4 How does the aesthetics of a web-based intervention impact attitude and engagement?*

The final phase of research on visual design supported the findings from commercial fields in regards to the importance of aesthetics in promoting user engagement and fostering positive attitudes. Specifically this work developed a preliminary model



specifically addressing this factor in relation to digital health interventions, in particular those designed for delivery to individuals with eating disorders, as shown in figure 7.1.

Figure 7.1: Model of the role of aesthetic facets and key mediators on behavioural intentions towards digital health interventions.



In comparison to the established models drawn from the HCI literature for use in this research (VisAWI, Moshagen & Thielsch, 2013; TAM, Van der Heijden, 2003) this model differs in a number of key ways. Firstly of the four facets of aesthetics proposed by Moshagen and Thielsch (2013), simplicity and craftsmanship were shown to be of particular importance when making design considerations for digital health interventions. Secondly, in an extension of Van der Heijden’s (2003) adapted TAM model, trust can be seen to key factor in mediating user’s behavioural intentions, suggesting that this needs to be strongly considered both in the design of visual elements of digital health interventions, as well as the content used within that framework. Finally, analysis of the factors within the TAM model showed that attitudes and behavioural intentions towards the intervention were very highly correlated, suggesting that, within this context, these two concepts may be virtually synonymous when considering influences of user engagement. The final study of this PhD

demonstrated the practical applications of this model by demonstrating increased levels of user engagement in a brief intervention designed using these principals in comparison to one designed without them. However, it must be noted that at this stage the above can only be viewed as a preliminary model, with further research required both to confirm its validity and develop more detailed guidelines as to how it can be meaningfully applied in the future development of digital health interventions.

This research therefore applied an established model to a new clinical context, helping to further understand how individuals perceive and consider engaging with clinical interventions at first contact and the role that visual aesthetics plays in this process as well as highlighting some of the more unique considerations that must be made in this context. By exploring differences in responses between individuals with eating disorders and the general population, the research also contributed to the literature by exploring possible variations in the ways that people with different conditions may perceive and engage with digital health interventions. With the conclusion that, at present, the evidence suggests that design guidelines targeting the general population can be meaningfully applied to individuals with eating disorders. This then helps to demonstrate the importance of visual design in the development of effective and engaging digital health tools, as well as starting to pick apart specific elements that play a key role when considering digital health intervention amongst different populations.

As such, this research makes the following recommendations:

- Brief motivational interventions represent a viable approach to improving motivation in individuals with eating disorders early in the treatment pathway. However their use in co-ordination with more established interventions, such as CBT, needs to be carefully considered.
- Whilst an online motivational intervention such as MotivATE may present a viable and acceptable approach to promoting treatment engagement amongst individuals with eating disorders, issues with lack of uptake and engagement need to be resolved before it can be fully established whether or not such an intervention is effective.

- Though individuals with eating disorders do appear to support the role of digital health interventions in addressing current limitations with treatment and support, negative attitudes and concerns about the way in which these interventions are delivered need to be addressed by developers.
- Aesthetic design plays a key role in improving both attitudes and engagement with digital health interventions, and should be considered by researchers from the early stages of intervention development. In particular it is suggested the following design points be carefully considered:
  - Simplicity: Interventions should be developed with consideration of the unity, homogeneity, clarity, orderliness and balance of the design. This can be achieved by optimising, or reducing, the number of elements on screen at any one time as well as by aligning points to ensure clear presentation (Ngo & Byrne, 2001).
  - Craftsmanship: Consideration must be given to the skilful and coherent integration of all relevant design dimensions in relation to up-to-date design principals. These principals will, by their very nature, change over time. As such designers should seek to familiarise themselves with up-to-date principals at the start of the development process. In regards to developing interventions for eating disorders, design principals developed with the general public in mind can be meaningfully applied.
  - Trust: Fostering trust plays a particularly key role in promoting engagement with health interventions. In a digital context this can be meaningfully achieved through the use of well placed and appropriate logos, a well crafted design, as outlined above, and careful consideration of the wording and placement of content.

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# Appendices

## Appendix 1: MotivATE Screenshots

### Front Page


register here. If you would like to know more before registering, please see our [Frequently Asked Questions.](#) If you have already registered, click **next** to log on'. The right column contains a white box with the text: 'MotivATE is your **free online resource** to help you feel ready for your first appointment at an eating disorder service:' followed by a bulleted list: '• Read stories about others' experiences', '• Take part in MotivATE quizzes and other activities', '• Get personal advice and information'. Below this is another white box with a bulleted list: '• You may be **worried** about an eating disorder', '• Perhaps you are a little scared about letting go and have **mixed feelings**', '• Maybe you don't feel that you have a problem with your eating'. Below the list is the text: 'Whatever situation you are in MotivATE will help you to prepare for your first appointment and feel more confident about making the next decisions.' At the bottom right of this box is a blue circular button with a white arrow pointing right and the text 'Next'. At the bottom of the page is a blue bar with three links: '[Help](#)', '[FAQs](#)', and '[About](#)'."/>

**motivATE**

Dorset HealthCare NHS Foundation Trust

BU Bournemouth University

**Welcome to MotivATE!**



New users will need to [register here.](#)

If you would like to know more before registering, please see our [Frequently Asked Questions.](#)

If you have already registered, click **next** to log on

MotivATE is your **free online resource** to help you feel ready for your first appointment at an eating disorder service:

- Read stories about others' experiences
- Take part in MotivATE quizzes and other activities
- Get personal advice and information

- You may be **worried** about an eating disorder
- Perhaps you are a little scared about letting go and have **mixed feelings**
- Maybe you don't feel that you have a problem with your eating

Whatever situation you are in MotivATE will help you to prepare for your first appointment and feel more confident about making the next decisions.

**Next**

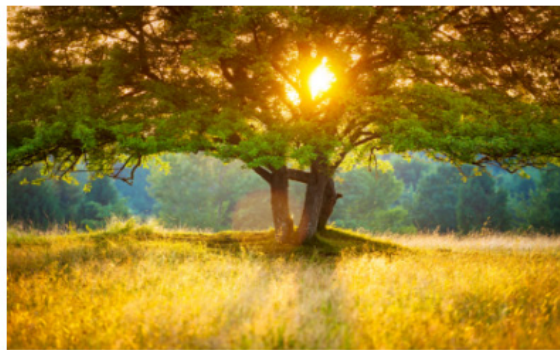
MotivATE has been designed by people with eating disorders, clinicians and researchers. It is based on real experiences and scientific evidence to make sure it is relevant and reliable. Click [here](#) to find out more.

[Help](#) [FAQs](#) [About](#)



### Which Module would you like to do?

It is recommended that you complete the modules in order because each module uses the information you gave in a previous session to give personal advice. Click on one to get started.



[Module 1 – What happens at the first appointment?](#)



[Module 2 - How motivated are you?](#)



[Module 3 – Arming yourself with information.](#)



[Module 4 – Preparing for your assessment.](#)



[Or click here if you would like to go to your profile page](#)

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### Welcome to Module 1

This session answers the question: "What happens at my assessment?"

"Sometimes I hate my eating disorder and just want to recover. Other times I can't see a way to live my life without it. I'm worried about how I will feel on the day of my assessment." (Lilly, 21)

- Maybe this sounds familiar. **You may find it difficult thinking about life without an eating disorder.** Perhaps you don't even know how to change or don't think you need to change at all.
- **These feelings are completely natural but can mean that you may be in two minds about going to your assessment.** MotivATE can help you to feel ready to discuss these feelings with a clinician.



If at any point you feel any distress or drop in mood, please click on the "Help" button at the bottom of every page. Also, don't forget that you can leave a module at any time or take a break.



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**What do you imagine will happen at your first appointment?**

Why not take the MotivATE assessment quiz to find out what you know (Correct answers will be given on the next page even if you choose not to respond to the questions now).



	True	False
They will assign me to a treatment plan without my input	<input type="radio"/>	<input type="radio"/>
There will be a doctor in a white coat	<input type="radio"/>	<input type="radio"/>
I will need to be weighed at my appointment	<input type="radio"/>	<input type="radio"/>
They will want me to eat lots of food	<input type="radio"/>	<input type="radio"/>
I will be forced to talk about things I am not comfortable talking about	<input type="radio"/>	<input type="radio"/>
They will think I am not ill enough and will not offer me anything	<input type="radio"/>	<input type="radio"/>
They will analyse my thoughts and dreams	<input type="radio"/>	<input type="radio"/>
There is a strong chance I will be hospitalised	<input type="radio"/>	<input type="radio"/>



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**What do you imagine will happen at your first appointment?**

All of the answers to this quiz are false  
Click the arrow next to each statement to learn more

**You said...**

	<a href="#">They will assign me to a treatment without my input</a>	<b>TRUE</b>	Not quite! You may wish to learn more by clicking on the question.
	<a href="#">There will be a doctor in a white coat</a>	<b>FALSE</b>	Well done! If you want, you can learn more by clicking the question.
	<a href="#">I will need to be weighed at my appointment</a>	<b>FALSE</b>	Well done! If you want, you can learn more by clicking the question.
	<a href="#">They will want me to eat lots of food</a>	<b>FALSE</b>	Well done! If you want, you can learn more by clicking the question.
	<a href="#">I will be forced to talk about things I am not comfortable talking about</a>	<b>FALSE</b>	Well done! If you want, you can learn more by clicking the question.
	<a href="#">They will think I am not ill enough and will not offer me anything</a>	<b>TRUE</b>	Not quite! You may wish to learn more by clicking on the question.
	<a href="#">They will analyse my thoughts and dreams</a>	<b>FALSE</b>	Well done! If you want, you can learn more by clicking the question.
	<a href="#">There is a strong chance I will be hospitalised</a>	<b>TRUE</b>	Not quite! You may wish to learn more by clicking on the question.

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Questions for your assessment

Do you still have questions?

You may want to make a note of these questions now so you can have them ready to ask at your assessment. These questions will be saved on your profile page for you to come back to later.

You may want to look at your questions again within the next week as you might want to add to them.  
Would you like MotivAte to email your questions to you?      Yes       No



Print My Questions



[Help](#)

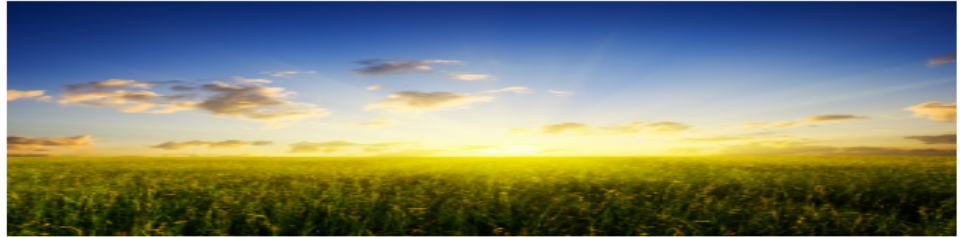
[FAQs](#)

[About](#)

Module End (similar page is shown at end of all modules)



Congratulations on finishing your first module!



- Any questions that you have written are now stored on your personal profile page.
- You can go to your profile page any time to add any other questions you have.
- You can re-view module 1 any time by re-visiting the module selection page. Module 2 is also ready to start whenever you like.

Where would you like to go next?

Profile Page

Next Module

Module Selection

Log out



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### Your Motivations

Below are some things that other people have said about how they feel before their assessment.

To get started, please choose the option that best fits with how you feel.

I'm not sure I'm ready or able to change my eating disorder	<input type="radio"/>
I have tried to change my eating disorder before but am struggling	<input type="radio"/>
I feel ready to start making changes in the next month or so	<input type="radio"/>
I don't want to change my eating disorder	<input type="radio"/>
My friends/family want me to change but I don't even think I have an eating problem	<input type="radio"/>
I have been successfully working towards recovery over the last 6 months	<input type="radio"/>



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What Stage am I in?

The responses you gave suggest that you may be in a preparation stage of change. You are making plans to change but may need a little bit of guidance to help you feel confident and ready to do this as your previous attempts to recover were not successful.

Being referred to the eating disorder service is an excellent step to help you reach your goals. Your assessment appointment will allow you to talk through the changes that you want to make.

Alice's story

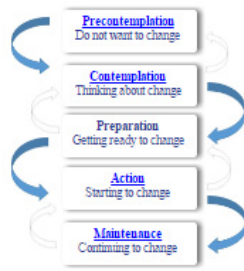
*"I knew what my eating disorder was doing to me, and I hated it. I wanted to be me again, to take back control. It's funny, this whole thing started because it gave me control over my life, and before I knew it, it had done the opposite, and taken everything away from me.*

*All I kept thinking was that I wanted it gone, to stop it having such a hold on me. There was no doubt in my mind, I wanted to change. But when it came to 'getting better', I just didn't know where to start. I didn't know how I could beat this, what I should be aiming for. I started off small, I started looking at websites for information to see how other people have recovered, and how I could begin to get better.*

*I began to set myself little goals - nothing huge - making body steps. For my first goal I told someone that I was going to get better. I told my best friend, and he promised to support me and help me with anything I needed. My second goal was to make an appointment to see my doctor, which then led to my referral. My current goal is to arm myself with as much information as I can so I'm ready for my first appointment in 2 weeks' time. I'm preparing for this fight, and I'm going to beat it."*

The Stages of Change Diagram

- The diagram below highlights what the preparation stage may mean.
- The preparation stage is the third stage in the cycle. People are said to be in this stage if they are getting ready to change.
- The diagram is designed as a spiral because you can enter at any point and can move forwards and backwards through the stages.
- You can click on any of the other stages in the diagram to learn more about them.





### What Stage am I in?

Based on what you have learnt about the stages of change diagram where do you think you fit?

- I do not want to change (precontemplation)
- I am thinking about change (contemplation)
- I am getting ready to change (preparation)
- I am starting to change (action)
- I am not sure



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### The Preparation Stage

You have said that you are in the preparation stage. You have made a commitment to change which is fantastic! Your assessment will really help you to use this motivation to take the next steps towards change.

In module 3 you will get the chance to think more about your motivations to change so you can be ready to discuss them with your clinician.

In module 3 you will get the chance to think more about your motivations to change so you can be ready to discuss them with your clinician.



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Welcome to Module 3!

Thinking about your eating disorder

- Some people say that their eating disorder plays a role for them. Sometimes this role may be positive or negative or sometimes both at the same time.
- You may not have thought about your own eating in this way before.
- Thinking about this could help you feel ready to discuss what is important to you or what you want to change. This will help you to answer some of the questions you may get asked at your assessment.

What roles do others say their eating disorder plays? Watch the videos and see if any of the stories sound like you.

*Sarah describes how her eating disorder played the role of a coping mechanism. She later found healthier coping mechanisms through her eating disorder service.*





Thinking about your eating disorder assessment

- Your eating disorder does not have to control your life and your assessment is the first step to find ways of gaining control of your life again. Your therapist will understand how important having control over your life is. They will not aim to take control from you but will work with you to come up with a treatment plan together. You may want to tell your therapist about any concerns you have about control at your assessment appointment.
- If you think your eating disorder helps you to cope you may also be worried about attending your assessment and being told to stop your behaviours. Mentioning this worry to your clinician will mean that they will work with you to find healthier ways to cope.
- The thought of going to your assessment may be making you feel worried and stressed. These difficult emotions may cause you to turn to your eating problem to cope. Naturally, this may mean you have mixed feelings about going.
- Remember, although your eating disorder may help you to cope in the short-term with this feeling it is not a long-term solution.



You may feel like you want to start working on alternative ways to cope while you wait for your assessment.

[Click here for more information now.](#)



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## Module 3 Minnesota Study Information



### Thinking about your eating disorder: The Minnesota Starvation Study

The Minnesota Starvation Study is a brilliant example of how health, mood, and relationships are affected by eating. This classic study was carried out by Ancel Keys in the 1940s on 36 healthy volunteers. All of the volunteers were white males, with ages ranging from 22 to 33 years old, and conscientious objectors. During the study the volunteers had to eat half of their usual calories for 24 weeks. The results of the study found that:

- Volunteers experienced exhaustion, dizziness, hair loss, muscle wasting, and a loss of concentration. They had no energy to do their normal activities.
- They became obsessed with food and eating. Some spent most of the day thinking about how they would spend their time eating with the food they were allowed. Others hoarded food and binged because they were so hungry.
- Volunteers reported strong depression, irritability and mood swings. Some self-harmed.
- The volunteers became progressively more withdrawn and isolated through out the experiment. They cut themselves off from others and removed themselves from group activities.
- Those who remained socially active reported that their relationships became strained.
- Volunteers reported feeling fat but did not worry about weight before the experiment.

**Ask yourself**

Do you have any worries about your health? You may find it useful to take note of any health problems you have so you can discuss these at assessment.

Would you like Motiv:ATE to email your response to you?    Yes     No

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## Module 3 Obsessional Thoughts Exercise

## Obsessional Thoughts and Eating



Studies show that people with eating disorders show more traits of an obsessive-compulsive personality than others. This means they may be more likely to:

- obsess about certain aspects of their life (e.g. food/weight)
- need strict rules and structure
- place higher importance on the need for control
- and have a higher need for perfection



People with higher traits of perfection may see things in black and white which can be unhelpful. You may find yourself thinking in terms of success vs. failure without anything in between. This may spill into other aspects of your eating disorder (fat or thin, good or bad foods, eat nothing or eat everything).

These thinking styles can be unhelpful. Below are some examples of common all-or-nothing thoughts that may make you think twice about changing (an unhelpful thought).

Thinking through some of these unhelpful thoughts and replacing them with motivating thoughts may help you feel more confident on the day of your assessment.

**Unhelpful thought 1:** My therapist will think that I'm not ill enough.

**MotivATing thought 1:** You have been referred to an eating disorder service. This means that you, your family or your doctor think an assessment will be a good idea. Not feeling ill enough (or good enough) is an example of black and white thinking and may be related to low self-esteem, which is common in people with an eating disorder. Your therapist can help you to address these thoughts.

**Unhelpful thought 2:** Going to the assessment and giving up my eating rules will be seen as a failure! I'm worried about giving up my rules.

**MotivATing thought 2:** Nobody else would see this as a failure! Think of all the other achievements you could work towards if you weren't thinking about food all the time. Giving up the structure of rules may be difficult at first but with the support of your therapist you can see how freeing it is to focus on other aspects of your life!

**Unhelpful thought 3:** I need to be the thinnest that I can be. The eating disorder service will make me fat.

**MotivATing thought 3:** This is a classic example of black and white thinking. It is not realistic for 3 reasons:  
 1) the service will not make you do anything  
 2) there are many shapes and sizes in between fat and thin  
 3) it is impossible to be the thinnest person and also be healthy

**Unhelpful thought 4:** I'm never going to get better so what's the point in trying?

**MotivATing thought 4:** You may have previously tried to improve your eating behaviour by yourself and not been successful but that doesn't mean it's always going to be that way. There are so many different treatments out there for you to try and your therapist will help support you along the way and help work out a plan which will work best for you.

Ask yourself

- Do you find yourself thinking in all-or-nothing terms?
- Do you expect perfection?
- Do you worry too much about failing?
- Do you have lots of strict rules?

Try writing your own unhelpful and motivATing thoughts in the boxes to the right. These will be saved to your profile.

Unhelpful thought:

MotivATing thought:



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### The pros and cons of eating disorders

#### Pro and Con Table

- You can use the table below to write down as many pros and cons that you have about not changing and changing your eating disorder.
- Have a good think about all the different areas where your eating disorder is a problem as well as all of the ways you may find it helpful.
- For example, in the Cons/Not changing box you can write down the negative reasons of not changing.

[Click here for an example pros and cons table](#)

	Pros	Cons
Not Changing		
Changing		



Welcome to module 4 and well done for sticking with MotivATE!

So far you have:

1. Learnt about the assessment appointment. Knowing what to expect can build your confidence. **Being prepared with a list of your own questions can help you to feel some control over this first consultation.**
2. Learnt about motivations to change and recognised that you may be in the preparation stage of change. With the support of the clinician at your assessment you can plan together how you can move through the stages.
3. Armed yourself with information about eating problems.



By now you are hopefully feeling more confident about your upcoming appointment. This next module aims to boost your confidence even further by:

- Giving you more assessment stories from others (including a story from an assessment clinician).
- Adding to your list of assessment questions
- Making plans for your assessment.



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### Mary's Story



"I was first referred to an eating disorder service 12 months ago. I'd gone to my GP because my family were worried and he had made the referral.

As the appointment got closer, though, I just couldn't force myself to go. I didn't feel ready to give up what I was doing and couldn't face my assessment.

Because I just didn't show up it meant I was back to square one. And 6 months down the line I could tell I was now struggling. I had no control over what I was doing and felt so depressed. I felt like I was only living through my eating disorder rather than living a full life.

I needed to go back to my GP to get another referral as by not turning up to my previous appointment I was now out of the system. This meant I had to wait for my new appointment.

I felt a little more motivated to attend my assessment but my eating disorder was now even more a part of me. I am still making changes to my eating and sometimes it feels like slow progress. But I am getting there.

I honestly believe that if I'd made better use of my first appointment the changes would be a little easier.

I now know that the clinician isn't just going to try and take away the eating disorder. They will work closely with you to help you make the changes gradually and in your own time.

I can say that I am now starting to live a full life instead of the half-life I had with my eating disorder."



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### A clinician's thoughts on the assessment appointment



Hello my name is Ciarán and I work in an Eating Disorders Service offering assessment and treatment for people affected by eating disorders.

Most people are referred to our service by their GP, another professional and a few self refer.

I am aware that people can be nervous about their assessment and can have mixed feelings about being there as this is a common feature of those who come for assessment.

Therefore to help with knowing what is likely to happen at your assessment I have described below the major parts which you are likely to experience.



The clinician is trying to understand why you have come to see them. To help with this they will ask questions about your problem but this does not mean you have to answer every question and if you do not want to, then that is ok. **If you want to you can bring another person with you** and the clinician will only talk to them with your permission.

The assessment will cover:

- **Your eating behaviours and thoughts and how these affect you**, those closest to you, as well as all areas of your life such as work, education, hobbies and interests.
- **The history of the problem with food**
- **Any other areas that you think are relevant to how things are in your life** (for example low mood or anxious feelings).
- **The possible areas of risks to you**. These are areas where your health (physical and psychological) may be damaged by the impact of the behaviours/thoughts that you have. Assessing the risk is important to ensure your safety and that a full care plan can be agreed with you to reduce risk as much as possible.

You may be asked to complete questionnaires before the assessment. These may assess eating disorder behaviours and thoughts, or low mood but this depends on the service. If you have any questions about these you can ask the clinician in the assessment.

Indeed, at the assessment, I would encourage you to ask any questions you may have. You may have questions about:

- Your eating disorder
- The service
- Likely treatments
- Any other areas you want to cover

This will help build the best picture of what the problem is and guide towards what needs to be done to assist you in recovering. I would also encourage you to contact the Service before your assessment with questions or worries you may have.

I would also encourage you to use Motiv-ATE to help prepare for the assessment and challenge any fears you may have about what might happen.

**Overall the aim of the assessment is to understand what has brought you to the Service, what you want to do next and how the Service can help you to achieve what you want.**

**We know it takes courage to tackle eating disorders and with help you can overcome the impacts of your eating disorder and live a healthier more rewarding life.**



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### My assessment questions - revisited

In Module 1 you learnt about what to expect at your assessment appointment. Any questions that you had for your therapist has been added to your profile page and re-shown below.

Example Example Example Example Example Example  
Example Example Example Example

Do you have any other questions to add to your list?

**Other people have said that taking their questions to their assessment made them feel more confident.** You may want to e-mail your questions to yourself or print them out.

Would you like MotivATE to email your questions to you?      Yes       No



Print



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**Feeling Prepared**

You may find it useful to fill in the following check-list so you are all set for your appointment. This information will be saved to your profile where it can be printed off.

What is the time and date of your session?

What is the address of the eating disorder service?

How will you get there?

Have you thought of someone to talk to after the appointment/someone to take with you for support? If so, who?

Have you printed or e-mailed any of your assessment questions so you will have them with you?  
Yes  No

Have you printed off any other information from MotivATE that you want to take with you to the assessment?  
Yes  No

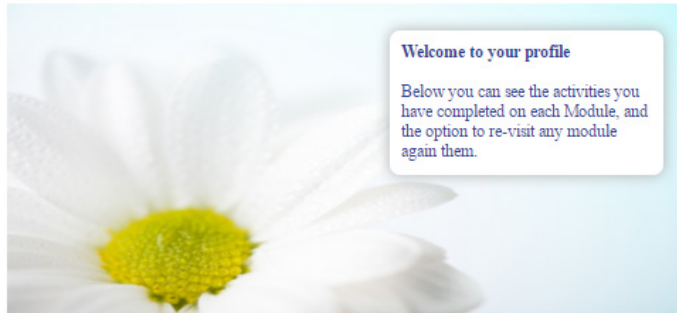
Are there any other obstacles you can think of that might prevent you attending your assessment (e.g. child care, bus-fares, other commitments)? If so you may find it useful to list them here.

How might these obstacles to attending your assessment appointment be overcome?





### My Profile Page



#### Welcome to your profile

Below you can see the activities you have completed on each Module, and the option to re-visit any module again them.

#### [Module 1: What happens at assessment](#)

In this module you may have written some questions for your assessment. You can access these [here](#).

#### [Module 2: How motivated are you?](#)

This module looks at your stages of change.

You said you may be in the preparation stage

#### [Module 3: Arming yourself with information](#)

In this module you may have completed activities to help you think about your eating. To see your work, click [here](#).

#### [Module 4: Preparing for your assessment](#)

To view your assessment checklist again, click [here](#).

[Or click here for a copy of all your assessment questions.](#)

**Your Questions for Assessment**[Print](#)

**These are all of the questions that you wrote in modules 1 and 4.**

Example Example Example Example Example Example Example Example Example Example

## Appendix 2: MotivATE Experience Interview Schedule

Thank you for coming. This is an interview regarding your thoughts and feelings about attending your assessment appointment at Kimmeridge Court as well as your experiences of the MotivATE program. Before we begin I would just like to confirm that having read the participant information sheet, you consent to take part in this interview and that it can be recorded for the purpose of transcription.

1. Can you describe to me what your reaction was when you received your invitation to be assessed at Kimmeridge Court.

---What were your feelings/thoughts?---

---Regarding changing/recovering from your eating disorder?---

---Regarding attending an eating disorder service?---

---Did you have any worries?---

--- What were your thoughts about attending the initial assessment appointment?---

2. Is there anything else you wish to add about your experiences of being invited to attend an assessment?

3. Prior to your assessment you received a letter inviting you to use the MotivATE website. Can you tell me what factors led to you registering to use MotivATE?

*((If the participant indicates that they did not use MotivATE jump to question 6))*

4. Please describe your experiences of using the website.

What are your general impressions of the website?

What are your thoughts on the four MotivATE modules?

---What about module 1/2/3/4?---

What are your thoughts on using the website?

What do you think of the look and feel of the website?

5. What are your opinions about the content of the MotivATE website?

Were there any aspects of the website you particularly found useful?

Was there anything you didn't like about the website?

Do you have any suggestions for improvement?

6. What factors led to you not using the MotivATE website?

7. Did MotivATE play any role in your decision making regarding the assessment and if so can you describe in what ways?

---Were there any particular parts of MotivATE that impacted on your thinking and decision making?---

---What impact do you feel this had?---

*((If the participant indicates that they decided to attend assessment continue to question 8. If the indicate that they decided not to attend assessment jump to question 9))*

8. Did you use anything from MotivATE in your assessment?

9. If you did not attend what do you think the reason for this was?

---Was there any particular thought or feeling that impacted your decision not to attend? ---

---Were there any practical reasons that contributed to you not attending?---

---Did any elements of MotivATE contribute to your decision making or thoughts?---

10. Is there anything else you wish to add about your experiences of attending/not attending assessment?

11. Is there anything else you wish to add about your experiences of using/not using MotivATE?

Thank you very much for participating. Have you got any questions or concerns that you would like me to answer before we finish.

I am now switching off the tape recorder and the interview is officially over.

### **Appendix 3: Focus Group Question Schedule**

Hello everyone, thank you for taking the time to participate in this online discussion exploring your perceptions of support.

During this discussion my role will be to ask questions and facilitate conversation. Please keep in mind that there are no “right” or “wrong” answers to any of the questions asked. The purpose is to stimulate conversation and hear the opinions of everyone. I hope you will be comfortable speaking honestly and sharing your thoughts. This discussion will continue for one month and will involve four stages. Firstly, we will be discussing your experiences and perceptions of support, both offline and online. Secondly you will be shown a screenshot of the front page of a new website intended to support people with eating disorders, with discussion about your thoughts and feedback on it. You will then be given the opportunity to use this new website for one week, with an opportunity to make any comments or given any feedback you might have. Finally, we will finish with a discussion of your experience of using the program and any final feedback you might have.

Please note that all posts you make in this forum as part of the focus group discussion will be recorded to ensure we adequately capture your ideas during the conversation. However, the comments from the focus group will remain confidential and your name will not be attached to any comments you make. You can read the full information sheet about this study that you were given before in the post above. Do you have any questions before we begin?

Let’s start with a quick round of introductions. Could everyone please let the rest of the group know how you would prefer to be addressed, as well as perhaps something interesting about yourself if you feel comfortable to do so. Let me start us off.

Hello everyone, I'm James and I'll be leading this discussion and acting as a moderator throughout. This means I have already put up all the questions you will see in the following weeks, and I may also get involved from time to time to ask follow up questions or clarify things if needed.

As a bit about me I am a huge animal lover, in particular my little lurcher Penny, who likes nothing more than chasing her ball up on the downs and then curling up on the sofa all day.

### *Phase 1*

#### Opening question

Thank you, now that we have all been introduced, can you discuss your experiences so far of seeking support for your eating disorder?

Can you tell me about any experiences with seeking support in offline situations (e.g. health professional, support groups, friends/family, any other types of support, etc.)

Can you tell us about some of the things you may have found helpful in accessing offline support?

Thank you for these great answers, is anyone able to expand on what impact you feel these experiences had on you?

What about anything unhelpful?

Again these are some great responses, is anyone able to expand on what impact you feel these experiences had on you?

Do you have any suggestions that might help people access this support in future?

Some excellent suggestions so far, this sort of thing will really help us try and improve services in future so if anyone else has anything they would like to add please do.

## Online support

So far we've been talking about experiences of accessing offline methods of support, what are your opinions of accessing online support?

If you were to think about getting support on the internet, what feelings does this produce?

Can you tell me about any experiences with seeking support in online situations (e.g. forums, email, online information, purpose built online tools etc.)

When did you access this support (before treatment, during treatment, after treatment)?

What led you to seek support online?

For those that haven't sought support online, why do you feel that is?

How would you feel about being offered support online?

Is there anything about support being online that you think would make it easier or harder to use?

Is there anything about online support you feel would be particularly different to offline (face to face) support?

If you were offered access to a website designed to support your recovery from your eating disorder, what would you expect from it?

What do you think would influence how likely you were to use it?

## *Phase 2*

Thank you everyone for your great contributions so far. Last week the focus was on your previous experiences of support, so this week I would like to introduce you to something new. We call it MotivATE, and it's a new website we have developed that is intended to support people with eating disorders as they are preparing to attend their



first assessment appointment at an eating disorders service. Firstly I would just like to get an idea of your initial impressions from the image of the front page below, and you will have a chance to use the full website next week.

If you click on the 'Full Size' button below the image it will open in a new window so that you can refer to it whilst answering the questions if you would like to.

What are your first impressions of MotivATE?

What impact, if any, has seeing MotivATE had on you?

Given any previous thoughts or expectations you had about online support, how does MotivATE compare?

What are your thoughts on the look and feel of MotivATE?

Are there any ways this might change how you use the website?

How, if at all, have your feelings about seeking support online changed now that you have seen MotivATE?

What do you think has lead to these changes?

If seeing MotivATE hasn't influenced you at all, can you explain why you think that might be?

### *Phase 3*

This week you will have the chance to use MotivATE in your own time.

MotivATE has been designed as a pre-treatment tool for people with eating disorders to use in preparation for their first assessment appointment with an eating disorders service, but we hope it will be of interest to all of you and would greatly appreciate your feedback next week so that we can continue to improve it.

You can access MotivATE by going to :

<https://www.lifeguideonline.org/player/play/MotivATEDemo>

When registering please use the username you choose for these discussions. We won't be looking at your usage or any answers you give in MotivATE, this is simply so we can see who has and hasn't accessed MotivATE.

There will be no specific questions for this week, but please do feel free to leave comments, questions or discussion about MotivATE below.

#### *Phase 4*

Having now had a chance to use MotivATE, please describe your experiences of it.

How do you feel having used MotivATE?

Can you describe whether you felt MotivATE was engaging?

In what ways could it be more engaging?

Can you describe any elements of MotivATE that you feel made it less engaging?

How does this website compare to any other online support you have come across?

How, if at all, have your feelings about seeking support online changed now that you have used MotivATE?

What do you think has lead to these changes?

If using MotivATE hasn't influenced you at all, can you explain why you think that might be?

If MotivATE were offered to you before you attended an eating disorders service for the first time, how might it affect your decision to attend?

## **Appendix 4: Aesthetic Stimuli Pilot Tests**

### **Pilot Study One**

#### *Participants*

Twenty participants from the general population, the minimum number of participants recommended when using the VisAWI by Thielsch and Moshagen (2015), were recruited online using posts on social media and research related forums.

#### *Ethics*

Ethical approval was given by Bournemouth University (ID: 12677).

#### *Independent Variable*

The ten MotivATE front page designs based on the facets of the VisAWI that are outlined above.

#### *Dependent Variable*

Aesthetics scores as measured by the VisAWI.

#### *Measure*

The VisAWI (Moshagen & Thielsch, 2010) is a validated 18 item measure of website aesthetics breaks the concept down into four facets identified above. This model has been successfully confirmed for two independent samples and thus cross-validated (Thielsch & Moshagen, 2015). The items of the VisAWI for each facet are outlined below, with reverse scored items highlighted with an (r) mark. Each item is scored on a 7 point likert scale anchored from strongly agree to strongly disagree.

### Simplicity

(r) The layout appears too dense.

The layout is easy to grasp.

The layout appears well structured.

(r) The site appears patchy.

Everything goes together on this site.

### Diversity

(r) The design is uninteresting.

The layout is inventive.

(r) The design appears uninspired.

The layout appears dynamic.

The layout is pleasantly varied.

### Colourfulness

The colour composition is attractive.

(r) The colours do not match.

(r) The choice of colours is botched.

The colours are appealing.

### Craftsmanship

The layout appears professionally designed.

(r) The layout is not up to date.

The site is designed with care.

(r) The design of the site lacks a concept.

### *Procedure*

Online recruitment material contained a link directing participants to study. Upon accessing the questionnaire participants were presented with a participant information sheet followed by consent.



Once consent was given the participant was directed to the questionnaire which consisted of 10 pages, each of which showed a static image of the relevant front page design at the top with the 18 items of the VisAWI presented below. The order in which the designs were presented, as well as the order of the VisAWI items in each instance, were randomised in order to remove order effects.

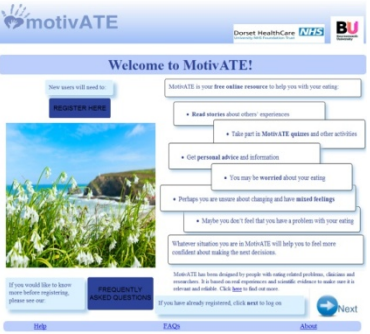



### *Analysis*

Descriptive statistics were generated for each design in order to compare mean scores for each of the facets of the VisAWI, with differences between facet scores for the positive and negative designs for each facet assessed using paired samples t-test. This has been chosen instead of a repeated measures ANOVA as only the difference in specific facet scores in each instance is of interest rather than the overall difference in scores between stimuli. This does however produce a multiplicity issue, as 25 analyses will be conducted, as such Bonferoni's adjustment has been made resulting in a critical p-value of 0.002 in order to achieve an overall alpha level of 0.05.

Results

Table 8.1: Table showing the score means and SDs of each VisAWI facet for each of the stimuli designs, as well as the difference and SE between the positive and negative designs for each facet.

<u>Image</u>	<u>Facet - Mean (SD)</u>	<u>Image</u>	<u>Facet - Mean (SD)</u>	<u>Difference (SE)</u>
<b>Base</b>	Simplicity: 4.53 (0.87)	<b>Full</b>	Simplicity: 5.00 (1.19)	0.47 (0.33)
	Diversity: 3.39 (1.11)		Diversity: 4.56 (1.34)	1.17 (0.36)
	Colour: 5.04 (1.06)		Colour: 5.53 (0.98)	0.49 (0.27)
	Craftsmanship: 3.6 (1.19)		Craftsmanship: 4.71 (1.46)	1.11 (0.35)
	<b>Total:</b> <b>4.14 (0.95)</b>		<b>Total:</b> <b>4.94 (1.15)</b>	<b>0.81 (0.31)</b>

<p><b>Simplicity Negative</b></p> 	<p><b>Simplicity:</b> 1.95 (0.89)</p> <p><b>Diversity:</b> 2.82 (1.28)</p> <p><b>Colour:</b> 3.98 (1.08)</p> <p><b>Craftsmanship:</b> 2.41 (1.17)</p> <p><b>Total:</b> 2.79 (0.97)</p>	<p><b>Simplicity Positive</b></p> 	<p><b>Simplicity:</b> 5.35 (0.88)</p> <p><b>Diversity:</b> 3.80 (1.09)</p> <p><b>Colour:</b> 5.53 (0.79)</p> <p><b>Craftsmanship:</b> 4.39 (1.12)</p> <p><b>Total:</b> 4.77 (0.78)</p>	<p><b>3.40 (0.25) **</b></p> <p>0.98 (0.36)</p> <p>1.55 (0.24) **</p> <p>1.98 (0.31) **</p> <p>1.98 (0.23) **</p>
<p><b>Diversity Negative</b></p> 	<p><b>Simplicity:</b> 3.80 (1.08)</p> <p><b>Diversity:</b> 2.24 (1.10)</p> <p><b>Colour:</b> 4.63 (0.99)</p> <p><b>Craftsmanship:</b> 2.86 (1.19)</p> <p><b>Total:</b> 3.38 (0.93)</p>	<p><b>Diversity Positive</b></p> 	<p><b>Simplicity:</b> 4.41 (1.24)</p> <p><b>Diversity:</b> 4.21 (1.50)</p> <p><b>Colour:</b> 5.11 (1.10)</p> <p><b>Craftsmanship:</b> 4.15 (1.39)</p> <p><b>Total:</b> 4.47 (1.13)</p>	<p>0.61 (0.27)</p> <p>1.97 (0.42) **</p> <p>0.49 (0.28)</p> <p>1.29 (0.28) **</p> <p>1.09 (0.26) **</p>

### Colour Negative



Simplicity:

3.18 (1.12)

Diversity:

2.79 (1.12)

Colour:

1.46 (0.67)

Craftsmanship:

2.43 (0.93)

Total:

2.46 (0.85)

### Colour Positive



Simplicity:

4.73 (1.22)

Diversity:

3.59 (1.30)

Colour:

5.35 (1.31)

Craftsmanship:

4.10 (1.26)

Total:

4.44 (1.14)

1.55 (0.39) \*\*

0.80 (0.30)

3.89 (0.34) \*\*

1.68 (0.28) \*\*

1.98 (0.27) \*\*

### Craftsmanship Negative



Simplicity:

2.52 (1.40)

Diversity:

2.78 (1.39)

Colour:

4.49 (1.00)

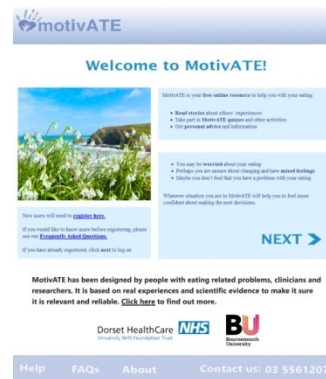
Craftsmanship:

2.21 (1.67)

Total:

3.00 (1.22)

### Craftsmanship Positive



Simplicity:

4.98 (0.57)

Diversity:

3.70 (1.03)

Colour:

5.26 (0.69)

Craftsmanship:

4.58 (1.08)

Total:

4.63 (0.70)

2.46 (0.28) \*\*

0.92 (0.27)

0.78 (0.21) \*

2.36 (0.41) \*\*

1.63 (0.24) \*\*



Note: \* $p < .002$ , \*\* $p < .001$

*The target facet for each of the stimuli is highlighted in bold.*

As can be seen from table 8.1 the results show highly significant differences between each of the negative and positive stimuli for each facet of the VisAWI on scores for their target facet. However similar differences can also be seen between most VisAWI facets for each of the stimuli pairs, with the noted exception of the measures between the base and full designs. It is also worth noting that whilst significant the mean difference between target facet scores for the Diversity and Craftsmanship pairs is markedly smaller than for the Simplicity and Colour pairings. This appears to be a result of lower scores for the positive designs.

### *Conclusions*

From this it can be concluded that whilst the current designs do appear to be successfully targeting the intended facets, improvements need to be considered for the positive stimuli, particularly those targeting the Diversity and Craftsmanship facets as well as the Full design, in order to produce designs that generate higher VisAWI scores.

It is of note that an apparent halo effect seems to be occurring with the designs, with changes targeting a single facet also impacting on scores for other areas, resulting in lower overall scores for negative designs and higher overall scores for positive designs. Whilst this is to be expected, and does not necessarily limit the use of these stimuli for the intended research, it does mean that the individual stimuli cannot be considered as separate representations of the individual facets they are intended to target.

### **Pilot Study Two**

Following the results of the initial pilot study alterations were made to the Diversity Positive, Craftsmanship Positive and Colour Positive designs. After detailed examination of the results it was decided that the Full design would be dropped from the study, as it did not provide any additional benefits to the study not already provided by the individually targeted positive stimuli. Instead this design was adapted

for use as the Craftsmanship Positive stimuli, as it had scored highest of any of the current stimuli for this facet.

### *Ethics*



Ethical approval was given by Bournemouth University (ID: 12826).



### *Methods*

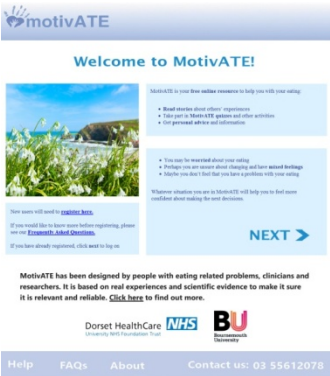

The second study replicated the methodology of the first, with the sole difference that in this instance only the adapted designs for the Diversity Positive, Craftsmanship Positive and Colour Positive stimuli were used. Ethical approval for the study was given by Bournemouth University.

## Results

Table 8.2: Table showing the score means and SDs of each VisAWI facet for the original and updated stimuli designs for Diversity Positive, Craftsmanship Positive and Colour Positive, as well as the difference and SE between them.

<u>Original Stimuli</u>		<u>Updated Stimuli</u>		
<u>Image</u>	<u>Facet - Mean (SD)</u>	<u>Image</u>	<u>Facet - Mean (SD)</u>	<u>Difference (SE)</u>
<b>Diversity Positive</b>	Simplicity:	<b>Diversity Positive</b>	Simplicity:	0.32 (0.37)
	4.41 (1.24)		4.73 (1.06)	
	<b>Diversity:</b>		<b>Diversity:</b>	<b>0.84 (0.44)</b>
	<b>4.21 (1.50)</b>		<b>5.05 (1.25)</b>	
	Colour:		Colour:	0.31 (0.29)
	5.11 (1.10)		5.43 (0.70)	
	Craftsmanship:		Craftsmanship:	0.30 (0.37)
	4.15 (1.39)		4.45 (0.87)	
	Total:		Total:	0.44 (0.32)
	4.47 (1.13)		4.91 (0.87)	

Colour Positive	Simplicity:	Colour Positive	Simplicity:	0.01 (0.36)
	4.73 (1.22)		4.74 (1.08)	
	Diversity:		Diversity:	0.52 (0.37)
	3.59 (1.30)		4.11 (1.32)	
	Colour:		Colour:	0.55 (0.32)
	5.35 (1.31)		5.90 (0.58)	
	Craftsmanship:		Craftsmanship:	0.13 (0.34)
	4.10 (1.26)		4.23(0.85)	
	Total:		Total:	0.30 (0.31)
	4.44 (1.14)		4.74 (0.76)	

Craftsmanship Positive	Simplicity:	Craftsmanship Positive	Simplicity:	-0.21 (0.29)
	4.98 (0.57)		4.77 (1.18)	
	Diversity:		Diversity:	0.93 (0.36)*
	3.70 (1.03)		4.63 (1.27)	
	Colour:		Colour:	0.28 (0.21)
	5.26 (0.69)		5.54 (0.66)	
	Craftsmanship:		Craftsmanship:	0.71 (0.37)
	4.58 (1.08)		5.29 (1.26)	
	Total:		Total:	0.43 (0.27)
	4.63 (0.70)		5.06 (0.97)	

Note: \* $p < .05$

*The target facet for each of the stimuli is highlighted in bold.*

As can be seen from table 8.2 the modifications made to the stimuli resulted in small but non-significant improvements to the target facets for each of the stimuli, though in each case a trend towards significance ( $p < .10$ ) was noted. The only significant change was observed for the diversity facet of the Craftsmanship Positive design. This is unsurprising due to the shift to using the design originally utilised for the Full design, which demonstrated higher scores on this facet during the first round of pilot testing.

### *Conclusions*

Whilst the improvements observed were not large enough to achieve significance the updates made to the stimuli were deemed to be sufficient. This is due to both the trend towards significance shown and the fact that the original stimuli already demonstrated significant differences over the negative stimuli for their target facets. As such the purpose of the alterations was simply to produce sufficient improvements in facets scores to elicit a wider range of scores in the final study, which the new stimuli have achieved.

## Appendix 5: Aesthetic Stimuli Screen Shots

### Base



The screenshot shows the MotivAte website interface. At the top left is the MotivAte logo, which consists of a stylized hand icon with rays emanating from it, followed by the word "motivAte" in a lowercase, sans-serif font. To the right of the logo are three logos: "Dorset HealthCare University NHS Foundation Trust", the "NHS" logo, and the "BU" logo for Bournemouth University. Below the header is a blue banner with the text "Welcome to MotivAte!". The main content area is divided into two columns. The left column features a photograph of a coastal landscape with white flowers in the foreground, a beach, and a cliff in the background. Below the photo is a light blue box containing registration instructions: "New users will need to [register here](#)." "If you would like to know more before registering, please see our [Frequently Asked Questions](#)." "If you have already registered, click [next](#) to log on". The right column contains text: "MotivAte is your free online resource to help you with your eating." followed by a bulleted list: "• Read stories about others' experiences", "• Take part in MotivAte quizzes and other activities", "• Get personal advice and information". Below this is another bulleted list: "• You may be worried about your eating", "• Perhaps you are unsure about changing and have mixed feelings", "• Maybe you don't feel that you have a problem with your eating". This is followed by the text: "Whatever situation you are in MotivAte will help you to feel more confident about making the next decisions." At the bottom right of the right column is a blue circular button with a white arrow pointing right and the word "Next" next to it. At the very bottom of the page is a blue navigation bar with three links: "Help", "FAQs", and "About".

**motivAte**

Dorset HealthCare  
University NHS Foundation Trust

NHS

BU  
Bournemouth University

**Welcome to MotivAte!**

MotivAte is your free online resource to help you with your eating.

- Read stories about others' experiences
- Take part in MotivAte quizzes and other activities
- Get personal advice and information

- You may be worried about your eating
- Perhaps you are unsure about changing and have mixed feelings
- Maybe you don't feel that you have a problem with your eating

Whatever situation you are in MotivAte will help you to feel more confident about making the next decisions.

New users will need to [register here](#).

If you would like to know more before registering, please see our [Frequently Asked Questions](#).

If you have already registered, click [next](#) to log on

[Next](#)

MotivAte has been designed by people with eating related problems, clinicians and researchers. It is based on real experiences and scientific evidence to make sure it is relevant and reliable. Click [here](#) to find out more.

[Help](#) [FAQs](#) [About](#)



**motivAte**

Dorset HealthCare NHS University of Bath Foundation Trust

**BU** University of Bath

## Welcome to MotivAte!

New users will need to:

**REGISTER HERE**

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If you would like to know more before registering, please see our:

**FREQUENTLY ASKED QUESTIONS**

If you have already registered, click [next](#) to log on

**Next**

[Help](#) [FAQs](#) [About](#)



Welcome to MotivATE!



MotivATE is your free online resource to help you with your eating:

- Read stories about others' experiences
- Take part in MotivATE quizzes and other activities
- Get personal advice and information
  
- You may be worried about your eating
- Perhaps you are unsure about changing and have mixed feelings
- Maybe you don't feel that you have a problem with your eating

Whatever situation you are in MotivATE will help you to feel more confident about making the next decisions.

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NEXT >

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**Welcome to MotivATE!**

MotivATE is your **free online resource** to help you with your eating:

Read stories about others' experiences, take part in MotivATE quizzes and other activities, get **personal advice** and information.



You may be **worried** about your eating. Perhaps you are unsure about changing and have **mixed feelings**. Maybe you don't feel that you have a problem with your eating.

Whatever situation you are in MotivATE will help you to feel more confident about making the next decisions.

New users will need to [register here](#).

If you would like to know more before registering, please see our [Frequently Asked Questions](#).

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## Welcome to MotivATE!



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If you have already registered, click [next](#) to log in.

MotivATE is your free online resource to help you with your eating:

- Read stories about others' experiences
- Take part in MotivATE quizzes and other activities
- Get personal advice and information

- You may be worried about your eating
- Perhaps you are unsure about changing and have **mixed feelings**
- Maybe you don't feel that you have a problem with your eating

Whatever situation you are in MotivATE will help you to feel more confident about making the next decisions.



MotivATE has been designed by people with eating related problems, clinicians and researchers. It is based on real experiences and scientific evidence to make sure it is relevant and reliable. Click [here](#) to find out more.

[Help](#)

[FAQs](#)

[About](#)

The screenshot shows the homepage of the MotivAte website. At the top left is the MotivAte logo, which consists of a stylized hand with rays emanating from it, followed by the word "motivATE" in a blue, lowercase, sans-serif font. To the right of the logo are the logos for Dorset HealthCare (University NHS Foundation Trust), NHS, and BU (Bournemouth University). Below the header is a blue banner with the text "Welcome to MotivAte!". The main content area is divided into two columns. The left column features a photograph of a coastal landscape with white flowers in the foreground, a blue sky, and a cliffside. Below the photo is a light blue box containing text: "New users will need to [register here.](#) If you would like to know more before registering, please see our [Frequently Asked Questions.](#) If you have already registered, click [next](#) to log on". The right column contains a white box with the heading "MotivAte is your free online resource to help you with your health:" followed by a bulleted list: "• Read stories about others' experiences", "• Take part in MotivAte quizzes and other activities", and "• Get personal advice and information". Below this is another white box with a bulleted list: "• You may be worried about your health", "• Perhaps you are unsure about changing and have mixed feelings", and "• Maybe you aren't sure that you have a problem with your health". This is followed by the text "Whatever situation you are in MotivAte will help you to feel more confident about making the next decisions." and a blue circular button with a white right-pointing arrow and the word "Next" next to it. At the bottom of the page is a blue navigation bar with three links: "Help", "FAQs", and "About".

**motivATE**

Dorset HealthCare **NHS** **BU**  
University NHS Foundation Trust Bournemouth University

**Welcome to MotivAte!**

MotivAte is your free online resource to help you with your health:

- Read stories about others' experiences
- Take part in MotivAte quizzes and other activities
- Get personal advice and information

You may be worried about your health

Perhaps you are unsure about changing and have mixed feelings

Maybe you aren't sure that you have a problem with your health

Whatever situation you are in MotivAte will help you to feel more confident about making the next decisions.

New users will need to [register here.](#)

If you would like to know more before registering, please see our [Frequently Asked Questions.](#)

If you have already registered, click [next](#) to log on

[Next](#)

MotivAte has been designed by people with health problems, clinicians and researchers. It is based on real experiences and scientific evidence to make sure it is relevant and reliable. Click [here](#) to find out more.

[Help](#) [FAQs](#) [About](#)

The screenshot shows the MotivAte website interface. At the top left is the MotivAte logo, which consists of a stylized hand holding a sun-like shape above the word 'motivAte'. To the right of the logo are the logos for 'Dorset HealthCare University NHS Foundation Trust' and 'NHS'. Below these is the 'BU University' logo. A blue banner across the top contains the text 'Welcome to MotivAte!'. The main content area is divided into several sections. On the left is a photograph of a coastal landscape with green grass in the foreground, a white building, and a blue sky. To the right of the photo is a text box that reads: 'MotivAte is your free online resource to help you with your eating:' followed by a bulleted list: '• Read stories about others' experiences', '• Take part in MotivAte quizzes and other activities', and '• Get personal advice and information'. Below the photo is a blue button with a white arrow pointing right and the word 'Next'. To the right of the 'Next' button is another text box with a bulleted list: '• You may be worried about your eating', '• Perhaps you are unsure about changing and have mixed feelings', and '• Maybe you don't feel that you have a problem with your eating'. Below this list is a paragraph: 'Whatever situation you are in MotivAte will help you to feel more confident about making the next decisions.' At the bottom of the main content area is a light blue box containing the text: 'New users will need to [register here](#).', 'If you would like to know more before registering, please see our [Frequently Asked Questions](#).', and 'If you have already registered, click [next](#) to log on'. Below this box is a paragraph: 'MotivAte has been designed by people with eating related problems, clinicians and researchers. It is based on real experiences and scientific evidence to make sure it is relevant and reliable. Click [here](#) to find out more.' At the very bottom of the page is a blue navigation bar with three links: 'Help', 'FAQs', and 'About'.

**motivAte**

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**NEXT** ➔

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## **Appendix 6: Think Aloud Pilot Study**

### *Participants*

Five participants were recruited from the general population. This figure is based in previous research that suggests that five participants will on average identify 80-85% of issues in a think aloud study, with rapidly diminishing returns as recruitment exceeds this number (Virzi, 1992; Nielsen, 2000).

### *Ethics*

Ethical approval was provided by Bournemouth University (ID: 13382)

Consent was collected digitally at the start of the questionnaire.

### *Procedure*

Participants were shown the questionnaire on a computer in a suitable environment by the researcher, at the start of which they were presented with the participants information sheet. Once the participant was happy to proceed they were asked by the researcher to complete the questionnaire whilst verbalising any thoughts that they had, be they positive or negative, during the process. The researcher was present in order to provide verbal prompts, take notes of participant comments and ask any follow up questions regarding their experience of the questionnaire. All think aloud sessions were recorded and transcribed to ensure all key points raised by the participant were noted. Once the questionnaire was completed the recording was stopped and the participant verbally debriefed.

## *Analysis*

Notes taken during the think aloud process, as well as additional notes made during review of the recordings, were used to assess any potential issues with the questionnaire, such as highlighting questions that were confusing or unclear.

## *Results*

Review of the recordings showed that all participants found the question *'This website adds value'* to be confusing, as can be seen from comments such as;

PP1 - *"I don't think I quite understand that question. Adds value to what?"*

PP3 - *"I find that this site adds value. To what?"*

As a result this question was removed from the final questionnaire in order to ensure that all included questions were suitably clear to participants.

Participants also noted some difficulty in answering the questions *'How many hours per week do you spend on a computer?'*, due to the need to try and calculate their average usage time.

PP2 - *"This is hard to judge."*

PP4 - *"Right, this gets me thinking. I don't want to have to do the maths. I think I'm going to have to work this out on my fingers."*

In order to remedy this an indication of the average daily usage time was added to each answer.

Finally the researcher noted that, amongst the general population, the inclusion of a question relating to eating disorders had the possibility of impacting participants' perceptions of the website and how they might relate to it. In order to attempt to control for this the introductory text was made clearer, in order to better frame each condition in the correct context, and two additional questions relating to general health have been included in an attempt to mask the target question relating to eating disorders. These two questions are as follows:

- *'Do you currently have any issues with your health?'*
- *'Have you ever had any issues with your health?'*

Responses to these questions will not be included as part of the analysis, but are included to reduce the possibility that the inclusion of eating related questions might prime participants to perceiving the intervention from that perspective.

## **Appendix 7: Aesthetics Study Questionnaire**

1. Do you currently have any issues with your health?

*Yes/ No*

2. Have you ever had any issues with your health?

*Yes/ No*

3. Have you ever used the internet for health related advice?

*Yes/ No*

4. Have you ever used health related online self-help?

*Yes/ No*

5. Do you currently suffer with an eating disorder?

*Yes/ No*

---Asked only if participant answers 'no' to question five---

6. Have you ever suffered in the past with an eating disorder?

*Yes/ No*

---Asked only if the participant answers 'yes' to question five or six---

7. Have you ever attended an eating disorder service?

*Yes/ No*

---Asked only if the participant answers 'yes' to question five or six---

8. How would you describe your experience of an eating disorder (e.g Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder etc.)?

*((Free entry box))*

9. What is your age?

*18 - 24 / 25 - 34 / 35 - 44 / 45 - 54 / 55 - 64 / 65 - 74 / 75 - 84 / 85 or older*

10. What is your gender?

*Male/ Female/ Other*

11. Do you currently live in the UK?

*Yes/ No*

12. Is English your first language?

*Yes/ No*

13. How often do you use a computer?

*Once a month or less/ Once a week/ Several times a week/ Every day/ Several times a day*

14. How many hours per week do you spend on a computer?

*0 to 1 hours (on average 0 to 15 minutes a day)*

*2 to 4 hours (on average 15 to 45 minutes a day)*

*5 to 6 hours (on average 45 minutes to 1 hour a day)*

*7 to 9 hours (on average 1 to 1 1/2 hours a day)*

*10 to 20 hours (on average 1 1/2 to 3 hours a day)*

*21 to 40 hours (on average 3 to 6 hours a day)*

*Over 40 hours (on average more than 6 hours a day)*

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Somewhat disagree</i>	<i>Neither agree nor disagree</i>	<i>Somewhat agree</i>	<i>Agree</i>	<i>Strongly agree</i>
Everything goes together on this site.	①	②	③	④	⑤	⑥	⑦
The layout is pleasantly varied.	①	②	③	④	⑤	⑥	⑦
The colour composition is attractive.	①	②	③	④	⑤	⑥	⑦
The layout appears professionally designed.	①	②	③	④	⑤	⑥	⑦
Overall, I find that the website looks attractive.	①	②	③	④	⑤	⑥	⑦
The layout of the site is attractive.	①	②	③	④	⑤	⑥	⑦
The colours that are used on the site are attractive.	①	②	③	④	⑤	⑥	⑦
I have a positive attitude towards this site.	①	②	③	④	⑤	⑥	⑦
I think this is a user-friendly site.	①	②	③	④	⑤	⑥	⑦
I find this to be a useful website.	①	②	③	④	⑤	⑥	⑦
The information on this site is interesting to me.	①	②	③	④	⑤	⑥	⑦
I find this website overall an entertaining website.	①	②	③	④	⑤	⑥	⑦

I intend to visit the site frequently.

①      ②      ③      ④      ⑤      ⑥      ⑦

It is likely that I would register  
with this website.

①      ②      ③      ④      ⑤      ⑥      ⑦

I feel that this website is  
trustworthy.

①      ②      ③      ④      ⑤      ⑥      ⑦

## Appendix 8: Randomisation Code

```
<?php
$num = Rand (1,6);
switch ($num) {
case 1: header('Location: https://www.lifeguideonline.org/player/play/studyplus');
break;
case 2: header('Location: https://www.lifeguideonline.org/player/play/studybase');
break;
case 3: header('Location: https://www.lifeguideonline.org/player/play/studyplus');
break;
case 4: header('Location: https://www.lifeguideonline.org/player/play/studybase');
break;
case 5: header('Location: https://www.lifeguideonline.org/player/play/studyplus');
break;
case 6: header('Location: https://www.lifeguideonline.org/player/play/studybase');
break;
}
?>
```



## Appendix 9: High/Low Design Screenshots

### High

**motivATE**

Dorset HealthCare **NHS** University NHS Foundation Trust

**BU** Bournemouth University

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To start using MotivATE click **NEXT** to log on.

Alternatively you can click **EXIT** to go straight to the final questionnaire.

**EXIT** **NEXT** ▶

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### Low

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## Appendix 10: Final Study Demographic Questions

1. Have you ever used the internet for health related advice?

*Yes/ No*

2. Have you ever used health related online self-help?

*Yes/ No*

3. Do you currently suffer with an eating disorder?

*Yes/ No*

---Asked only if participant answers 'no' to question three---

4. Have you ever suffered in the past with an eating disorder?

*Yes/ No*

---Asked only if the participant answers 'yes' to question three or four---

5. Have you ever attended an eating disorder service?

*Yes/ No*

---Asked only if the participant answers 'yes' to question three or four---

6. How would you describe your experience of an eating disorder (e.g Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder etc.)?

*((Free entry box))*

7. What is your age?

*18 - 24 / 25 - 34 / 35 - 44 / 45 - 54 / 55 - 64 / 65 - 74 / 75 - 84 / 85 or older*

8. What is your gender?

*((Free entry box))*

*Prefer Not To Say*

9. Do you currently live in the UK?

*Yes/ No*

10. Is English your first language?

*Yes/ No*

11. How often do you use a computer?

*Once a month or less/ Once a week/ Several times a week/ Every day/ Several times a day*

12. How many hours per week do you spend on a computer?

*0 to 1 hours (on average 0 to 15 minutes a day)*

*2 to 4 hours (on average 15 to 45 minutes a day)*

*5 to 6 hours (on average 45 minutes to 1 hour a day)*

*7 to 9 hours (on average 1 to 1 1/2 hours a day)*

*10 to 20 hours (on average 1 1/2 to 3 hours a day)*

*21 to 40 hours (on average 3 to 6 hours a day)*

*Over 40 hours (on average more than 6 hours a day)*