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The feasibility of a self-help workbook intervention for subthreshold Anorexia Nervosa

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Abstract

Importance: Anorexia Nervosa (AN) is a debilitating illness with the highest mortality rate of all mental disorders. With protracted illness linked to declining recovery rates, evidence indicates prompt treatment in AN is a significant predictor of full recovery. Despite this, specialist treatment remains scarce and inaccessible with funding limited to those severe in presentation.

Objective: The Maudsley outpatient treatment for adult anorexia nervosa (MANTRA) is an adult treatment of AN with demonstrated efficacy as a psychologist-led and guided self-help treatment in RCTs. The current study sought to evaluate the feasibility of MANTRA as a pure self-help workbook treatment for mild to subthreshold adult AN.

Design: The study was an open consecutive case-series feasibility study**.** Eligible adults with a diagnosis of mild to subthreshold AN without specialist treatment history were recruited through G.P.s, community settings and website between 2020 and 2021.

Intervention: Participants received a specialist psychological self-help workbook (MANTRA) for AN containing 10 treatment modules. A suggested reading schedule was provided, no additional guidance was given.

Main outcomes and measures: Primary outcomes were 12-week change in AN case status measured by DSM-5 Structured Clinical Interview and AN symptomology measured by the EDE-Q. Secondary outcomes included 12-week and 24-week change on clinical impairment, general psychopathology and decisional balance measured using the CIA, DASS-21 and DB. Other outcomes included participant evaluation regarding treatment credibility, acceptability and perceived effectiveness.

Results: A total of 8 participants completed the study and 38% of participants were reclassified to a milder AN case status at discharge. Statistically significant results were yielded using paired calculations before and after on AN symptomology (measured by EDE-Q) with large effect-sizes ($d = 0.86$). Significant reductions were also observed in clinical impairment at 12-weeks ($z = -1.96$, $p = .05$). No significant changes were observed on the DASS-21 or DB. The intervention was well rated for acceptability, practicality, and expansion by participants.

Conclusions and Relevance: Limited findings suggest that the workbook is feasible and may improve AN case-status symptomology and clinical impairment. Less conclusive evidence was found for general psychopathology and decisional balance. Further RCTs are required to imply cause and effect.

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1. Introduction

1.1 Overview

While the modern term ‘Anorexia Nervosa’’ (AN) was not coined until 1873, descriptions of anorectic illnesses had been documented in varying forms for nearly a century prior (Bemporad 1996). AN is a disorder commonly assumed to have its roots in the preference for slimmer bodies that gained momentum in the 18th century. In fact, records from as early as the middle-ages detail numerous occurrences of restrictive behaviours long before this (Dell’Osso, Abelli et al. 2016)). Throughout history, these behaviours around food have served functionality spanning spiritual purity, perfectionism, and moral rigidity (Bell 2014). As empirical progress has been made, the modern clinical picture of AN has increasingly moved away from seeing the disorder as a product of contemporary body ideals, and more and more as arising from an intricate interplay of genetic, cognitive and environmental risk factors (Treasure, Willmott et al. 2020). Additionally, a robust evidence-base suggests specific treatment needs in AN are unique from other eating disorders and that a staged model of care may be critical (Schmidt, 2014, Treasure, 2015).

Despite a growing appreciation for clinical complexity, this does little to simplify the path to evidence-based interventions for AN. With quick access to specialist treatment in AN predictive of making a full recovery, (Treasure and Russell 2011), such treatment options often remain scarce and inaccessible to those not classified as severe enough in presentation. This leaves poor treatment options for those with mild to subthreshold eating disorders, capturing an estimated 13% of females by age 20 (Stice, Marti et al. 2009). Thus, a growing need for optimised, scalable and easily disseminated interventions in the treatment of AN is becoming increasingly critical in the face of rising prevalence (Oakley Browne, Elisabeth Wells et al. 2006, Smink, Van Hoeken et al. 2012).

Even now, empirically supported adaptations of specialist treatment for mild to subthreshold AN remain limited. One such specialist treatment is the Maudsley outpatient treatment for adult anorexia nervosa (MANTRA) developed in the United Kingdom (Schmidt and Treasure 2006). The approach takes a cognitive-interpersonal approach to the disorder and is increasingly being piloted in varying contexts to address varying treatment gaps and needs with relative success (Schmidt, Renwick et al. 2013, Cardi, Ambwani et al. 2015). However, MANTRA and its adaptations have only been trialled either as a specialist outpatient treatment or psychologist-led (Schmidt, Wade et al. 2014, Cardi, Albano et al. 2020). This calls to question whether an adaptation suitable for those presenting with mild to subthreshold AN would be appropriate to be delivered in the primary care context and if this is feasible when delivered in a self-help format.

Research Objectives

This pilot project aims to assess the feasibility and early efficacy of a self-help workbook adaptation of a specialist evidence-based psychological treatment for AN (MANTRA.) The intervention will be targeted to mild and subthreshold cases of AN with a view of informing a larger scale randomised controlled trial (RCT).

1.2 Thesis Organisation

This thesis is organised into 5 chapters. The introductory chapter provides a summary of the research problem and objectives.

Chapter 2 reviews the literature concerning prevalence, the impact of AN at both an individual and societal level, the importance of early intervention and barriers to the scalability, dissemination and accessibility of specialist treatment in AN. Finally, a specific hypothesis is formed as informed from the literature.

Chapter 3 describes the study methodology. This includes details regarding the design, participants, pilot intervention, key measures and outcome indicators and study procedure. This section will also contain information detailing risk management, data analysis and data security.

Chapter 4 describes the study results, including participant sociodemographic, cognitive and clinical demographics and key measures against specific study aims and hypotheses.

Chapter 5 contextualises the study results in the broader literature. This includes a discussion of implications, limitations, future directions and any conclusions that may be drawn from the research as a whole.

2. Literature Review

2.2 Conceptualisation & Prevalence.

AN is a debilitating condition that is well-associated with severe healthcare and social costs worldwide (Simon, Schmidt et al. 2005, Arcelus, Mitchell et al. 2011). As the first diagnostic classification to be included under the 'eating disorder' typology in the *Diagnostic and statistical manual of mental disorders (DSM),* the current DSM-5 (5th ed.; DSM–5; American Psychiatric Association, 2013) defines the cluster of disorders as a "persistence disturbance of eating or eating-related behaviour that results in the altered consumption or absorption of food and that significantly impairs health or psychosocial functioning." AN carries significantly elevated mortality risk even in comparison to other eating disorders (standardised mortality ratio 5.86, compared with 1.93 in BN and 1.92 in EDNOS) (Smink, Van Hoeken et al. 2012). The condition is characterised by; restrictive food and exercise behaviour, low body weight, intense fear of weight gain, engaging in behaviours to thwart weight gain and disturbances in bodily perception, (American Psychiatric Association, 2013).

The modern conceptualisation of AN has continued to evolve through continued research and understanding of the complex neurobiology, cognitive processes and environmental factors that contribute to the illness. While the current clinical criteria for AN has had few changes over the last two decades, the changes that have been implemented have been significant as evidence grows regarding the epidemiology of the illness. Since the DSM-IV-TR (American Psychiatric Association, 2000), there has been a broadening in the diagnostic criteria across all eating disorders. Specifically in AN, this saw the removal of amenorrhea as essential for diagnosis and greater emphasis placed on measurable behaviours as opposed to more difficult to assess cognitions. The removal of the amenorrhea criteria was an update intended to reflect evidence suggesting that while amenorrhea may be helpful as an indicator of severity and nutritional status, there are few psychological differences between those with amenorrhea present and those without (Attia and Roberto 2009). This difficulty in assessing AN, alongside the frequent concealment of eating disorders and their relative scarcity compared to other mental disorders, can make obtaining community prevalence data challenging. This can only be expected to be further complicated in the New Zealand research context, characterised by finite resources, small population size and ethnic inequalities (Lacey, Cunningham et al. 2020). Despite these obstacles, a survey conducted by the Ministry of Health in 2006 estimated lifetime prevalence of AN in the New Zealand context to be 1.0% for New Zealand women and 0.1% for New Zealand men (using DSM-IV-TR criteria) (Wells, Oakley Browne et al. 2006). In a large-scale Australian study of female twins, prevalence estimates were placed even higher, indicating a 1.9% lifetime prevalence of AN that grew to 2.4% when criteria for amenorrhea were removed, more closely matching the current DSM-5 criteria (Wade, Bergin et al. 2006). Considering these difficulties in obtaining community prevalence data as well as the broadening of clinical criteria in the last decade, it is very likely that lifetime incidence of AN is much higher than what can be estimated both in Aotearoa/New Zealand and abroad (Attia and Roberto 2009, Smink, Van Hoeken et al. 2012).

With the data that we do currently have, overseas estimates of AN prevalence are relatively aligned to the New Zealand and Australia data available. One large-scale population study of American adults found the lifetime prevalence of AN at around 0.80%, reflecting an increase of approximately 30% from the research groups prior 2006 data (Udo and Grilo 2018). This increase could easily, and is commonly, attributed to the broadening of clinical criteria from DSM-IV-TR to DSM-5 (Mustelin, Silén et al. 2016). However, Udo & Grilo's (2018) prevalence data may indicate attributing this solely to classification changes is overly simplistic. Despite both Bulimia Nervosa (BN) and Binge-Eating Disorder (BED) also undergoing classification broadening, the lifetime prevalence of both disorders appears to be decreasing. While these findings hold little weight in isolation, the indication of the reduced prevalence of BN and BED was also found in a separate 2020 Australian population survey conducted by Bagaric, Touyz et al. (2020). This study, which surveyed individuals in South Australia, similarly found that lifetime incidence of BN and BED appeared to be decreasing in younger age groups compared with prior community data (Bagaric, Touyz et al. 2020). Concerningly, this trend does not appear to be consistent for AN. Various epidemiological studies indicate a steady upwards trend in the incidence of high-risk AN in adolescent females and earlier age of onset, compared to the dropping incidence of other eating disorders (Smink, Van Hoeken et al. 2012, Smink, van Hoeken et al. 2016).

Further demonstrating the complexity in understanding rising AN prevalence, one twin study indicated that many of the individuals newly identified as having AN using DSM-V criteria (as opposed to DSM-IV-TR criteria) tended to have a later age of onset (Mustelin, Silén et al. 2016). With the majority of ‘newly’ identified cases tending to have a later age of onset, there is a failure to explain the upwards climb in AN prevalence in younger age groups. When considering that only the minority of individuals with AN are ever treated in mental healthcare and that there is frequently a failure to identify subthreshold eating disorder pathology, there is likely a large dark figure that goes unrecognised. Supporting this, longitudinal data suggests that up to 12% of adolescent women will meet criteria for some form of threshold or subthreshold eating disorder by age 20, and even those with mild presentations will still suffer significant impairment and emotional distress (Stice, Marti et al. 2009). Similarly, in the New Zealand context one Victoria University of Wellington study examined disordered eating patterns and obsessive-compulsive tendencies in 17-23-year-old undergraduates, with findings indicating that one-third of the total sample exhibiting disordered eating patterns (Roberts 2006). Thus, the high prevalence of disordered eating in younger subclinical populations appears to be as consistent in the New Zealand context as internationally.

2.3 Impact of Chronic AN

While all eating disorders are associated with a significantly elevated mortality rate, the highest and most striking rates of mortality have been found in those with AN (Arcelus, Mitchell et al. 2011, Smink, Van Hoeken et al. 2012). It is estimated that those with AN have nearly six times the mortality rates of those in the general population and the highest number of years of life lost through death or disability of all mental disorders (Mathers, Vos et al. 1999, Hay, Girosi et al. 2015). Mortality is further increased by common co-morbidities such as substance abuse, poor social adjustment, and low BMI, with death through suicide, a common cause of death in AN (Franko, Keshaviah et al. 2013, Treasure, Stein et al. 2015). Unfortunately, full recovery rates for AN are relatively disheartening. Only 46% of those diagnosed in their lifetime with AN are ever considered fully recovered, with up to one-third of individuals left with residual features of the disorder and a further 20% remaining chronically ill (Steinhausen 2009, Arcelus, Mitchell et al. 2011, Smink, Van Hoeken et al. 2012).

Even where death does not occur, chronic AN's impact on individuals' health, development trajectory, and social and emotional functioning are substantial. As an illness that often begins in adolescence, a time when the brain is undergoing significant changes, chronic AN can have severe impacts on brain development and maturation. With the brain requiring around 20% of total calorie intake to successfully undergo required structural and functional changes required in adolescence, it is unsurprising that long-term effects on brain plasticity and neuroadaptation may occur and further complicate recovery (Treasure and Schmidt 2013). It is suggested that the prefrontal areas that control self-reflection, impulse-control and risk-taking may be particularly impacted as the illness course progresses. As starvation and malnutrition increase, a corresponding shrinkage in grey matter has been suggested to further reduce executive functionality (Treasure, Stein et al. 2015), particularly in tasks requiring central coherence, set-shifting and attention (Roberts, Tchanturia et al. 2007). While there is conflicting evidence as to whether these deficits in cognition are antecedents to the illness or cumulative effects from resulting starvation, the display of these biomarkers in AN is well-documented (Roberts, Tchanturia et al. 2007, Lopez, Tchanturia et al. 2008, Lang, Roberts et al. 2016). Also well-documented is the impact the illness has on social and emotional functionality. Sensitivity to negative stimuli, inability to self-regulate emotions and lack of facial expressivity serve to further erode individuals with AN's social capital, with individuals often becoming increasingly socially withdrawn and sensitive to social threat as starvation progresses (Cardi, Matteo et al. 2013, Treasure, Stein et al. 2015, Treasure, Willmott et al. 2020). This social withdrawal is often associated with the increased suicidality seen in AN (Treasure, Willmott et al. 2020).

Disruptions to the ventral-striatal reward system are also seen in those with AN compared to healthy controls, suggesting altered reward habit learning that maintains the illness further (Fladung, Grön et al. 2010). Reward sensitivity in AN sees the daily repetition of initial goal-motivated eating disorder behaviours become automated and eventually positively reinforced with minimal environmental cues (Cardi, Matteo et al. 2013, Treasure, Willmott et al. 2020).

This disruption in reward response is seen to persist even in those who are recovered, with one study demonstrating difficulties differentiating between positive and negative feedback relative to controls and a more strategic and planned approach to reward stimuli which may translate to food behaviours. Changes to the endocrine system are also common in AN, with hormonal adaptations in response to caloric deficit resulting in loss of bone mass. With bone mass accrual a core feature of adolescence, chronically reduced bone density may result in retardation of development and high fracture risk that persists even after full clinical recovery (Hartman, Crisp et al. 2000, Mumford, Kohn et al. 2019). The disability that comes with these complicated health and psychosocial aspects is evident, with one longitudinal study showing that 20% of those diagnosed with AN in adolescence could not support themselves independently at 14-year follow-up timepoint (Hjern, Lindberg et al. 2006).

While the individual burden of AN is usually highly visible, the significant burden AN poses to public healthcare and social, occupational and economic costs may be more insidious. One analysis of service use for AN in the United Kingdom (UK) estimated that annual costs might be anywhere between £45M and £230M in 2011 (Schmidt, Sharpe et al. 2017). In 2013 a Canadian study investigating the cost per admission for adolescents with AN found that each admission on average cost hospitals $51,349, and when including the cost to caregivers through lost work and leisure productivity jumped to $54,932 (Toulany, Wong et al. 2015). Taking a similarly integrated consideration of cost, a 2012 report commissioned by an Australian eating disorder support foundation suggested health cost expenditure for AN was around $99.9 million with an estimated further $15.1 billion losses in productivity (Paxton, Hay et al. 2012). This is a significant increase from the estimated $14 million spent on eating disorders in Australia just a decade prior (Mathers, Vos et al. 1999). While productivity costs are difficult to accurately measure due to their abstract nature, these estimates attempt to consider factors such as lower employment participation, greater absenteeism and sick leave, and presenteeism resulting in lower productivity. With the peak of AN onset often occurring when individuals are progressing through secondary school or higher education milestones, AN can therefore have a substantial and life-long impact on occupational and educational functioning (Simon, Schmidt et al. 2005). In addition, family members are usually the primary carers for those with AN and with an average illness length commonly estimated in the 11-15 year range (Paxton, Hay et al. 2012, Udo and Grilo 2018), the impact this may have on carer's psychosocial, occupational, educational functioning as well as whole family functioning and resource is substantial (Schmidt and Treasure 2006, Treasure, Willmott et al. 2020).

2.4 Early intervention and barriers

There is a wealth of evidence indicating that early intervention of AN is critical for a full recovery. The duration of time that the AN persists has clear implications for recovery, with significantly poorer outcomes found unless effective treatment is provided in the first 3 years of illness onset (Treasure and Russell 2011). With the age of illness onset substantially linked to outcome, significantly poorer psychosocial outcomes have been found in those diagnosed with AN in adolescence by age 35 (Wentz, Gillberg et al. 2009). As the illness timeline continues, chances of recovery rapidly decrease, with various studies reporting a dramatic decrease spanning any duration of illness past the 3-10 year mark (Von Holle, Poyastro Pinheiro et al. 2008, Treasure and Russell 2011). Despite this, New Zealand estimates have assessed it may be as long as 15 years between AN onset and any contact with treatment services (Oakley Browne, Elisabeth Wells et al. 2006). This has a number of implications for treatment, as starvation and stress take their toll on the brain, body and cognition. Despite this, recovery rates may be as high as 96% when subthreshold eating disorder symptomology is targeted within 1 year from onset (Stice, Marti et al. 2009). While it is not revolutionary that less severe symptomology is easier to resolve, it does imply that less intensive interventions, and therefore less costly interventions, implemented in the early phases of the illness can have substantial outcomes. A growing evidence base is beginning to suggest improved outcomes when treatments are adapted for the specific stage and course of AN, referred to as a 'staged model' of illness (Treasure, Stein et al. 2015). Evidence and guidelines clearly reflect that effective interventions provided early in the course of AN can substantially impact the trajectory of the illness and avoid progression into more severe or enduring forms of AN (NICE, Beumont, Beumont et al. 2004, Treasure and Russell 2011, 2017).

Unfortunately, implementing early intervention for AN is complicated. One of the hardest to overcome is the avoidance and denial of the condition often observed in the early phases of the illness, with many in high spirits and denying any issues (Schmidt and Treasure 2006). This hyperactivity posited to be partially moderated by dysregulation in neurotransmitters such as 5-HT alongside the maladaptive coping mechanism the illness serves, often results in lower motivation or difficulty engaging individuals in treatment (Schmidt, Wade et al. 2014, Cardi, Albano et al. 2020). How this may manifest is clearly documented in the literature, suggesting up to 44% of those meeting strict criteria for an eating disorder do not believe they have an issue, or at the least one significant enough to require treatment (Hart, Granillo et al. 2011). Similar evidence was found in a cohort of young Australian adults with weight and shape concerns, with 73% not believing they required any external assistance for their concerns (Ali, Fassnacht et al. 2020). For these individuals, the primary barriers identified appeared to be self-sufficiency, denial and failure to perceive the seriousness of their condition.

For those who do recognise that they do have an issue, not wanting others to worry, fear of losing control and stigma and shame are also commonly seen as barriers to treatment (Griffiths, Rossell et al. 2018, Ali, Fassnacht et al. 2020) One meta-analysis found that even at baseline, those with AN have been found to report substantially higher levels of shame than both non-clinical and clinical groups (depression and anxiety) (Blythin, Nicholson et al. 2020). In fact, levels of shame directly link to the severity of symptoms in AN (Troop, Allan et al. 2008). This shame is likely to be compounded by stigmatising attitudes from others towards the ill individual, that often centre around the voluntary or superficial nature of the illness (Griffiths, Mond et al. 2015, Hamilton, Mitchison et al. 2021). This may result in further concealment and is likely to be a primary reason for delayed treatment due to embarrassment. Evidence suggests that AN commonly goes unrecognised as serious by the general population, with common misconceptions around individual ‘choosing’ not to eat and beliefs that those suffering possess obsessionality with physical appearance and a need for attention (Crisp 2005, Dimitropoulos, Freeman et al. 2016, Hamilton, Mitchison et al. 2021). This is likely further reinforced by the socially acceptable nature of weight-control behaviours like dieting and exercise.

While many of these stigmatising attitudes are mitigated through education (Crisafulli, Von Holle et al. 2008), even amongst general health professionals it appears knowledge around AN may be lacking. Only a fraction of those with eating disorder symptomology will likely be identified at the primary care level as needing further support or treatment, with some studies estimating recognition rates as low as 10% growing to a meagre 40% in higher estimates (Johnson, Spitzer et al. 2001, Hoek and Van Hoeken 2003). Concerningly, this does not appear to be due to lack of contact either, with research indicating that those with eating disorder pathology may consult with their general practitioners (G.P.) significantly more frequently than healthy controls (Simon, Schmidt et al. 2005). For those identified as having an issue, many are not treated for their eating disorder behaviours, but rather for weight loss, anxiety and depression (Hart, Granillo et al. 2011). Additional weight bias can often account for clinicians overlooking eating disorder symptomology in those still regarded as being in an average to high weight range and therefore a likely earlier presentation of the illness (Hamilton, Mitchison et al. 2021).

2.5 Scalability, Dissemination and Accessibility of Specialist Treatment

This delayed detection and lengthly time between onset and treatment-seeking frequently results in more severe cases when individuals are eventually referred into specialist eating disorder treatment services (Treasure, Oyeleye et al. 2021). This means that a higher proportion of individuals will require inpatient care for at least part of their treatment, resulting in higher cost and burden on the healthcare system (Simon, Schmidt et al. 2005). While there are no recent official estimates in New Zealand, a 2008 report published by the New Zealand Ministry of Health reported lack of inpatient beds, an absence of defined client pathways and an insufficient number of outpatient programs (NZMH, 2008). Nearly a decade later, in 2018 an active eating disorder community group Eating Disorder Association New Zealand (EDANZ) submitted to the New Zealand Government asking for urgent improvements to be pushed around acceptance criteria to specialist treatment, limited beds and unrealistic waiting times for treatment (EDANZ, 2018). This suggests barriers to treatment are far from resolved in the New Zealand context. International reports detail similar failures of detection and requirements to improve capacity and acceptance criteria for eating disorder services, particularly for community and adult cases (UK Parliamentary and Ombudsman 2017, NHS, 2019).

This underprovision of eating disorders can result in costly travel for individuals with AN and their families, or lengthy periods spent in non-specialist units (Simon, Schmidt et al. 2005). The evidence reflects that those treated in non-specialist outpatient services incurred significantly higher costs than those who had only been treated in specialist services (Schmidt, Sharpe et al. 2017). More importantly, these non-specialist services are substantially less effective, with up to 35% of those in outpatient non-specialist services later admitted to inpatient treatment, versus only 10% of those in outpatient specialist treatment (Schmidt, Sharpe et al. 2017). Furthermore, treatment of eating disorders by non-specialists are associated with poorer long-term outcomes and higher mortality rates (Simon, Schmidt et al. 2005, Schmidt, Sharpe et al. 2017). The relative lack of efficacy is likely due to non-specialist treatments being frequently adapted from other disorders and are not tailored to the uniquely complex characteristics, needs and maintenance factors seen in AN (Schmidt, Magill et al. 2015). We therefore see a paradox between those with eating disorders having increased interaction with health services in the prodromal stage, where the most significant impact can be made, yet still experiencing a largely unmet need for specialist treatment. This has not gone unnoticed, with a growing call to improve the dissemination and implementation for specialist treatment for eating disorders (Fairburn and Wilson 2013, Schmidt, Wade et al. 2014).

Many of the barriers to widespread dissemination of specialist eating disorder treatment relate directly to funding and lack of trained clinicians to administer such treatments, frequently caused by difficulties in providing the intensive training that is required (Cooper and Bailey-Straebler 2015). Additionally, specialist treatments for eating disorders are typically lengthy, labour-intensive and limited by face-to-face modes of delivery (Fairburn and Wilson 2013). This is only likely to be exacerbated by novel coronavirus (COVID-19), with evidence already reflecting a marked increase (150%) in hospital admissions for severe eating disorder presentations during lockdown periods (Shaw, Robertson et al. 2021). Another study that contrasted demand, capacity and outcomes of an adult specialist eating disorder inpatient services in South England before and since the pandemic similarly found a 21% increase in referrals, increase in waiting times and reduced bed capacity (Ayton, Viljoen et al. 2020). New Zealand news reports have indicated similar issues with long waits for public treatment and four-times the increase in demand for private treatment since April 2020 (Stuff, 2020). With additional distancing measures in place paired with increasing service demand, the mode of treatment delivery has become an even more pertinent issue (Fairburn and Wilson 2013, Schmidt, Wade et al. 2014).

2.6 Manualised Treatment for Eating Disorders

This overdependence on professional care and lack of resource, albeit exacerbated in modern times by COVID-19, is not a new phenomenon in treating eating disorders. Since the 1990s, there have been various efforts to bridge this gap in dissemination with manualised treatments, first developed for BN and BED (Fairburn and Beglin 1994, Treasure, Schmidt et al. 1996, Carter and Fairburn 1998). Manualised treatments are generally defined as therapy that is performed by following specific evidence-based guidelines centred around a manual or workbook. Manualised treatment can provide significant benefits in that it provides consistency of the intervention across contexts, settings and individuals. Thus manualised treatment in eating disorders may offer improved treatment dissemination while also providing a clear source of information for individuals to follow and revisit in their own time. Despite this, most manualised treatment in its traditional form remains far from formulaic and still requires significant clinician skill in its implementation (Schmidt, Wade et al. 2014).

Early trials of manualised therapy developed for BN and BED aimed to provide education, cognitive restructuring and other cognitive-behavioural therapy (CBT) techniques in an easily digestible way. They were administered paired with varying levels of guided contact. In Carter and Fairburn (1998), a manual was given alongside non-specialist therapist guidance as well as pure self-help in a sample of individuals with BED. Substantial and sustained impact was found for both conditions. While also working from a CBT base, Treasure, Schmidt et al. (1996) followed a slightly more individual-led approach in a sample of individuals with BN. In this study, the manual was provided first in isolation to a sample of individuals with BN, with sequential CBT offered only if participants remained symptomatic. The intervention included a comparison control group receiving CBT. Remarkably, manualised self-care was found to have comparable effectiveness to standard CBT with half the experimental group requiring either no sessions of additional therapy or 50% less than the control group. In fact, due to this treatment format, there was a sub-set of individuals that received only pure self-help as they became asymptomatic with the manual alone.

Despite efforts around this time to build off the back of manualised CBT successes in the treatment of AN, the efficacy of such interventions remained unestablished (Dalle Grave, Ricca et al. 2001, le Grange and Lock 2005). One common criticism in implementing these for AN lies in CBT-based model's primary focus on weight and shape cognitions and emphasising self-monitoring techniques around food. When considering that those with AN possess a preoccupation around monitoring their intake and implementing rule-based behaviours around eating, the facets of treatment may be less appropriate and even perpetuate or exacerbate these issues (Schmidt and Treasure 2006). Additionally, while at a superficial level those with AN may appear to be primarily concerned with issues associated with their eating disorder, research reflects that eating disorder symptomology is more likely symbolic of larger underlying concerns as well as the interpersonal difficulties and experience of negative emotions (Sternheim, Startup et al. 2012, Schmidt, Wade et al. 2014). Furthermore, such models fail to consider the starvation-related effects on cognition and neurobiology, which complicate treating AN significantly. Finally, when looking through a cultural lens - CBT and other frontline treatment models' emphasis on weight and shape concerns are based on Western individualist cultural presentations of the illness. In contrast, cross-culturally individual's may differ significantly with far less emphasis placed on shape or 'fat phobia' in other ethnicities presentations of AN (Agüera, Brewin et al. 2017). Considering that health interventions should be relevant to the target population and based on an up to date empirical base, a clear need for improvement was identified in these earlier treatment models (Bowen, Kreuter et al. 2009).

2.7 The Maudsley Model of Anorexia Nervosa Treatment for Adults (MANTRA)

Considering these inadequacies in frontline treatments models and the lack of empirical support for existing models of treatment, in 2006 two established psychiatrists specialising in eating disorders proposed an evidence-informed cognitive-interpersonal model for adult AN (Schmidt and Treasure 2006). The model suggested that a range of intra- and interpersonal factors, cognitive predispositions and starvation-attenuated processes put individuals at risk of developing and maintaining AN. Connecting recent advances spanning the fields of biology, personality, neuropsychology, and cognition, the model was underpinned by the philosophy that a solid theoretical understanding that is continually modified with new empirical evidence is critical to developing interventions that are sufficient to target the unique treatment challenges in adult AN (Treasure and Schmidt 2013). Also novel, is the cognitive-interpersonal models lack of emphasis on weight and shape, instead emphasising psychoeducation around nutritional requirements and adequate eating patterns. This allows the model to be cross-cultural in its application and target the deeper cognitive-interpersonal processes maintaining the disorder in adult presentations (Schmidt and Treasure 2006).

Informed by the development of the cognitive-interpersonal model, the Maudsley Model of Treatment of Adults with Anorexia Nervosa (MANTRA) was developed (Wade, Treasure et al. 2011, Schmidt, Wade et al. 2014). A specialist outpatient treatment designed to be given over 20-40 sessions, MANTRA combines an empirically-based theory led approach while still taking into account patient and clinician experience (Schmidt, Wade et al. 2014). Centralised around a user-friendly workbook-style patient-manual, the treatment is collaborative with patient and clinician deciding which aspects are relevant and the flexible involvement of family members or supports (Schmidt, Wade et al. 2014). Utilising a formulation-based approach alongside the influential theories by James W. Pennebaker (Pennebaker 2004) relating to the therapeutic nature of writing, the workbook contains writing exercises (such as letters) designed to assist individuals tapping into their social and emotional mind for enhanced expression and regulation (Wittek, Truttmann et al. 2021). Through both diagrammatic and writing-based tasks, individuals with AN are helped to frame and visualise how the illness may be developed and maintained in a highly individualised manner. A motivational interviewing (MI) style is also incorporated into the treatment model, typically characterised by a supportive and empathic style designed to increase willingness to engage and overcome resistance and ambivalence (Price-Evans and Treasure 2011, Cardi, Albano et al. 2020).

By emphasising a therapeutic approach focused on a collaborative, empathetic and reflective style, MANTRA attempts to minimise clinician related harm and maintain factors in the treatment of AN that are often overlooked. Clinicians and eating disorder services engaging in coercive refeeding, offering an overly protective environment or expressing high emotion may further accommodate, enable and reinforce eating disorder behaviours (Treasure, Crane et al. 2011). Despite a lack of emphasis on weight and shape, nutrition and medical risk are still highly prioritised in the MANTRA model and treatment plan. However, in opposition to CBT, this is presented in an educational manner around energy intake and starvation related effects. This is in opposition to CBT's food tracking, which may cause harm through the detail-oriented and cognitively rigid thinking style frequently seen in AN (Schmidt, Wade et al. 2014).

The theoretical base for the model considers predisposing factors that lead to increased risk of developing AN, such as obsessive-compulsive (OC) and anxious-avoidant traits that then go on to maintain the disorder (Schmidt and Treasure 2006). Empirical evidence infers that obsessive-compulsive traits may be a core predisposing feature of developing adult AN, with perfectionistic and rigidity in childhood showing high predictive validity for the later development of an eating disorder (Anderluh, Tchanturia et al. 2003, Treasure and Schmidt 2013). Emerging genome data creates a compelling argument for a shared genetic basis between AN and obsessive-compulsive disorder (OCD), indicating there may be substantial genetic crossover (Yilmaz, Halvorsen et al. 2020). These obsessive-compulsive traits are also posited to underpin cognitive processing styles that see deficits in set-shifting and central coherence commonly observed in AN.

Set-shifting is defined as the ability to 'shift' back and forth between multiple tasks or mental representations, (Roberts, Tchanturia et al. 2007) while weak central coherence refers to the tendency to focus in on the detail at the sacrifice of understanding the larger context or 'big picture' (Roberts, Tchanturia et al. 2013). With poorer global integration and set-shifting, these are suggested to present in the high-detail oriented style often seen in AN as well as inability to adapt to environmental demands (Treasure and Schmidt 2013). Found to be impaired in those with AN external to the length of illness, it is highly likely that a cognitive profile characterised by inflexibility and detail-focus may be both a predisposing trait that precipitates the development of the disorder as well as maintaining (Lopez, Tchanturia et al. 2008, Tchanturia, Harrison et al. 2011). Manifesting in individuals being more attuned to societal norms and highly focused on detailed aspects of physical appearance, the traits also perpetuate AN through strict rules being implemented around food and exercise that are followed in a highly rigid manner (Schmidt, Wade et al. 2014). As the illness progresses, brain function is further reduced due to starvation related effects and sees weakened set-shifting and central coherence only exacerbated. With an increasingly narrowing cognitive focus on aspects of the illness, a reinforcing cycle of rigidity becomes ingrained (Roberts, Tchanturia et al. 2007).

The model is bi-directional in its consideration that starvation attenuated states can also serve to accentuate existing co-morbidities. Deficits in emotional distress are one such predisposing co-morbidity that is commonly seen in AN. Whether this emotional distress is caused by genetic predisposition, developmental trauma, or emotional abuse; deficits in social and emotional processing is the second trait identified by the model as increasing the risk and perpetuating AN (Schmidt and Treasure 2006, Oldershaw, Hambrook et al. 2011, Treasure, Willmott et al. 2020). In adolescent cases, up to 20% of individuals are found to have predating deficits in social cognition, expressing elevated fears around negative evaluation, perceived lack of social competence and submissiveness within the family (Wentz, Gillberg et al. 2009, Cardi, Mallorqui-Bague et al. 2018). These difficulties are likely only to be attenuated as the illness progresses and caloric restriction increases and may persist long after recovery (Treasure and Schmidt 2013). With high levels of loneliness, feelings of inferiority and social anxiety frequently seen in AN, there is high co-morbidity between eating disorders and anxiety disorders (Swinbourne, Hunt et al. 2012). Twin studies have indicated a similar underlying heritability to temperaments that skew toward perfectionism, need for order and sensitivity to praise and reward indicating the risk of both disorders may be in part genetic (Wade, Tiggemann et al. 2008).

With interpersonal difficulties a core component of the MANTRA model, it’s emphasised that social situations, due to their highly ambiguous nature, are something individuals with AN are likely to struggle with significantly (Sternheim, Startup et al. 2012). Attentional bias toward negative emotional stimuli and decreased response to positive emotional stimuli is a well-documented phenomenon in AN (Treasure and Schmidt 2013, Caglar-Nazali, Corfield et al. 2014). In one large-scale study, both women with acute AN and those recovered were found to have significantly higher biases than controls towards angry-threat based stimuli on the pictorial Stroop task administered with angry or neutral faces (Harrison, Tchanturia et al. 2010). When social signals are ambiguous, individuals with AN show bias towards anger (Dapelo, Surguladze et al. 2016). Furthermore, individuals with AN may have difficulty attending to happy or positive expressions (Cserjési, Vermeulen et al. 2011). Interpretation of social signals is another area of social cognition that appears to be impacted in AN, with poor recognition of emotions in others across voice, body or media clearly apparent in a large-scale meta-analysis conducted by Oldershaw, Hambrook et al. (2011). Individuals with AN appear less able to recognise sadness compared to healthy controls, and when presented with ambiguous social contexts, are more likely to interpret these negatively increasing sensitivity to social rejection ranking and alienation (Cardi, Esposito et al. 2015, Lang, Dapelo et al. 2015, Cardi, Turton et al. 2017).

One of the most sophisticated forms of social cognition referred to as 'Theory of Mind' (ToM) is also frequently demonstrated as compromised in those with AN (Caglar-Nazali, Corfield et al. 2014). This implicit social processing refers to the ability to represent the mental states, intentions and moods of others to predict behaviour (Russell, Schmidt et al. 2009). Deficits in ToM are commonly seen in Autism Spectrum Disorder (ASD), which shares several similarities to the cognitive profile of AN (Oldershaw, Treasure et al. 2011). This is demonstrated with those with AN performing poorly on tasks that require the reading of others' emotional states as represented through black and white images of people's eyes, a task initially developed for those with ASD (Oldershaw, Treasure et al. 2011). The emotional mind is also a core component of the model, with deficits in intrapersonal processing signalling of one's own emotion identified as a critical perpetuating factor in AN. Demonstrating limited emotional expression, individuals with AN have been found to not only avoid emotional displays of others but also demonstrate poor facial expressivity themselves (Cardi, Corfield et al. 2015). Similarly attenuated in the acute stage of the illness, less displayed emotion has been found to both positive and negative stimuli despite no reported difference in subjective emotion experience (Davies, Schmidt et al. 2013, Rhind, Mandy et al. 2014).

As the individual seeks to cope with these cognitive-interpersonal difficulties, eating disorder behaviours become further and further habituated into daily life. Avoidance and rule-based thinking about 'bad' foods and social situations are initiated to achieve goals and reinforced repeatedly, cementing these behaviours as positively rewarding (Treasure, Willmott et al. 2020). For example, conditioning can occur whereby eating 'high-fat' or 'bad' foods is followed by negative consequences in the form of critical comments, teasing or weight and appearance-based comments (Cardi, Leppanen et al. 2019). Avoidance of food or other eating disorder behaviours then become automatic in response to relevant stimuli or cues with minimal effort. This has been supported in neurobiology, which implicates the ventral and dorsal front-striatal neural systems in restrictive behaviours and disturbed habit-learning and the limbic system in avoidance and fear-learning behaviours (Uniacke, Walsh et al. 2018, Steinglass, Berner et al. 2019). With anxiety and fear of food a core feature of AN, this can provide significant resistance to the weight-restoration component of AN treatment. This is a key part of why coercive refeeding is not included as part of the MANTRA model or treatment, as it may only serve to enhance aversive fear-learning toward food (Treasure, Willmott et al. 2020).

The model's co-founder Janet Treasure has compared AN alike to a snowball down a hill, becoming more complex as it progresses with greater psychopathology, rules, and habits. An illness that is highly ego-syntonic in nature, many individuals with AN will not see themselves as 'sick', contributing to the high ambivalence frequently seen in the disorder (Treasure, Willmott et al. 2020). This is often a clear divergence from the visibility of the illness to others. With lack of emotional or social expressivity linked to activation of autonomic arousal in others, this can lead to increased stress response from close others in response to the illness and further disruption to interpersonal relationships (Butler, Egloff et al. 2003). These interpersonal reactions in response to living with an individual with AN perpetuate the illness, as interpersonal relationships are easily disrupted due to heightened negativity bias. Maladaptive coping mechanisms on behalf of carers can result in hostility or enablement, which only results in further interpersonal difficulties dealt with through retreating further into illness symptoms and increasing isolation (Schmidt and Treasure 2006, Treasure, Willmott et al. 2020). The highly heritable nature of obsessive-compulsive traits in first-degree relatives to those with AN may also serve to compound over-controlling or over-protective behaviours on behalf of carers (Schmidt, Wade et al. 2014). Thus, evaluating family dynamics and including support is critical for the MANTRA treatment model (Treasure, Parker et al. 2021).

2.7.1 Empirical Evidence for MANTRA

Working in line with the Medical Research Council's 2008 framework for designing complex interventions, MANTRA as both a treatment and model has been continually reviewed and informed as new empirical evidence emerges (Treasure and Schmidt 2013). Designed to target rigid thinking styles, avoidant traits, pro-anorectic beliefs and responses of close others, MANTRA was first trialled as an outpatient treatment for those diagnosed with AN in 2011 (Schmidt and Treasure 2006, Wade, Treasure et al. 2011). Although the sample was small (*n=23*), 30% were found to have a 'good outcome', as defined through BMI and global eating disorder pathology questionnaire scores, at the conclusion of treatment which was retained at 12-month follow-up (27%). While this was found to be a better outcome than similar trials for psychotherapy interpersonal psychotherapy at the time, it was comparable to Specialist Supportive Clinical Management (SSCM) and CBT; however treatment drop-out rates for MANTRA were found to be lower than reported rates for comparable therapies. A subsequent randomised controlled trial comparing SSCM and MANTRA (*n=72*) found that while both treatment groups improved significantly in terms of their eating disorder and other psychopathology, those in the MANTRA condition were significantly more likely to require additional service utilisation than SSCM (Schmidt, Oldershaw et al. 2012). However, this was potentially because significantly less individuals in the MANTRA condition were likely to be in a partnered relationship, providing support for the critical role close others play in the cognitive-interpersonal model of AN.

Further refinements to the MANTRA model in 2013 included clarifications and complexity added around familial vulnerabilities and attenuated starvation related effects, with a detailed paper published in 2014 describing the revised MANTRA treatment framework (detailed in chapter 2.7) (Treasure and Schmidt 2013, Schmidt, Wade et al. 2014). Following this, a larger-scale randomised controlled trial MOSAIC (*n=142*) compared MANTRA and SSCM once again on both efficacy and acceptability, with primary outcome being BMI at 12-months (Schmidt, Magill et al. 2015). Building on previous findings, SSCM was chosen in this trial as it was an established form of treatment that similarly emphasises the therapeutic relationship and active interest of the therapist in the progress of patients (Zainal, Renwick et al. 2016). This is in likeness to the therapeutic style of MANTRA, in which an empathetic and responsive manner is similarly incorporated (Schmidt, Wade et al. 2014). SSCM has been found to be as effective as other front-line adult AN treatments such as CBT and interpersonal therapy (IPT). However these effects may diminish over time (Carter, Jordan et al. 2011, Touyz, Le Grange et al. 2013).

While both groups in the MOSAIC trial improved significantly across BMI, psychopathology and psychosocial impairment at the 12-month mark, MANTRA was rated significantly more acceptable and credible than SSCM. Additionally, emerging trends suggested that MANTRA may be more effective for those with greater clinical severity, with mean BMI increase for the same time point 1.75 kg/m2 for MANTRA and 1.36 kg/m2 for SSCM. Treatment completion rates for MANTRA (75%) were either improved or similar to comparable studies for adult AN treatment and higher than that of SSCM (57%.) In a two-year follow-up study to the MOSAIC trial, both SSCM and MANTRA maintained or increased improvements in outcome measures at 24-months, with improvements in BMI increased to 2.25 kg/m2 (MANTRA) and 2.16 kg/m2 (SSCM) (Schmidt, Ryan et al. 2016). However, those who participated in the SSCM condition had a slightly increased chance of developing treatment-related harms, such as binge-eating or uncontrollable weight gain compared to those in the MANTRA condition (Schmidt, Ryan et al. 2016).

While randomised-controlled trials remain the most rigorous and methodologically sound way of evaluating treatment outcomes, there are a number of other ways to assess factors of treatment success that are frequently not accounted for (Zainal, Renwick et al. 2016). Acceptability and credibility, as measured in the MOSAIC trial, are important areas of focus for interventions to evaluate suitability and whether it meets participant expectations (Bowen, Kreuter et al. 2009). With increased treatment acceptability and credibility rated for MANTRA over SSCM in the MOSAIC trial, taking these factors into account is critical as it may translate into greater willingness to have treatment in the future, resulting in improved long-term outcomes (Schmidt, Magill et al. 2015). In a second phase process evaluation of the MOSAIC trial, in-depth qualitative interviews were conducted with both the clinician and participants' views regarding the two treatments and unique or overlapping features (Zainal, Renwick et al. 2016). The manual used in MANTRA was identified as one of the participant's primary positive treatment aspects. It was reported that having the treatment manualised with exercises to work through assisted them in gaining a better understanding of themselves, allowing reflection and providing personal tools for change. Participants in the MANTRA condition reported that the treatment had helped them see AN symptomology as separate from their identity and enabled them to challenge negative thoughts while supporting confidence in recovery. This is important as self-efficacy, or an individual's self-perceived ability to succeed is a demonstrated predictor of outpatient treatment drop-out in eating disorders (Keshen, Helson et al. 2017).

While research highlights that MANTRA may have some unique benefits over other treatments of adult AN, there is less clarity and consistency around which individuals with AN this may be true for. A randomised-controlled trial conducted in Australia examined MANTRA compared to SSCM and Cognitive Behavioural Therapy – Enhanced (CBT-E) *(n=120)*. No significant differences were found between the three treatments. All three demonstrated significant improvements on eating disorder symptomology, achievement of healthy BMI at both 12-months and follow-up, and lowered psychopathology (Byrne, Wade et al. 2017). Additionally, in this trial CBT-E was found to be superior to both MANTRA and SSCM in its ability to assist patients to achieve a healthy weight potentially through a more active focus on food intake. These inconsistencies in a clear front-runner for the treatment of AN are supported by meta-analyses comparing treatments for adult AN. One meta-analysis examining 18 randomised-controlled treatment studies since 2008 found a lack of replicated results to demonstrate the superiority of any one treatment for adult AN (Zeeck, Herpertz-Dahlmann et al. 2018). While this suggests that current therapies for AN are likely targeting functional components required for AN recovery, it may also mean further analysis needs to be conducted on what line of treatment may be more appropriate for specific sub-groups within AN to ensure an adaptive and practical treatment approach. This meta-analysis and results from the

MOSAIC trial may also support a staged model of AN in which different stages of the illness may be better targeted by differing treatment approaches (Treasure, Stein et al. 2015).

2.7.2 MANTRA Adaptations / MANTRA as Self-help

Thus, since MANTRA's development, the treatment and model have been adapted to several sub-groups and contexts within the AN population. An ongoing multi-centre cohort study currently in progress by Wittek, Truttmann et al. (2021) is examining whether the observed improvements in AN symptomology, high acceptability and credibility and low drop-out rates in traditional MANTRA will be transferred to an adolescent population. An adapted version of MANTRA 'MANTRa' is being used. The workbook was translated into a developmentally appropriate level in terms of language, design and content, and additional content was added around non-suicidal self-injury and social media. Results are pending the completion of the study, which has an 18-month follow-up. Another very recent study has examined whether MANTRA is feasible when delivered as part of an integrated group format in a study by Startup, Franklin-Smith et al. (2021). Retaining elements of MANTRA's individual administration to foster motivation and individual specific goals, the group format acts as an adjunct 'interpersonal laboratory' or 'live arena' to explore and practice emotional regulation and social problem-solving. Despite the small sample size, results were promising, suggesting acceptability and medium effect sizes in reducing eating disorder cognitions and symptoms. This indicates that MANTRA may also be feasible in an integrated group therapy format.

Yet, some of the most promising adaptations to MANTRA have rested on some of the same principles the model was initially developed on, improving accessibility, dissemination and scalability of specialised treatment for AN through self-help. With promising findings found for manualised pure-self-help in eating disorders as early as the 1990s (Treasure, Schmidt et al. 1996), the translation of the MANTRA treatment model, which is already manualised in its approach, into self-help adaptations appears to be a natural progression. Self-help interventions are ideally based on validated psychological models and designed to be delivered either entirely without (pure) or with minimal input from professionals or peers (guided) (Yim and Schmidt 2019). Thus, one could argue that MANTRA already incorporates elements of guided self-care in its original format. With lower costs, ease of accessibility and flexibility associated compared to traditional outpatient specialist treatment, manualised guided self-help interventions are already widely used as a first step intervention for BN and BED with empirical support (Beintner, Jacobi et al. 2014, Slade, Keeney et al. 2018). One early literature review conducted by Perkins, Murphy et al. (2006) suggested that pure and guided self-help improved all eating disorder symptoms (bar bingeing), psychopathology, and interpersonal functioning in samples of individuals with BN and BED compared to controls.

Unfortunately, the evidence supporting self-help interventions for AN is less robust than that of BN and BED (Fichter, Cebulla et al. 2008). Challengingly, some have also critiqued any attempts at self-care strategies for AN as inappropriate and not worth attempting due to the high ambivalence seen in the disorder, low motivation for change and increased medical risk (Wilson and Zandberg 2012). Despite this early attempts to examine CBT self-help adaptations as an adjunct to inpatient treatment for AN found promising reductions in service utilisation, lower rates of readmission and symptom reduction when administered alongside inpatient treatment as usual (TAU) (Fichter, Cebulla et al. 2008, Fichter, Quadflieg et al. 2013). Attempting to build on these successes, a team including one of MANTRA's original developers sought to examine the feasibility of the cognitive-interpersonal treatment model being adapted as a guided self-care relapse prevention for AN after discharge from specialist inpatient units (Schmidt, Sharpe et al. 2017). The risk of relapse is posited to be as high as 30-50% in the two years after inpatient admission. However while relapse prevention is a critical component in retaining treatment outcomes, it can be complicated by the accessibility of specialist after-care post-discharge and lack of standardisation in care (Khalsa, Portnoff et al. 2017, Berends, Boonstra et al. 2018). Unfortunately, outpatient TAU and aftercare post-inpatient admission can also vary greatly depending on levels of services, geographical location and availability and can have profound implications for long-term recovery (Schmidt, Sharpe et al. 2017).

Considering this lack of standardisation and access to specialist treatment, the original MANTRA patient manual and treatment format was adapted by Schmidt, Sharpe et al. (2017) into iMANTRA (internet-based Maudsley Model of Anorexia Nervosa Treatment for Adults), an online guided self-care treatment with email support for relapse prevention. The trial compared iMANTRA as an adjunct to outpatient TAU compared to outpatient TAU alone. Participants included individuals ≥ 16 years old meeting DSM-IV AN or atypical AN from seven specialist inpatient units in the UK. Individuals with atypical AN typically exhibit the same ED psychopathology as those with typical AN, without dramatic or sudden weight-loss (DSM-5, 2013). Further inclusion criteria required participants were required to not only have undergone a period of inpatient treatment but also have shown clinically significant weight gain during this inpatient period, defined as a minimum of 3kg or 1 BMI point.

In a 12-month intervention, participants were assigned an email therapist and offered up to three times weekly email contact for the first 6-months following their inpatient discharge. Alongside an initial phone call with the online therapist to clarify information and ask questions, participants were required to complete an online questionnaire covering background information to assist their therapist in tailoring their approach to the individual's relapse risk and clinical profile. A revised version of the workbook was used in the intervention covering four key components, spanning awareness of relapse risk, nutrition plans, coping with anxiety-related processes that may be particularly salient in the post-discharge period and strategies to prevent and cope with deterioration and relapse (Schmidt, Sharpe et al. 2017). From months 7-12, participants were offered more flexible email contact with their therapist, between once weekly to monthly. As in the original MANTRA intervention, a motivational therapeutic approach that emphasises support and empathy was prescribed in the iMANTRA intervention. Therapists were specialists in ED who had been trained in preparation to deliver the treatment. Despite this, email contact was designed to be brief, warm and informal, focusing on pointing participants towards the materials in the manual that may be most relevant, emphasising the 'guided' component of self-help.

Despite the small sample size (*n=41*), by the twelve-month mark those receiving iMANTRA demonstrated favourable effects on BMI, depression, anxiety and stress over TAU alone (Schmidt, Sharpe et al. 2017). In support of previous research using the cognitive-interpersonal model, readmission rates were also lower in the iMANTRA group (22.7% vs. 31.2%) supporting the intervention in terms of relapse risk. Aligning with previous findings, the acceptability and credibility of the iMANTRA intervention were also indicated at the 12-month mark, supporting that the high credibility in the MOSAIC trial was not sacrificed when MANTRA was translated to the guided method self-help format (Schmidt, Renwick et al. 2013). However, it is important to note that out of an initial participant pool found eligible in initial screening for the intervention, only 19.5% agreed to participate. Those who did not wish to participate cited preference for another form of treatment, lack of internet access or desire for more intensive aftercare. Unfortunately, this low treatment uptake was consistent with the previous literature examining other interventions based on guided self-help for relapse prevention, with an even lower ratio of treatment uptake of self-help CBT (14.35%) indicated in Fichter, Quadflieg et al. (2013). Thus, while iMANTRA had promising results in its pilot form - low treatment uptake rates reinforce the idea that this type of intervention may be less suitable for certain sub-groups within the AN population.

Other adaptations of MANTRA include a study trial published by Cardi, Ambwani et al. (2015) applying a novel MANTRA-based self-help intervention to the outpatient setting. The SHARED trial sought to examine whether MANTRA as guided self-help would enhance treatment outcomes when extended to the outpatient setting. Developing a six-week guided self-help treatment to be delivered adjunct to outpatient TAU, *Recovery* MANTRA consisted of a self-care workbook, a series of short video clips including recovery narratives, behavioural strategies and anxiety management content. Participants were also provided with weekly text-based guidance from peers with lived experience recovering from an eating disorder. Taking the original MANTRA workbook and translating it into an abbreviated version, the four primary modules are targeted towards difficulties with cognitive processing, emotional functioning, interpersonal style and nutrition. Video clips were available online for participants to access on-demand and download locally when desired. By including peer guidance, the researchers hoped to provide a solution to the current resource constraints posed by specialised AN treatment requiring a highly skilled trained clinician to administer and improve scalability and dissemination (Fairburn and Wilson 2013). This guided self-help with peer support was previously implemented with carers of those with eating disorders within the cognitive-interpersonal model (Goddard, Macdonald et al. 2011).

With disturbances in peer networks and difficulties with social cognition a key feature in AN, this peer-support approach applied to the individual may also have compounded benefits. The evidence reflects that peer-support when added to mental health services, has been shown to have a substantial impact on psychosocial outcomes (White, Foster et al. 2020) and qualitative reports in the eating disorder literature reflects that this addition can also add significant value through normalisation of experiences, inspiration to recover and sharing of insights (Lewis and Foye 2021). Considering the promising evidence in relation to peer-support and information sharing, (Cardi, Ambwani et al. 2015) in the SHARED trial peer mentors underwent comprehensive training and were under close supervision of treatment experts. Like in the iMANTRA intervention, a vital component of the guided support was directing participants to use the self-help materials effectively and purposely. Recruiting across 22 adult outpatient services, participants included individuals who met DSM-5 criteria for AN or atypical AN had a body mass index (BMI) of 18.5 kg/m2 or below had access to the internet (*n* = 187) (Cardi, Albano et al. 2020). Adherence rates to the intervention were reasonably high (83%), and over three-quarters of participants accessed self-help materials during the six-week intervention. Surprisingly, while there was a more significant reduction in anxiety symptoms, improved confidence to make a change and enhanced therapeutic alliance found in the *Recovery* MANTRA condition, group differences on BMI and eating disorder symptoms were not significant from controls (Cardi, Albano et al. 2020).

Recovery MANTRA's lack of impact on BMI and eating disorder symptomology may have resulted from the sample possessing features associated with worse prognosis and a more severe clinical picture at baseline, such as long duration of illness and low weight. This could potentially provide further support for a staging model of illness in that this sample with greater clinical severity may have needed additional support, Ambwani, Cardi et al. (2020) conducted secondary analyses on the SHARED trial data, grouping participants into 'early stage' illness duration (> 3 years) and 'severe and enduring' (> 3 years.) Examining duration of illness, psychological wellbeing and 12-month symptom trajectories and service use, those with severe and enduring AN were found to have more modest treatment gains and worse psychological wellbeing overall regardless of receiving the experimental intervention or TAU. While these findings are not particularly novel in isolation, this does provide some initial support that those with more severe or enduring AN may require more specific treatment strategies outside of *Recovery* MANTRA specifically focused on low mood and psychosocial functioning. Additionally, with up to one-quarter of participants not accessing self-help materials, a familiar pattern emerges where specific self-help adaptations of MANTRA may be more suitable for some individuals than others. Despite this, *Recovery* MANTRA's advances in enhancing confidence in the ability to make a change and anxiety-related processes are promising. This could suggest that one strength of the self-help adaptations of MANTRA lies in targeting ambivalence and enhancing autonomous motivation to engage in treatment which can be critical in the early stages of the illness (Treasure, Stein et al. 2015, Cardi, Albano et al. 2020).

Looking to combine carer processes with the promising, albeit modest, successes of *Recovery* MANTRA, Adamson, Cardi et al. (2019) designed guided self-help intervention ECHOMANTRA for carers and patients transitioning from inpatient to outpatient care. With both ECHO and *Recovery* MANTRA underpinned by the cognitive-interpersonal model, the combination of these two treatment modalities was expected to provide greater intensity and 'wrap-around' care and produce improved traction for change when transitioning from inpatient care to community. An earlier randomised-control trial had already examined the feasibility and efficacy of adjunct ECHO for carers alongside TAU for adolescents with AN (Hodsoll, Rhind et al. 2017). Superiority was found in weight-related variables with fewer transfers to greater intensity of care, that is day or inpatient treatment, in the ECHO group and reduced time burden for carers. Additionally, adolescents in the ECHO group demonstrated moderate-sized improvements in interpersonal difficulties over the controls. Thus, Adamson, Cardi et al. (2019) sought to examine if targeting cognitive-interpersonal maintaining factors alongside carer burden and distress would provide a similar positive impact in adults with more severe presentations of AN. Specifically, the two-pronged approach could reduce readmission rates and symptoms through the ECHOMANTRA interventions.

While ECHO was delivered as an adjunct to treatment in previous trials, ECHOMANTRA provided an integrated intervention for both the individual with AN and their carer. Similar to previous self-help adaptations of MANTRA, ECHOMANTRA included video clips and workbooks aiming to retain treatment outcomes and recovery identity after discharge. Weekly guided-self-help sessions were incorporated with a minimum of five were required, alongside homework prescribed for between sessions. A collaborative approach with the carer was facilitated through joint meals, with practice meals and advice offered by experienced staff to carers and individuals prior to discharge. Carers were also individually provided a workbook, videos, and a full-day workshop focused on psychoeducation and skill training for AN and transition support. Participants were recruited after admission to a national eating disorder service in the UK and were required to have a diagnosis of AN and a nominated carer. Designed to be administered alongside TAU, this trial followed participants through inpatient care through to 3-months post-discharge in the outpatient setting. As in the SHARED trial, participants trended towards greater clinical severity with a low average BMI at admission (M = 13.7, SD = 1.5). This posed an interesting question as to whether the addition of ECHO to target carer processes would result in more significant changes than in the SHARED trial, where the self-help adaptation of MANTRA was given in isolation to the individual with AN.

Finding support for this, those in the ECHOMANTRA group's inpatient stay was on average 4.5 weeks less than the comparison group. Despite this shorter length of treatment compared to controls, those who received the adjunct self-help treatment displayed a significant difference in eating disorder symptomology, which was maintained at 3-months compared to TAU. Significant reductions were also found in depressive symptoms, supporting that ECHOMANTRA's greater intensity may successfully target aspects of low mood identified as a common feature in those with greater clinical severity. However, effects on motivation were negligible, indicating that potentially the intervention had less of an impact on motivation to change in this cohort. Despite promising results for the individual, while there was a reasonable reduction in carer burden there was little change in distress or accommodating and enabling behaviours. However, with many carers in the study who were older and looking after individuals with an enduring presentation of AN, distress and accommodating and enabling were also higher at baseline.

Regardless, ECHOMANTRA was deemed to be a useful and acceptable intervention on behalf of both patients and carers and had substantial impacts on length of inpatient stay and psychopathology. Many identified the positive and motivational stance ECHOMANTRA took as helpful alongside the real-life practical skills identified, stating that the focus on transition was a very positive experience. Despite the lack of a control group, initial results suggest that increasing the intensity of the self-help adaptation of MANTRA through incorporating a carer component for those with more severe presentations or in inpatient settings may be effective. While the evidence base remains relatively recent, there are an increasing number of pilot and feasibility studies investigating self-help adaptations of MANTRA for relapse prevention and transition support. While all these treatments have been supplemented with TAU, it can be tentatively said that the majority of these trials have culminated in positive or, at the least, promising findings. The self-help adaptations of MANTRA and other iterations of MANTRA have reflected positive effects on BMI, eating disorder psychopathology, and broader psychosocial functioning across depression and anxiety. Furthermore, we have an indication that MANTRA as a treatment model may provide significant benefits compared to other interventions across therapeutic alliance, acceptability, credibility and adherence (Adamson et al., 2019; Cardi et al., 2020; Schmidt et al., 2017).

2.8 Pure Self-Help for Early Intervention

However, these self-help adaptations have primarily been designed to either retain beneficial outcomes from inpatient treatment or to enhance outpatient treatment after inpatient admission as usual. This indicates that the target populations in these studies likely at least one-point had greater clinical severity and those self-help adaptations of MANTRA that may have the best impact are those scaled up in intensity to include carer intervention, peer support or greater guidance (Adamson, Cardi et al. 2019, Cardi, Albano et al. 2020). This calls to question whether less complex iterations of the MANTRA model in a pure self-help format may be feasible for earlier intervention. Interestingly in the trial examining the addition of ECHO to TAU, it was found that the addition of telephone guidance had little benefit over those who worked through ECHO as pure self-help; in fact weight-based variables were better in the ECHO alone adolescent group which trended towards a milder clinical presentation when measured by BMI (M = 17, SD = 2.2). It is essential to consider that Stice, Marti et al. (2009) found that while 12% of adolescents experience some form of subthreshold eating disorder, only 13-17% may progress to threshold if provided treatment at this stage. The 91-96%

recovery rate in Stice, Marti et al. (2009) is much higher than that commonly found in those with more severe eating pathology or those that have passed threshold (Fairburn, Cooper et al. 2000, Fichter and Quadflieg 2007), This may suggest that 'dosage' in forms of the intensity of self-help interventions may be effective when delivered in a stepped approach, particularly at the subthreshold stage.

While evidence of pure-self interventions for the early intervention of subthreshold AN remains limited, one recent study examined an online pure self-help program to prevent disordered eating in an at-risk sample of New Zealand and Australian young-adult women (Wilksch, O'Shea et al. 2018). The intervention, which focused on enhancing body image and teaching strategies to mitigate bodily pressures, demonstrated promising results at 12-month follow-up. Lower scores on eating disorder symptomology, general psychopathology measures as well as clinical impairment were observed compared to those who did not complete the intervention. In other research, Deakin University looked at ways to improve the scalability of early intervention for eating disorders in the face of COVID19 restrictions, developing a binge-eating prevention platform, *Break Binge Eating* (Linardon, Rosato et al. 2020). The platform, which provided pure self-help tools and strategies for individuals to break binge-eating habits, had nearly 50,000 users by the end of the first 13-months. Furthermore, most users uptaking resources on the platform were highly symptomatic yet had not experienced any prior treatment based on an initial survey on sign-up.

While concerning so many highly symptomatic individuals had not had any prior support, this growing evidence base does have some promising implications. The first is that there is a high demand for pure self-help tools for eating disorder treatment when ease of access is improved and provided at low cost to the individual. Secondly, all visitors sought the website out voluntarily, with nearly three-quarters of platform visitors reporting significant concern about their symptoms and reasonable motivation to change prior to any treatment. With motivation to change an important predictor of intervention success in AN, and documented to decline as the illness progresses (Hillen, Dempfle et al. 2015, Keshen, Helson et al. 2017), this may suggest a unique window in which an early intervention pure self-help treatment may be particularly effective (Adamson, Cardi et al. 2019).

2.9 The Current Study

Self-help formats may assist to foster a sense of autonomy and independence through a user-led approach early on in the illness (Yim and Schmidt 2019) with early changes in self-efficacy found to be an important treatment outcome (Keshen, Helson et al. 2017). While the literature remains promising, there remains a lack of evidence across all stages of care and levels of intensity in the AN treatment pathway. Furthermore, many of the early intervention pure self-help interventions that have been implemented for eating disorders have centred around psychoeducation or models non-specific to AN. While psychoeducation can be particularly impactful for didactic knowledge transfer to enhance motivation and adherence, alone it does little to target the underlying cognitive-interpersonal factors that maintain illnesses such as AN. The MANTRA workbook, which combines psychoeducation alongside an empirically validated model of development and maintenance, is already designed to be worked through in a self-care manner. Thus, if the workbook was found to be as efficacious and acceptable as has been found in other contexts for the early intervention of adult AN in pure self-help format (Schmidt, Sharpe et al. 2017, Cardi, Albano et al. 2020), this could not only improve accessibility to early specialist treatment but also provide substantial benefits regarding the dissemination and scalability of intervention that has previously been difficult to access.

However, despite gaps in the literature, interventions must be evidence-based for public health implementation. Unfortunately, due to resource constraints it is unrealistic that all potential interventions, no matter how sound their theoretical base, will be able to be subject to rigorous evaluation around their effectiveness and efficaciousness (Bowen, Kreuter et al. 2009). Feasibility studies are one methodologically sound way of evaluating and prioritising which interventions may be most suitable for further and more stringent efficacy testing prior to a full-scale RCT, often associated with a myriad of expenses. In Bowen, Kreuter et al. (2009)'s guidelines around designing feasibility studies, three primary intervention design phases are proposed. The first phase may examine if there is limited evidence the intervention will work, for example, if exposure to the intervention may be associated with better outcomes than those not exposed. This is often done using a case-series or cohort design, thus while it cannot assume directionality of effects, confounding variables or timing provides an initial foundation for further research. The second phase seeks to address ‘does it work’, potentially trialling the intervention using a pre-and post-design in realistic conditions. The third phase, ‘will the intervention work’, will often look to adapt an interventions method of delivery or apply the intervention to a new sub-group within the target population ,often referred to as ‘expansion.’ Feasibility studies therefore provide a clear path to establishing which interventions should progress to the RCT phase, and what adaptions may be necessary to get them there with lesser resource constraints.

Thus, a feasibility study translating the self-help specialist psychological treatment (MANTRA) for mild to subthreshold AN is of value. Suppose self-help treatment (MANTRA) was found to be as efficacious and acceptable as has been found in other settings Field (Schmidt, Sharpe et al. 2017, Adamson, Cardi et al. 2019, Cardi, Albano et al. 2020, Wittek, Truttmann et al. 2021). In that case, this may further improve accessibility to early specialist treatment for those with subthreshold/mild AN and remove some traditional barriers to treatment seeking. Furthermore, if the self-help workbook intervention is feasible without guidance, there is potential to alleviate financial and time burdens for healthcare providers and clinicians.

The current study will consider how those with mild AN receive a specialist self-help psychological treatment (MANTRA), the practicality of such an intervention where resources are limited, whether similar beneficial outcomes will be found as existing literature and possible indications of efficacy. Keeping in line with the fundamental goal of feasibility research, the research will be conducted with a longer-term view of informing a larger randomised control trial (RCT) (Bowen, Kreuter et al. 2009).

2.9.1 Study Aims

Thus, the current study examines the feasibility of a psychological self-help workbook intervention (MANTRA) for early intervention in adult AN. Within this objective there sits a number of specific aims:

1. Limited efficacy testing of the workbook intervention to reduce AN symptomology.

2. Examine key indicators of engagement and response through clinical and demographic markers.
3. Explore the feasibility of a recently published self-help workbook in terms of expansion outside of the UK, acceptability to recipients, the practicality of a self-help workbook without outside intervention with existing resources.
4. Assess recruitment and retention and investigate specific obstacles that may arise to recruitment and retention in the New Zealand context.
5. Evaluate outcome measures for appropriateness

3. Methodology

3.1 Design

The study was an open trial with a pre-and post-consecutive case-series designed to examine the feasibility and preliminary evidence for a specialist psychological self-help intervention (MANTRA) in the early intervention of adult AN. All participants were allocated to the treatment. The study was employed with the intention of informing a later RCT.

The case-series approach was primarily used for its key advantages of requiring fewer financial resources and time than a full-scale RCT. However, this exploratory design also serves as an early foundation upon which further empirical knowledge and progress can be built upon. Considered appropriate for refining new treatments or study protocols before the more rigorous assessment, what case-series may lack in strength of evidence they often make up for in their sensitivity to novelty and early detection of adverse or beneficial effects (Vandenbroucke 2001). In addition, case-series are well known for their high external validity due to containing a diverse range of participants that reflect the population of interest and application to clinical practice (Kooistra, Dijkman et al. 2009)

Despite the lack of a control group, a structured methodological approach was still applied following Bowen, Kreuter et al. (2009) guidelines for the design of feasibility studies. Our five study aim address the key areas of focus for feasibility research as outlined by Bowen, Kreuter et al. (2009), spanning expansion, acceptability, practicality and limited-efficacy testing. Using a mixed-methods approach, both quantitative and qualitative data will be leveraged throughout the study to address key aims.

3.2 Participants

Participants were individuals 18 years or older who met The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM–5; American Psychiatric Association, 2013) criteria for mild to subthreshold AN (Body mass index > 17.0 BMI). Participants were required to be medically stable throughout the study and retain a BMI of at least > 17.0. Inclusion criteria was kept relatively broad to capture the heterogeneity of those with mild to subthreshold AN. If these requirements were not met, participants were discharged from the study and referred for alternative treatment.

Exclusion criteria included a history of current or specialist eating disorder treatment, psychosis or current suicidal ideation to avoid confounding effects or further health risks and ensure that participants were able to successfully engage in treatment.

While no specific residential location was required to undertake the treatment, in-person data-collection was based in Auckland at either a private clinical practice or UOA clinic rooms. Online data-collection was emailed to participants to complete in their own time. Participants could self-refer to the study through flyers/study website (advertised in community spaces and community mental health channels) or be referred through primary care, a mental health professional or word of mouth.

3.3 Intervention

3.3.1 The Maudsley Model of Anorexia Nervosa Treatment for Adults (MANTRA)

MANTRA is a specialist psychological workbook-based treatment for AN based on the model by Schmidt and Treasure (2006). The current study examined MANTRA as a standalone pure self-help workbook intervention using the patient workbook published by Schmidt & colleagues (2018).

MANTRA is an evidence-based cognitive-interpersonal model of AN. The model targets both the intra- and interpersonal maintenance factors of AN and focuses on evidence-based traits associated with AN. The theory underpinning MANTRA is that adult AN is maintained by four-broad factors, positive beliefs about the value of AN, rigid thinking style, avoidance of emotion and expression and difficulty in interpersonal relationships. The model is designed to be both theory and data-driven while also considering patient experience and flexibility (Schmidt, Wade et al. 2014).

3.3.2 MANTRA Workbook (current intervention)

Participants received an interactive workbook at baseline developed by Schmidt, Startup et al. (2018) designed to engage participants in the MANTRA model through reading, pictures, checklists, and activities to complete throughout. 10 broad treatment modules are covered throughout the book, with target content aligned with the cognitive-interpersonal model of AN. The content is designed to build upon each subsequent section, moving from content less or more likely to be considered emotive in a graded fashion (Schmidt, Wade et al. 2014).

Table 1.

Overview of MANTRA Workbook Content

Workbook Module	Target Content
Module 1: The Background to MANTRA	- Treatment overview and evidence base
Module 2: Getting started	- Engagement and exploration of motivation to change - Identifying pro-anorectic beliefs and functionality of AN - Externalisation and value exploration
Module 3: No (wo)man is an island – working with support	- Involving supports - Importance of social connections - Helpful and unhelpful responses of close others
Module 4: Improving your nutritional health	- Assessment of medical risk - Nutritional health and psychoeducation - Nutritional change plan with supports and blocks
Module 5: My anorexia nervosa: Why, what and how?	- AN Formulation - Identification of unique strengths, needs, characteristics and other illness maintenance and development factors

Module 6: Developing treatment goals	- Effective goal setting - Behavioural experimentation - Identifying aspirations and concerns
Module 7: The emotional and social mind	- Emotions - Context/Patterns of emotions in interpersonal relationships - Managing emotions and self-compassion
Module 8: Exploring thinking styles	- Identifying thinking styles - Impact of detail orientation, anxiety perfectionism and cognitive flexibility
Module 9: Identity	- AN and identity - Developing/Practicing a new identity beyond AN
Module 10: The virtuous flower of recovery from anorexia	- Maintaining treatment progress - Managing potential future obstacles

While participants were provided a suggested reading schedule that aligned with the 12-week intervention, it was encouraged that individuals work through the workbook at their own pace and decide which workbook modules or sections are most relevant. Participants were able to contact the researchers regarding administrative questions, they were unable to ask for further information regarding workbook content. This was implemented as the study was geared toward increasing access to eating disorder treatment in the primary care sector where participants may not have frequent access to a supporting clinician.

3. 4 Measures

A number of in-house questionnaires, diagnostic interviews, neuropsychological assessments and psychometrics were administered to participants at differing timepoints throughout the study. For clarity, these have been organised by study outcome.

3.4.1 Primary and Secondary Outcomes

Primary outcomes

1. Change in Anorexia case status based on the Structured Clinical Interview for DSM-5 Diagnosis - Clinical Version (SCID-5-RV; First et al., 2015) at Baseline and 12-weeks.

Diagnostic Interview

The Structured Clinical Interview for DSM-5 (SCID-RV, (First 2014) with extended Module H pertaining to feeding and eating disorders was used as a guide for the diagnosis of mild to subthreshold AN alongside current and lifetime disordered eating pathology. This is a semi-structured clinical interview guide that is designed to be administered by a mental health professional for making DSM-V diagnoses. Module H was applied as modified in Kaye et al. (2008) for AN classification.

Kaye et al. (2008)'s modifications adjust criteria to include those who also purged or have occasional binge eating episodes, however not at a frequency to indicate "regular" binge eating. The rationale behind this was designed to capture the variation often seen in the clinical picture of AN. Based on this interview, five diagnostic classifications were recorded for included participants. These included both 1) Anorexia Nervosa - Restricting subtype (AN-R) and 2) Anorexia Nervosa – Binge/Purge subtype (AN-BP) of mild severity. Other included classifications were 3) Atypical Anorexia Nervosa or Other Specified Feeding or Eating Disorder (OFSED) indicating predominant symptoms of AN/eating disorder without full criteria being met (e.g. BMI > 19.) The final two included categories were 4) subthreshold

Anorexia Nervosa either in partial remission or 5) without a lifetime history of AN, e.g. individuals with soft cognitions relating to AN and minimal weight-loss.

2. Change in Eating disorder psychopathology assessed using the Eating Disorder Questionnaire (EDE-Q) at Baseline, 12-weeks and 24-weeks.

Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn and Beglin, 1994)

The Eating Disorders Examination Questionnaire is a 41 item self-report questionnaire that provides a measure of the range and severity of eating disorder attitudes and behaviours across four domains: eating restraint, eating concern, shape concern and weight concern. The questionnaire assesses explicitly disordered-eating behaviour frequency over a four-week period. The questionnaire was derived from the Eating Disorder Examination (Fairburn, Cooper et al. 1993), a comprehensive interview schedule that focuses on the psychopathology of disordered eating behaviours. This focus on behaviours and frequency has been credited with avoiding some of the symptom denial that may be seen in ED, or more specifically AN psychopathology. The EDE-Q may also be a solid case-finding questionnaire for AN, with significantly higher scores found for AN cases over healthy controls compared to other eating disorder inventories (Engelsen and Laberg 2001).

Validity studies have indicated that the EDE-Q has a high level of agreement with the EDE when assessing dietary restraint in the general population (Fairburn and Beglin 1994). The EDE-Q has demonstrated high discriminant validity when identifying the presence of eating disorders in clinical versus general populations when using the global score (Aardoom, Dingemans et al. 2012). Additionally, the global score and all four subscales of the EDE-Q have demonstrated excellent internal consistency with Cronbach's alpha coefficients across the s global score ($\alpha = .95$), restraint ($\alpha = .85$), eating concern ($\alpha = .81$), weight concern ($\alpha = .83$) and shape concern ($\alpha = .91$). The EDE-Q has also demonstrated high test-retest reliability ($r = .94$) (Luce and Crowther 1999, Aardoom, Dingemans et al. 2012). Since the EDE-Q's conception, several large-scale studies have established general population norms for adult women in Australia and comparative norms across the general population and clinical ED groups (Mond, Hay et al. 2004, Aardoom, Dingemans et al. 2012).

3.4.2 Secondary outcomes

3. Change in Clinical impairment secondary to eating disorder assessed using the Clinical Impairment Assessment (CIA; Bohn and Fairburn, 2008) at 12-weeks and 24 weeks.

Clinical Impairment Assessment (CIA; Bohn and Fairburn, 2008)

The CIA includes 16 items designed to assess the severity of psychosocial impairment secondary to eating disorder features. Items cover impairment in domains of life that are typically affected by eating disorder psychopathology: mood and self-perception, cognitive functioning, interpersonal functioning and work performance. The questionnaire is designed to be completed after a measurement of eating disorder features, so these are salient in the individual's mind. The questionnaire focuses on the past 28 days and aims to provide a straightforward single index of psychosocial impairment to aid diagnosis and treatment.

In samples of those at high risk of eating disorder onset, the CIA has been found to be a reliable measure with high internal consistency ($\alpha = 0.93$) with good convergent validity to the EDE-Q global score (range $r = .62$ -.70) (Vannucci, Kass et al. 2012, Jenkins 2013). Additionally, robust discriminant validity has been demonstrated not only between community and clinical samples but also when identifying across different levels of ED severity (Bohn, Doll et al. 2008, Vannucci, Kass et al. 2012)

4. Change in General psychopathology measured using the Depression Anxiety & Stress Scale (DASS-2; Brown et al., 1997) at 12-weeks and 24 weeks

Depression Anxiety & Stress Scale (DASS-21; Lovibond & Lovibond, 1995)

The DASS-21 is a 21-item measure of general psychopathology measuring distress along the three axes of depression, anxiety and stress. Brief to administer, the DASS-21 provides an efficient yet robust measure of depression, anxiety and broader psychological distress. There is high comorbidity documented in the literature between AN, depression and anxiety, with anxiety-related processes substantially hindering treatment (Pollice, Kaye et al. 1997, Kaye, Bulik et al. 2008, Sternheim, Startup et al. 2012).

The DASS-21 demonstrates good convergent and discriminant validity with other measures of depression and anxiety in large-scale samples representative of the general population (Henry and Crawford 2005). In the same study, internal consistency was found to be excellent (α = .88).

5. Change in change readiness as measured by the Decisional Balance (DB; Cockell et al., 2002) at 12-weeks and 24-weeks.

Decisional Balance (DB; Cockell et al., 2002)

The DB is a 30-item self-report questionnaire designed to assess both the negative and valued consequences of eating disorder pathology from the perspective of the participant. Decisional balance has been identified as key to influencing how receptive individuals are towards change and recovery across disorders (Cockell, Geller et al. 2003). Developed as an AN specific framework, the questionnaire covers 3-subscales, covering the perceived burdens and benefits of the disorder and functional avoidance often seen in AN. The scale is designed to indicate those in the pre-contemplation stage of change, as opposed to those who are seriously contemplating recovery and assist in identifying specific areas that may be targeted for motivation-enhancement interventions (Cockell, Geller et al. 2003).

In a large clinical sample of individuals with a current, subthreshold or historic diagnosis of AN, the DB was found to have good internal consistency across the three subscales (α = .88). Acceptable test-retest reliability was found within the same sample (ranging r = .64 – .71) (Cockell, Geller et al. 2002). In a later follow-up study, the DB was found to have good discriminant validity when distinguishing between individuals at different stages of change (pre-contemplation, contemplation and action) as well as convergent validity with measures examining the cognitive, affective and behavioural processes of change (Cockell, Geller et al. 2003).

6. Participant qualitative evaluation regarding treatment credibility, acceptability, perceived effectiveness, and workbook usage assessed using an in-house process evaluation questionnaire at 12-weeks and 24 weeks.

12- Week Feedback Questionnaire (in-house)

An in-house questionnaire was developed to capture participant opinion regarding treatment credibility, acceptability and perceived effectiveness at discharge from the study. The questionnaire included open and closed questions regarding most and least helpful sections, participant suggestions and perceived advantages and disadvantages. The questionnaire also included workbook usage metrics. For copy of the questionnaire please see Appendices.

24- Week Feedback Questionnaire (in-house)

An in-house questionnaire was developed to capture whether participants continued with the workbook in the 12-weeks since discharge, perceived credibility and acceptability and further engagement with additional eating disorder treatment. The questionnaire also included workbook usage metrics. For copy of the questionnaire please see Appendices.

7. Indicators of engagement measured using demographic, neuropsychological test battery, eating disorder traits as measured by the EDI-3 and self-report measures collected at baseline between completers and non-completers.

Demographic questionnaire

A brief demographic questionnaire was developed to obtain participant age, ethnicity, gender, education, illness duration and other demography. This information was used to examine key demographic markers of engagement. This information was gathered at the baseline assessment, kept separately from other study data and destroyed at the conclusion of the study.

Neuropsychological Test Battery

- *Wechsler Abbreviated Scale of Intelligence (WASI-II; Wechsler, 2011*)

The Weschler Abbreviated Scale of Intelligence is an abbreviated assessment of intelligence consisting of four subtests: Block Design, Vocabulary, Matrix Reasoning and Similarities. The assessment is designed as a short form to the Weschler Adult Intelligence Scale Fourth Edition (WAIS-IV) allowing administration of all four sub-tests in approximately 30-minutes. Deficits in visuoperceptual tasks (Block Design and Matrix reasoning) has been demonstrated in AN (Schmidt, Startup et al. 2018).

The current study used the WASI-II as a brief estimate of full-scale intelligence quotient (IQ), alongside verbal comprehension and perceptual reasoning performance. Raw scores and t-scores were recorded for each of the four subtests. Three index scores were computed: Verbal comprehension index (VCI), perceptual reasoning index (PRI), full-scale intelligence quotients for both the four subtests (FSIQ-4) and two subtests (FSIQ-2) composite scores and percentile ranks were also recorded. The WASI-II has demonstrated excellent internal consistency for VCI, PRI, FSIQ-4, and FSIQ-2 scores, at $\alpha = .95$, .94 and .97, respectively. The WASI-II has also demonstrated excellent concurrent validity against the WAIS-IV (range $r = .71 - .92$) (Wechsler 2011, McCrimmon and Smith 2012).

- *Rey–Osterrieth Complex Figure Test (ROCF; Meyers & Meyers, 1995)*

The Rey–Osterrieth Complex Figure Test (ROCF) is a neuropsychological task used to measure memory and visuo-constructional ability in which individuals are asked to reproduce a complex figure. The ROCF has increasingly been adopted as an indication of central coherence in eating disorders (Lang, Roberts et al. 2016).

The assessment measures accuracy, processing style, and order by examining how they copy a complex figure. The recall component of the task was omitted as central coherence is generally considered to be best measured using the direct copy component (Lang, Roberts et al. 2016). In the task, participants were presented with a figure and a blank piece of paper. A predetermined order of colour pencils was used to copy the figure. The researcher sequentially swapped out the colours based on when the participant completed an element or moved on to another section. The task was video-recorded, and the order that the pencils were presented in was black, green, gold, brown, pink, light blue, red, yellow and orange. Participants were also video recorded completing the exercise to ensure the reliability of scoring and the ability to score scores again by a second researcher.

Using Booth's (2006) scoring system with modifications suggested in Lang, Roberts et al. (2016), participants were scored on the order they chose to draw elements and the style in which they were drawn in. These two scores are then calculated to gain the Central Coherence Index (CCI). This approach examines whether individuals choose to draw more global or local elements first, as well as noting if their approach is more fragmented or coherent. Lower CCI scores indicated weaker central coherence. Lang, Roberts et al. (2016) collated data from approximately 1000 individuals with current or prior histories of eating disorders on the RCFT. These robust bench markers, instructions and scoring guidelines will be used in the current study. When following these guidelines' inter-rater reliability has been found to be good to excellent (*range r =* .71 - 0.97).

- *Brixton Spatial Anticipation Test (Burgess and Shallice, 1997)*

The Brixton test is a neuropsychological test of executive function and set shifting. Set-shifting is defined as the ability to 'shift' back and forth between multiple tasks or mental representations, with performance on set-shifting related to an individual's cognitive flexibility (Roberts, Tchanturia et al. 2007). The task consists of 56-trials in which participants are asked to predict where a blue circle will move to next. The circle moves location after each trial, and occasionally the pattern changes; at this point the participants need to abandon the previous concept and adapt to a new concept. Participants are scored on their total number of errors, as well as their scaled errors.

The Brixton test has been found to have satisfactory convergent validity with other assessments of set-shifting executive function such as Trails Making Test and comparably acceptable test-retest reliability to traditional measures of executive functioning such as the Wisconsin Card Sorting test (*ranges* $r = 0.61 - 0.71$) (Van Den Berg, Nys et al. 2009).

- *The "Reading the Mind in the Eyes" Test (RMET; Baron-Cohen et al., 2001)*

The "Reading the Mind in the Eyes" Test (RMET) is a test designed to measure social cognition and theory of mind (ToM). ToM is defined as the ability to draw on socially salient information in the physical world to draw conclusions around the thoughts, feeling and mental states of others (Thye, Murdaugh et al. 2018).

The revised version of the RMET was used with 36-items with an approximately equal split across male and female faces. For each trial, the participant was shown a black and white photograph of a pair of eyes reflecting a complex mental state. They then chose four target words which best reflected the mental state shown in the picture. Target word definitions were provided if needed, and no time limit was imposed. The total number of correctly identified mental states was recorded alongside the total correct for each gender.

The RME was found to have satisfactory convergent validity with other measures of ToM (Olderbak, Wilhelm et al. 2015), and in a sample of women with AN the RME was found to possess good concurrent validity with other measures of empathy and alexithymia (Redondo and Herrero-Fernández 2018). A systematic review has found test-retest reliability to be satisfactory to good values with r values ranging from .65 and .83 (Redondo and Herrero-Fernández 2018).

Self-Report Measures

- *Eating Disorders Inventory-Third Edition (EDI-3; Garner, 2004)* *

The EDI-3 is a 91 item self-report questionnaire organised into 12 primary scales, 3 of which consist of eating-disorder specific scales and 9 general psychological scales relevant to eating disorders. The eating disorder-specific scales consist of drive for thinness, bulimia, body dissatisfaction. The 9 general psychological scales include low self-esteem, personal alienation, interpersonal insecurity, interpersonal alienation, interoceptive deficits, emotional dysregulation, perfectionism, asceticism, and maturity fears. Six composite scores are computed from the questionnaire, Eating Disorder Risk and five other psychological constructs Ineffectiveness, Interpersonal Problems, Affective Problems, Overcontrol, General Psychological Maladjustment. The EDI-3 includes response style indicators to identify potential threats to validity common in the ED patients, measured by 3 indicators of infrequency, inconsistency and negative impression. These assist with identifying potential approval seeking or denial (Cumella 2006). While the EDI-3 demonstrates some overlap with the EDE-Q, both are frequently used in eating disorder intervention studies so were included in the interests of completeness and cross-study comparison.

The EDI-3 has been found to discriminate significantly ($d = .71$, $p < .001$) and strongly between clinical patients diagnosed with either AN or BN as per DSM-IV and non-clinical community controls (Clausen, Rosenvinge et al. 2011). Additionally, in a study examining female patients diagnosed with ED alongside females at risk for ED, the EDI-3 was found to correctly identify 99% and 94.2% respectively (Segura-García, Aloi et al. 2015). Sound reliability has been demonstrated for the EDI-3 scores in the clinical patient group, alongside good internal consistency on seven of the 12 subscales for patients and 8 of the 12 for community controls ($\alpha = .80$) (Clausen, Rosenvinge et al. 2011).

For descriptions of the remaining self-report measures evaluated under this study aim please see above.

- *Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn and Beglin, 1994)*
- *Clinical Impairment Assessment (CIA; Bohn and Fairburn, 2008)*
- *Depression Anxiety & Stress Scale (DASS-21; Lovibond & Lovibond, 1995)*
- *Decisional Balance (DB; Cockell et al., 2002)*

8. Evaluate intervention uptake, recruitment and retention

Uptake of the intervention was evaluated by the number of participants who read at least two-thirds of the workbook modules between baseline and 12-weeks as in Cardi, Albano et al. 2020. Recruitment was evaluated through referral sources and recruitment rates during the active period of study recruitment. Retention was examined through drop-out rates and reasons for drop-out.

For all feasibility aims, observational data by researchers was supplemented where appropriate to provide enrichment. A summary of all measures by time-point is shown in Table 2.

Table 2.

Summary of measures used in the study

	Measure	Time Point		
		Baseline	12-weeks	24-weeks
Demographics and Informed Consent	Demographic form	✓		
	Informed Consent form	✓		
Neuropsychological Assessment	WASI	✓		
	Brixton	✓		
	Rey	✓		
	Reading the Mind in the Eyes	✓		
Psychometric Questionnaires	EDI-3	✓	✓	✓
	EDE-Q	✓	✓	✓
	CIA	✓	✓	✓
	DASS	✓	✓	✓
	DB	✓	✓	
Feedback Questionnaires	12-week feedback questionnaire		✓	
	24-week feedback questionnaire			✓

3.5 Procedures

3.5.1 Recruitment procedure

Participants were recruited from April 2020 to June 2021. Recruitment channels such as GP surgeries, community-based mental health practitioners (e.g., private and university counsellors), and mental health support services (e.g., Eating Disorders Association of NZ) were provided with a letter or email inviting them to contribute to recruitment in the study. The letter of invitation detailed participant entry criteria and enclosed a copy of the participant information sheet. Referring agencies, with consent, were able to email the researchers with participant details, or participants could also self-refer. Community mental health services were also invited to share the study via social media (either via independently written posts, linking to study website/flyer/Instagram or in online support groups.) The study website and Instagram account were directly linked to full participant entry criteria and information sheets for both potential participants and recruiters. The study was also promoted through hard-copy flyers in academic spaces (various Auckland university campuses) and community spaces (gyms, community centres and community mental health services), calling for those engaging in disordered behaviours around eating and exercise. Please refer to the appendices for a copy of these flyers. The ethics committee approved all channels prior to recruitment.

All channels directed interested participants to the study coordinator's email address, where they were again provided with the full participant information form. Potential participants were then invited to schedule a triage call with a clinical psychologist to briefly (5-10 minutes) confirm eating disorder features within the AN spectrum and other inclusion and exclusion criteria. If participants were excluded at this stage due to low BMI or location, they were offered an emailed list of resources to assist them in finding alternative treatment. Individuals assessed as meeting study criteria were then invited to schedule an initial appointment with the study coordinator.

3.5.2 Assessment procedure

Baseline (+0 weeks)

Participants were invited to an initial assessment session with the study coordinator and clinical psychologist at the University of Auckland Clinical Research Centre after the triage call. In this session, participants were first required to complete informed consent and a demographic questionnaire with the study coordinator. Following this, the clinical interview (SCID-RV, (First 2014) was conducted with the clinical psychologist in which participants were allocated a diagnosis based on AN features and severity, assessed for comorbid psychiatric conditions (including current suicidal ideation) and asked to self-report on their confidence, importance and effort with changing eating disorder features and behaviours. The clinical psychologist conducted heighting and weighting of the participant for sensitivity, and blind weighing was offered.

Following this, the trained study coordinator conducted a neuropsychological battery of assessments to assess neurocognitive functioning. The participant was then introduced to the self-help treatment workbook, suggested reading schedule and upcoming assessment dates. All self-report measures were be sent to the participant via email to complete on Google Forms (via the University of Auckland) after the initial assessment with instructions to complete within 3-days of the initial evaluation. The EDI-3 (Garner 2004) was the exception to this, which was completed on paper in the transition between clinical interview and neuropsychological assessment to create a richer diagnostic picture at baseline. With participant permission, a letter informing the participant’s G.P. of their engagement with the study and any diagnoses determined by the clinical psychologist was sent as part of due diligence for physical wellbeing.

Study Discharge (+12 weeks)

Participants were assessed 12-weeks after baseline in a final in-person discharge session that corresponded with the end of the recommended reading schedule for the self-help workbook. The session was conducted with a Clinical Psychologist at the University of Auckland Clinical Research Centre as in baseline assessment or via Microsoft Teams if in person was not possible. Participants were then assessed again in a clinical interview (SCID-RV, (First 2014) to reassess diagnostic status and updated heighting and weighting was taken if the assessment was in person. Participants were then emailed the full battery of self-report questionnaires to complete and a 12-week feedback questionnaire and asked to complete these as close as possible to the discharge appointment.

At the end of the appointment, participants were officially discharged from the study and provided or sent a $40 NZD voucher as a token of appreciation for participating. With the participant's permission and in line with best practice clinical care, a brief study discharge letter was sent back to the GP after study discharge to indicate whether ongoing treatment intervention was indicated as assessed by the clinical psychologist.

Follow-up (+24 weeks)

Follow-up post-study discharge is a critical component of determining the longer-term effects of the intervention. Thus, at 24-weeks after study discharge, participants were be sent a battery of questionnaires administered via online format (Google Forms via University of Auckland.) Previous studies have indicated improvements using MANTRA seen at 24 weeks (6 months) are likely to be maintained at both the 12-month and 24-month timepoints (Schmidt, Ryan et al. 2016).

3.5.3 Harm Management

As the participant group is a high-risk cohort, many risk management processes were incorporated into the study. When participants enrolled in the study, permission was asked to contact their G.P. to provide the assessment diagnosis and allow for appropriate medical monitoring throughout the study. If at any point a higher level of care was indicated due to active suicidality, psychosis or medical risk issues, participants were released from the research and their G.P's contacted with recommendations made for appropriate supports. This assessment was made by a clinical psychologist conducting the assessment. They also completed a mood screen (DASS-21) at each time point throughout the study, allowing for further psychosocial risk screening.

3.5.4 Data Analysis

The overarching aims of examining the acceptability, feasibility, practicality, expansion of the intervention and predictors of treatment engagement and response will be evaluated using the primary and secondary outcomes detailed in 3.4.1 and 3.4.2. Sample size calculation was not done as the final number of participants was unable to be determined at study outset. No randomisation was conducted due to study design.

Change in AN case-status was examined on a case-by-case basis as well as percentage of the sample that moves to a milder case-status by end of intervention.

Change in eating disorder psychopathology (EDE-Q scores), clinical impairment (CIA scores), general psychopathology (DASS-21 scores) and change readiness (DB scores) were examined using paired-before and after calculations at 12-weeks and 24-weeks. As this is a pilot study, confidence intervals were estimated as well as p-values where relevant. This paired approach will enhance low statistical power in a small sample.

Evaluation regarding treatment credibility, acceptability, perceived effectiveness, and workbook usage was examined through thematic analysis of participants comments provided in qualitative feedback questionnaires. This included grouping statements by theme and providing a percentage based on number of participants who shared this sentiment.

Treatment response and engagement variables of interest included all participant demographics, neurocognitive profile and psychometric data provided by the EDI-3, EDE-Q, CIA, DASS-21 and DB. Participants were split into two sub-groups based on completing discharge or not; ‘completers’ and ‘non-completers.’ Analyses was then done on between-group differences. As this is was a pilot study, confidence intervals were estimated as well as p-values where relevant.

3.5.5 Data and Security

Participant coding was used to keep data separate from any personally identifying data. Online data was kept password secure in one database with only the study coordinator and clinical psychologist/research fellow having access. Hardcopy data was held in a locked filing cabinet at the Clinical Research Centre in an area only accessible by key card. Personal identifying information such as demographic questionnaires and consent forms were kept in a separate secure location to participant data and destroyed at the study's conclusion. All raw data on which the project results depend will be retained in secure storage for ten years, after which they will be destroyed.

3.5.6 Ethics and Informed Consent

The study was submitted for review on the 23/10/19 to the Health and Disability Ethics Committee (HDEC) reference 19/STH/189 and was approved on the 16/12/19. Additional ethics approval was sought and approved for recruitment via social media channels on 5/08/20, reference 19/STH/189/AM05.

Participants were required to complete paper informed consent forms (please see appendices) available at their first onboarding meeting, which required a signature as consent and were stored in a secure location.

3.5.7 Trial Registration

This trial was prospectively registered with the Australian New Zealand Clinical Trials Registry (ANZCTR) (ACTRN12620000078954).

4. Results

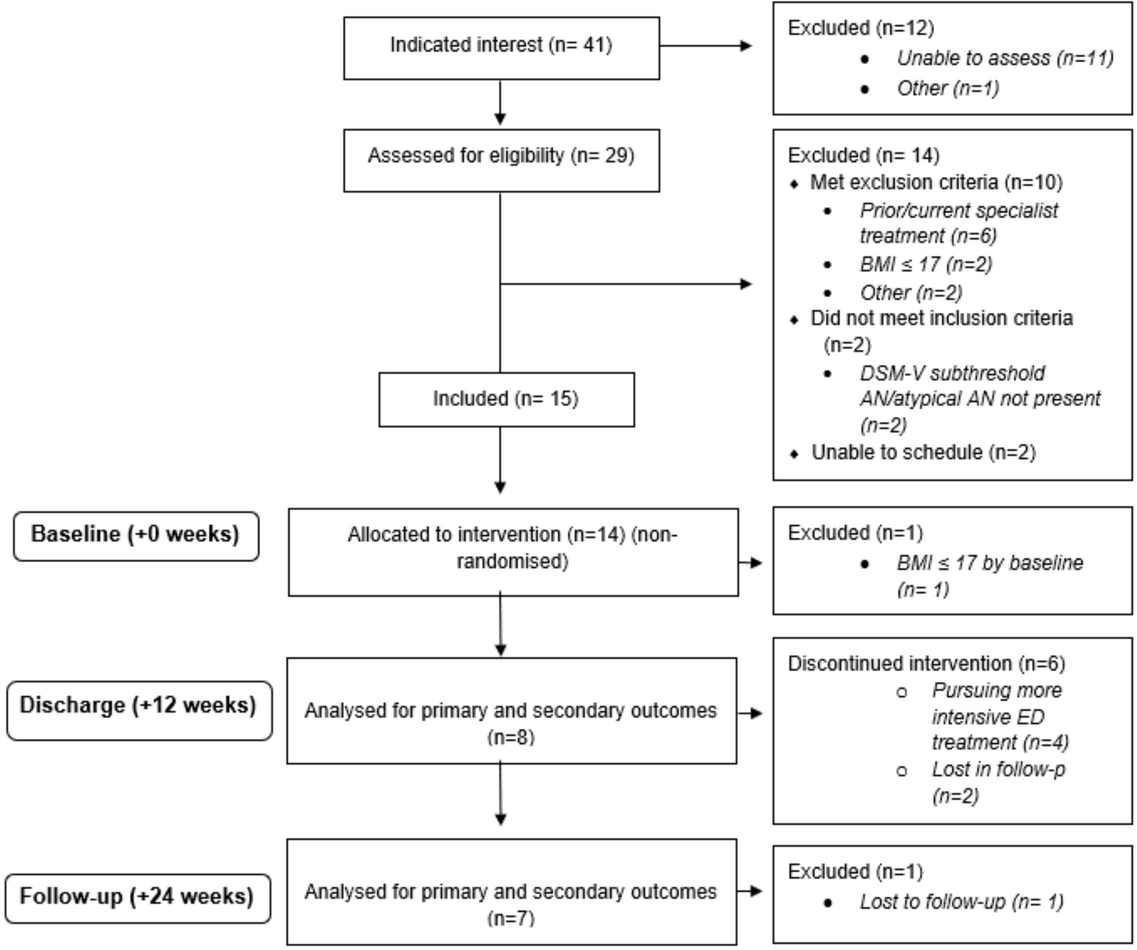
This section describes the recruitment, sample demographics and results from the current study against the key study outcomes.

4.1 Participant flow and Recruitment

14 participants were allocated to the intervention, with a total of 8 participants completing the study discharge. Analysis of demographics and primary outcome measures will include the 8-participants who completed study discharge. For secondary outcome measures 6 (indicators of response and engagement) and (uptake, recruitment and drop-out) analysis of all onboarded 14 participants may be included where appropriate. Participant flow is shown in. Table 3.

Table 3.

Participant Flow



Recruitment commenced in early 2020, with an initial recruitment goal of 50 participants set. This number was determined intended to provide a robust study sample from which limited population inferences could be made when considering the open-trial case-series study design. While the study was initially planned to be approximately one-year, recruitment was significantly delayed by COVID-19 and recruitment was concluded in June 2021.

One participant was onboarded then excluded due to dropping below the required BMI by baseline. This is shown between 'Included' to 'Baseline' on Table 3.

4.2 Demographics & Baseline Data

Participants were aged from 19 - 30 years old at initial assessment with an average age of 23.1 years of age (*SD* = 3.68). The majority of participants in the sample were female (87%) and identified as New Zealand European/Pakeha (75%). Most participants were born in New Zealand (75%) and identified with one ethnicity only (75%.) In terms of relationship status, most identified as defacto (63%). All participants had achieved at least NCEA Level 3 or equivalent, with the majority possessing an undergraduate degree (75%.) Most participants were tertiary students (88%), with the remainder partaking in full-time work (13%). For complete general demographic information, please refer to Table 3.

The majority of participants were diagnosed with subthreshold AN (75%), either in partial remission or with no lifetime history, which was the primary target population for this intervention. 25% of all participants met the threshold for AN restricting subtype. Thus, 25% of participants met the clinical threshold for AN (AN-R).

On average, participants had first noticed the onset of AN symptomology at approximately 14-years old (*M* = 13.6, *SD* = 9.4), with one participant reporting age of onset as early as 8-years old (range 8 – 18 years.) Participants had varying degrees of illness duration, with the shortest time 2 years and the longest being 20 years (*M* = 9.38, *SD* = 5.78). Participant BMI at intake ranged from 18.4 to 32.7, with an average BMI for the sample 24.3 (*SD* = 5.12). When asked out of 10 around their motivation to change, 50% of participants rated the importance of change above a ‘7’ and 50% rated their confidence in change a ‘7’ or higher. 75% of participants rated their effort towards making a change above a ‘7’.

4 of 8 participants (50%) had co-morbid psychopathology, with 13% diagnosed with comorbid Major Depressive Disorder (MDD), 25% with co-morbid Generalised Anxiety Disorder (GAD) and 13% Post-Traumatic Stress Disorder on intake.

Table 4.2.1

Demographic Characteristics of Participants at Baseline

Baseline characteristic	Completed Intervention	
	n	%
Gender		
Female	7	87
Male	1	13
Marital status		
Single	3	38
Married	-	-
Defacto	5	63
Age Group		
18 to 24	6	75
25 to 29	1	13
30+	1	13
Employment		
Full-time	1	13
Student	7	88
Highest level of education		
NCEA Level 3	1	13
Undergraduate degree	6	75
Postgraduate degree	1	13

Eating Disorders Inventory-Third Edition (EDI-3; Garner, 2004)

To gain a complete clinical picture of eating disorder psychopathology in the group at baseline, the EDI-3 was administered. This assessment examines psychological traits/facets associated with eating disorders providing scores that indicate whether levels of these facets are present that are uncommon in those without eating disorders.

Participants overall scored at levels common in those with clinical eating disorders across Eating Disorder Risk (EDRC), Interpersonal Problems (IPC) and Overcontrol (OC) subscales. This indicates eating and weight concerns, distress around social relationships and placing high standards and self-sacrifice onto oneself were present at a clinically significant level in the sample.

In contrast, General Psychological Maladjustment (GPMC), Ineffectiveness (IC) and Affective Problems (APC) were not present at a clinical level in the sample. This suggests participants did not usually report high levels of psychological distress, issues responding to emotional states or feelings of emotional emptiness typically seen in ED populations.

Neuropsychological measures

Neuropsychological assessment was administered at baseline to gage neurocognitive functioning and examine indicators of engagement. The Shapiro-Wilk test of normality was used to examine if neuropsychological scores were normally distributed in the sample prior to further analysis. All neuropsychological scores were normally distributed, with the exception of Reading the Mind in the Eyes Test (RMET) female gender eye scores. To ensure consistency with their relational scores, means and standard deviations have been reported with median and range in the footnotes.

Wechsler Abbreviated Scale of Intelligence (WASI-II; Wechsler, 2011)

The WASI-II is a measure of general intellectual functioning. All raw scores, index scores and composite scores with normally distributed for the WASI within the group.

The average FSIQ was in the normal to expected range compared to age-appropriate norms for the group (*M* = 112.3, *SD* = 11.10), all participants scored in the high-average range for their age group with scores for the entire group ranging from 99 - 127. The average VCI composite score for the group was 110.25 (*SD* = 7.43), with all scores ranging falling in the average to high-average range. The average PRI composite score was 111.36 (*SD* = 16.76), with all scores falling in the average to high-average range. Raw scores are as follows: Block Design *M* = 52.00 (*SD* =10.70), Matrix Reasoning *M* = 22.87 (SD = 4.39), Vocabulary *M* = 42.87 (*SD* = 2.36), and Similarities *M* = 34.13 (*SD* = 3.23). These results suggest high-average performance intellectual functioning in the group overall.

Brixton Spatial Anticipation Test (Burgess and Shallice, 1997)

A measure of cognitive flexibility, the Brixton raw scores are a count of the number of errors made during the test (maximum of 54), which are then converted to a scaled score between 1 and 10. Both raw scores and scaled scores on the Brixton were normally distributed for the group. The average raw error for the group was 10.36 (*SD* = 4.10), and the average scaled score was 8 (SD = 1.77), with scaled scores ranging between 6 – 10.

In accordance with the original norms (all ages typical population), this indicates that the group generally scored in the high-average range for cognitive flexibility, with 38% of the group achieving a scaled score of 10, indicating very superior cognitive flexibility (Shallice and Burgess 1996). This is also consistent with Tchanturia, Anderluh et al. (2004) norms in the AN population, in which the current study group scored more similarly to healthy controls than those with AN.

Rey–Osterrieth Complex Figure Test (ROCF; Meyers & Meyers, 1995)

The ROCF is a measure of central coherence and was scored using Booth (2006)'s scoring as modified by Lang, Roberts et al. (2016). The average accuracy scores were 32.50 (SD = 0.71) with scores ranging from 29 to 36. In line with Roberts, Tchanturia et al. (2013)'s norms contrasting ED subtypes with healthy controls no scores significantly differed from healthy controls. This is what is expected in a clinical AN population.

The average order index for the group was 2.19 (*SD* = 0.56) and the average style index was 1.43 (*SD* = 0.38). Using norms from Roberts, Tchanturia et al. (2013) contrasting ED subtypes with healthy controls, this suggests that participants indicated more impairment than healthy controls on these measures. Similarly, Central Coherence Indexes (CCI) were on average closer to ED populations than healthy controls (M = 1.34, SD = 0.46). This indicates central coherence was likely at least slightly impaired in the group as expected in a clinical/sub-clinical AN population.

The "Reading the Mind in the Eyes" Test (RMET; Baron-Cohen et al., 2001)

The RMET is a measure of Theory of Mind. Scores on the RMET are calculated through a count of the number of items correct. Both total correct scores and total male correct scores were normally distributed. Female correct scores were skewed with skewness -1.69 (SE = 0.75) and kurtosis of 2.83 (SE = 1.48). Percent correct scores will also be reported alongside means and standard deviation for ease of comparison to normative literature.

The group on average got 75% of all items correct (M =27.5, SD = 1.26.) The group on average got 79% of all female items correct (M = 13.62, SD = 0.92)[1] and 74% of all male items correct (M = 13.87, SD = 0.93). These scores fall in between the reported percent correct ranges in the literature for those with Acute AN (72.2% total correct) and those recovered from AN (75% total correct) (Harrison, Tchanturia et al. 2010).

4.3 Primary Outcome Measures

8 participants remained to evaluate the efficacy of the intervention at 12-weeks and 7 participants by 24-week follow-up. As this is a pilot feasibility of a small sample size, any

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[1] Female Correct median = 15, inter-quartile range = 8-16

analysis of efficacy will remain tentative. In addition, confidence interval estimation will be included where appropriate, as suggested in Lancaster, Dodd et al. (2004).

1. Anorexia case status based on the Structured Clinical Interview for DSM-5 Diagnosis - Clinical Version (SCID-5-RV; First et al., 2015) at 12-weeks.

AN Case status was reassessed using the same Structured Clinical Interview for DSM-5 Diagnosis - Clinical Version (SCID-5-RV; First et al., 2015) used at baseline. 3 of 8 participants had a change in diagnostic status, with 2 of these 3 being moved to nil diagnosis by the end of the 12-week intervention and the other moving from clinical to subclinical. While no participants were reclassified to a more severe diagnosis, 5 participants remained at the same diagnostic status post-intervention. This is a change rate of 38%. Complete information is displayed in Table 4 below.

Table 4.3.1

Change in AN Case Status between Baseline and Discharge

	Baseline		Discharge	
	n	%	*n*	%
AN Case Status				
Anorexia Nervosa (restricting subtype)	2	25%	-	-
Subthreshold AN (in partial remission)	5	63%	5	63%
Subthreshold AN (no lifetime history)	1	13%	1	13%
Nil diagnosis	-	-	2	25%

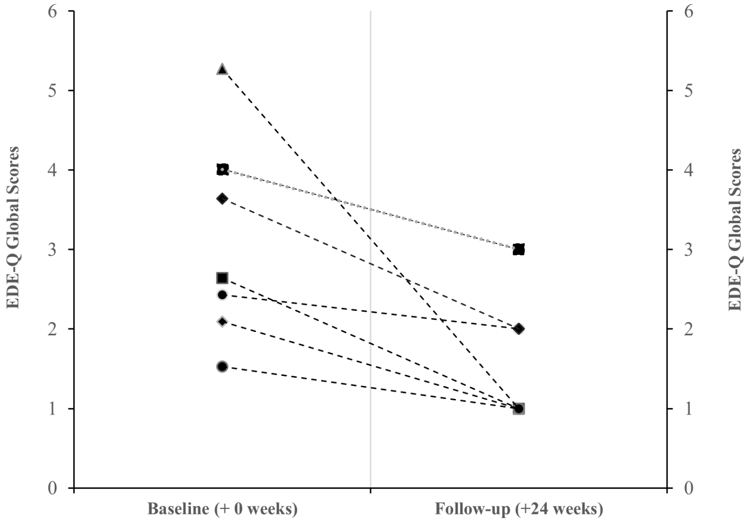
2. Eating disorder psychopathology assessed using the Eating Disorder Questionnaire (EDE-Q) at baseline, 12-weeks and 24-weeks.

All baseline subscale scores on the EDE-Q were normally distributed as indicated by the Shapiro-Wilk test of normality thus, paired sample t-tests and Cohen's d effect sizes were utilised to evaluate post-intervention changes with greater statistical power in a smaller sample. When assessing eating disorder psychopathology, reductions with large effect sizes were seen between baseline and discharge (12-weeks) on all subscales on the EDE-Q. In particular, significant reductions *(p* = ≤ 0.05) were observed for EDE-Q eating concern (*d* = 0.86, CI [.02, 1.67]) and shape concern (*d* = 0.83, CI [-.002, 1.63]) subscales. This suggests by 12-weeks individuals may have been significantly less preoccupied with food and their weight than at baseline.

When follow-up (24-weeks) was compared to baseline, significant reductions with very large effect sizes across all of the EDE-Q scales, including EDE-Q global scores (*d* = 1.07, CI [.10, 1.99]) and restraint (*d* = .96, CI [.03, 1.85]), eating concern (*d* = 1.15, CI [.15, 2.10]), shape concern (*d* = 1.43, CI [.32, 2.48]) and weight concern (*d* = 1.0, CI [.05, 1.90]) subscales were observed, decreasing further from discharge. While the size of these effects is likely only partly due to the intervention and partly attributed to time, this does suggest individuals globally demonstrated less eating disorder behaviours 6-months post intervention. Per participant results at 6-months shown in Figure 1.

Figure 4.3.2.

Changes in EDE-Q Global Scores between baseline and 6-months



Note: This figure demonstrates participant scores (n=7) on the Eating Disorder examination questionnaire (EDE-Q) at baseline/intake into the intervention and at follow-up/24 weeks. Each data marker represents a participant

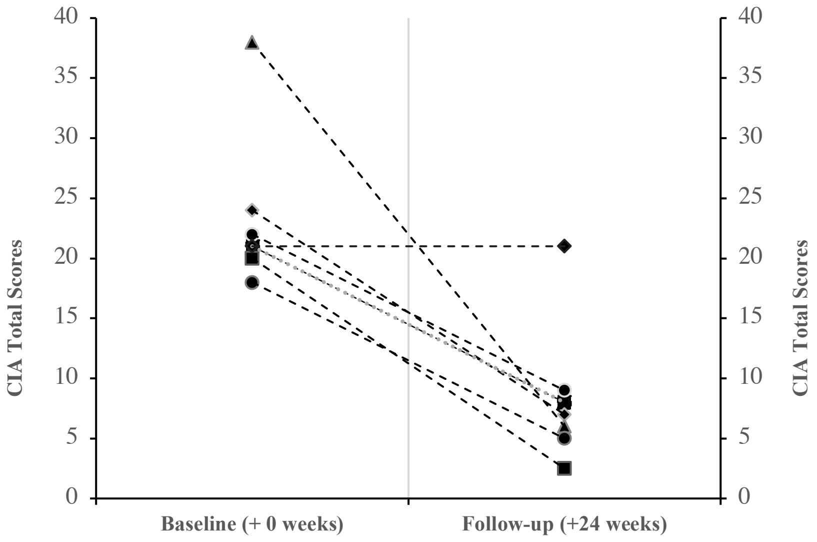
4.4 Secondary Outcomes Measures

1. Clinical impairment secondary to eating disorder assessed using the Clinical Impairment Assessment (CIA; Bohn and Fairburn, 2008)

As CIA scores were not normally distributed at baseline, the Wilcoxon Signed-Rank Test was used to measure differences between pre- and post-intervention. Clinical impairment, as measured by the CIA) was also found to have a significant reduction in scores between baseline and discharge (12-weeks) and baseline and follow-up (24-weeks.) This test indicated that 12-weeks post-intervention a statistically significant reduction in CIA scores was found from baseline (Z = -1.96, *p* = .05) with median scores reduced from 23.5 (*IQR* = 20.75-33.5) to 13 (*IQR* = 8.5-25). When comparing baseline CIA scores to 24-week follow-up, reductions were also significantly reduced (Z = -2.26, *p* = .026) with median scores reduced from 23.5 (*IQR* = 20.75 - 33.5) to 7 (*IQR* = 5-9). This suggests participants had significantly less psychosocial impairment by discharge and 6-month post-intervention. Per participant results on the CIA are reported in Figure 2 at 24-weeks.

Figure 4.3.3

Change in CIA Scores between baseline and 6-months



Note: This figure demonstrates participant scores (n=7) on the Clinical Impairment Assessment (CIA) at baseline/intake into the intervention and at follow-up/24 weeks. Each data marker represents a participant

2. General psychopathology measured using the Depression Anxiety & Stress Scale (DASS-Brown et al., 1997) at 12-weeks and 24 weeks

While DASS-21 scores were normally distributed at baseline, no significant differences were observed; however moderate effect sizes were still seen on Depression (*d* = .64, CI [-.14, 1.39]) and Stress (*d* = .48, CI [-.27, 1.21]) subscales between baseline and discharge. Between baseline and follow-up moderate effects were found for Anxiety (*d* = .65, CI [-.19, 1.45]) and Stress (*d* = .69, CI [-.16, 1.50]) subscales. However, all confidence intervals were wide and passed through zero.

3. Change in change readiness as measured by the Decisional Balance (DB; Cockell et al., 2002) at 12-weeks and 24-weeks.

No notable differences or effect-sizes were observed for any of the Decisional Balance subscales across any study timepoints. Psychometric scores which underwent change across study timepoints are shown in Table 5.

Table 4.4.1

Psychometric Scores Pre- and Post-Intervention

	Baseline (n=8)		12-Weeks (n=8)		24-weeks (n=7)	
Measures	M	SD	M	SD	M	SD
EDE-Q Global	3.33	1.27	2.20	1.49	1.61*	.79
Restraint	2.68	1.47	1.57	1.33	1.09*	1.08
Eating Concern	2.98	1.35	1.60*	1.40	0.94*	0.62
Shape Concern	4.13	1.33	2.97*	1.80	2.20*	0.98
Weight Concern	3.52	1.99	2.66	1.76	1.70*	1.20
CIA Total	25.75	9.02	16.38*	10.33	8.38*	5.96
DASS-21						
Depression	5.88	5.25	3.88	3.56	4	4.66
Anxiety	4.88	4.19	4.13	3.68	3.43	3.60
Stress	7.5	4.18	6.63	4.78	4.79	3.05

** Significant difference from baseline p = ≤ 0.05*

4. Participant qualitative evaluation regarding treatment credibility, acceptability and perceived effectiveness, assessed using an in-house process evaluation questionnaire at 12-weeks and 24 weeks

55% of participants who completed the intervention rated it as at least somewhat helpful (rating 4-7 on a 7-point scale) at 12-week study discharge. By follow-up 100% of those who had continued reading the workbook rated the intervention as helpful to very helpful (6 or 7 on a 7-point scale.) 75% of participants felt that 3-months was about the right length of treatment and that the workbook met their expectations going into the treatment.

When examining the top two most-helpful modules as rated by participants, ‘Getting Started’ (23%) and ‘My Anorexia Nervosa’ (19%) were most commonly mentioned. The three least-helpful modules mentioned by participants were ‘Improving your nutritional health’ (20%), “The virtuous flower of recovery” (16%) and “Getting Started” (16%.) Participants generally commented that the helpful sections of the workbook had allowed them to ‘reflect’, ‘provided insight’ and ‘introspection’ (mentioned by 55%). Other comments mentioned allowing motivation to change/suggesting ways to improve (mentioned by 22%.) In terms of least helpful section, many discussed already knowing some of the information/nutritional content that was provided to them (sentiment mentioned by 44%.) Some also mentioned feeling confused in less helpful sections and needing support to help work through these (mentioned by 22%.)

When asked around the advantages of the intervention, being able to set their own pace and complete anywhere and repeat sections appears to be a key benefit for participants (mentioned by 67%.) Others mentioned being able to work through in private was a key advantage (22% mentioned.) When asked around the perceived negatives of the intervention, comments centred around lack of motivation or outside accountability to work through the intervention (55% mentioned). Lack of support was also a key disadvantage with many finding it was difficult to work through harder sections without supports (55% mentioned.) 66% did however agree that working through the workbook with a therapist or support would be beneficial.

Table 4.4.2.

Select Participant Feedback at 12-week Discharge

Element	Feedback
Insight	*"First chapter was eye opening regarding how much ED has a hold on my life, that it literally has its own set of values that apply to all aspects of my life not just food and exercise which is a new concept to me…"* *"…made me create a pretty well rounded image of my difficulties etc. and it gives me something I can refer back to on days I may struggle."*
Change	*"They highlighted the need and inspired me to change behaviours. I also felt understood when reading these chapters and as though I was not alone."*
Introspection	*"Introspection into why I feel and act the way I do, and figuring out that there are reasons behind it that I can do something about."*
Pace	*"Being able to do it self-paced, putting it down when you need a break."*
Privacy	*When I was trying to recover, particularly at the beginning I really just wanted to be alone …I did not feel judged in anyway in completing it [intervention]"*
Accessibility/Flexibility	*"…one can spend more time on areas they feel are most relevant to them (allows a very personalized and tailored treatment approach)."* *"Can use it whenever and wherever you want and can go over sections multiple times"*

Accountability	*"You can choose to not work through it if there is no one keeping you accountable. Sometimes the most helpful sections are the ones that are most difficult to work through."*
Support	*"No-one to talk to while dealing with difficult moments and having to find the motivation and effort to keep going…"*
	"When it is too intrusive or confronting there isn't the option of support so it's hard to stick to it"
	"I sometimes felt alone with all the concepts that I had to deal with"
Motivation	*"It's easy to just put it aside and not do the exercises properly."*
Nutritional Content	*"I read it at the beginning of my journey and it allowed me to think even more about food- for me it was counterproductive."*

5. Indicators of engagement measured using demographic, psychometric and neurocognitive data collected at baseline between completers and non-completers

All 14-participants were included for analysis and were split into two groups, 'completers' (n=8) and 'non-completers' (n=6) depending on if they had completed 12-week discharge. Due to small sample size predictors of response and engagement were unable to be evaluated using logistical regression as planned. Chi-squared tests and independent sample t-tests were run for relationships between categorical variables and continuous variables. As cell counts were less than 5, Fisher's exact test was used in place of Chi-Square where assumptions were not met.

There were very few identifiable significant associations in demographic markers between those who completed the intervention and those that did not. There was a statistically significant association between completeness and relationship status however (p = <.005).

Non-completers were more likely to be single (50%) than completers (38%) and have an initial intake diagnosis at clinical level (50%) compared to those who completed (25%). On average those who completed the intervention were slightly younger (M = 23.26, SD = 3.68) than those who dropped out (M = 27.83, SD = 6.49) and thus on average had shorter illness length (on average, 9.38 years) than those who did not complete (13.53 years).

When examining differences in psychological traits associated with eating disorder populations (measured by the EDI-3) on the whole non-completers were more likely to demonstrate elevated clinical risk overall (scores rare in non-clinical populations.) Particularly for Affective Problems (APC) (*d* = .81, [-0.32, 1.90], Introspective Deficits (ID) (*d* = .75, CI [-0.36, 1.83]), Overcontrol (OC) (*d* = .73, CI [-0.38, 1.81]) and Interpersonal Insecurity (II) (*d* = .72, CI [-0.39, 1.80). This suggests those who did not complete were more likely to have elevated difficulties in accurately responding to emotion, incessant demands to achieve high personal standards/engage in self-denial and experience discomfort in social situations.

Similarly, moderate effect sizes were found on EDE-Q subscales restraint (*d* = .64, CI [-0.46, 1.71]) and shape concern (*d* = .41, CI [-1.47, 0.67]) indicating those who did not complete may have been more concerned with their body and engaging in more restrictive behaviours than completers.

Non-completers also indicated higher scores on the DASS-21 (indicating greater psychopathology) than those who completed at baseline. While not significant, moderate to strong effect sizes were found between Completers and Non-Completers at baseline on DASS-21 Stress (*d* = .87, CI [-0.26, 1.97]) and Depression subscales (*d* = .57, CI [-0.52, 1.64]). Decisional Balance Benefit subscales also had a moderate to strong effect size between Completers and Non-completers (*d* = .71, CI [-0.40, 1.79]) indicating those who did not complete may have perceive greater ‘value’ in having AN.

Non-completers also scored slightly lower than completers on a baseline neurocognitive test that measured cognitive flexibility. Moderate to strong effect sizes were found on the Brixton spatial awareness between Completers and Non-Completers (*d* = .78, CI [-0.34, 1.87) with those who did not complete making more errors than those who completed.

6. Intervention uptake and recruitment measured using recruitment rates, recruitment sources and drop-out rates

In 2020 new participants were recruited at a rate of roughly one participant every 6 weeks from April. In 2021 recruitment was concentrated in May-June due to COVID-19 restrictions, with 7 participants in the final pool recruited in these two months. This is approximately a rate of one new participant per week. For further information on participant flow, please refer to Table 3.

The majority referral source for all potential participants (where information was able to be gathered) were flyers that were placed in tertiary and community spaces (47%), followed by the study website (21%), promotion through community/mental health groups (18%), GPs/Mental health professionals (11%) and word of mouth (3%). A total of 41 individuals responded to the study coordinator over the recruitment period indicating interest in participation in the study. Of these 41, 15 were excluded due to not meeting criteria either through triage or during baseline assessment, and 12 were lost to follow-up. 14 participants met inclusion criteria completed the informed consent process and initial intake session.

In terms of uptake, 55% of participants had read two-thirds of the workbook modules by 12-week discharge increasing to 66% by 6-month follow-up. The retention rate for the intervention was relatively low, with only 8 of the 14 (57%) included participants completing study discharge and a further 7 (50%) able to be contacted at 24-week follow-up. Of the 8 participants who made it to discharge, only 1 participant did not complete their 24-week follow-up.

4.5 Harms

No dropouts were observed to be directly caused by harms of the intervention in the current study. 6 participants dropped out of the intervention after being recruited into the study; of these 4 did so to engage in more intensive therapeutic treatment (67%), no indication was given that this was due to the intervention causing additional harm. While 1 participant was lost to due to co-morbid mental health difficulties, these difficulties predated the intervention.

4.6 Validity

Internal validity in the sample was high for the EDE-Q ($\alpha = .85$), CIA ($\alpha = .91$), DASS-21 ($\alpha = .95$), DB ($\alpha = .88$) and EDI-3 subscales ($\alpha = .80$) respectively. When examining convergent validity, EDE-Q global scores were significantly correlated with total CIA scores ($r = .85$, p < .001) and eating concern, shape concern and weight-concern subscales ($r = .75 – .95$, p < .001) as expected. Decisional Balance burden and benefit subscales were also significantly correlated with CIA total scores ($r = .59$ - .67, p < .005). EDE-Q global scores and DB benefit subscales were also significantly correlated ($r = .59$, p < .005). Overall internal consistency and convergent validity for the sample was satisfactory.

5. Discussion

5.1 Statement of Key Findings

The overarching purpose of this study was to examine the feasibility of a specialist self-help workbook intervention (MANTRA) for early intervention in AN, in relation to primary and secondary study outcomes. 3 of 8 participants underwent a clinically significant change in AN case status, as evaluated by a clinical psychologist, at the conclusion of the intervention. A significant difference with large-effect size was found before and after the intervention for eating disorder attitudes and behaviours and clinical impairment due to eating disorder psychopathology. These changes appear to be sustained at 6-month follow-up. However, no significant change was detected on general psychopathology or change readiness at discharge or follow-up. While large-effect sizes and significance was reached on certain outcomes, we cannot infer cause and effect as we do not have the capability to make between-group judgments. However, these findings in a pre- and post-design are still more positive than zero and indicate the true effect-size likely exists and is somewhere in the middle.

The intervention was rated as reasonably credible and acceptable by participants with over half rating perceived effectiveness positively. When evaluating between-groups indicators of engagement between those who dropped out and completed the study, the only significant difference appeared to be relationship status with those who dropped out more likely to be single. However, moderate to strong effect-sizes were found for certain eating disorder pathology, general psychopathology, decisional balance and cognitive flexibility with those who dropped out tending to have higher on average scores. Those who dropped out also tended to have longer illness length. Despite this, confidence intervals were wide and overlapped zero which could be due either to small sample size or type 2 error.

5.2 Strengths and Limitations

One of the critical successes of the project was its contribution to a growing body of research seeking to close the treatment gap for those with AN. While the study was built on an existing research base of MANTRA adaptations, this trial was novel both in the population it targeted and its pure self-help delivery method. All existing MANTRA adaptations had been delivered adjunct to treatment, in a group setting, as relapse prevention and with guidance. While it should not be implied that the study is random in its rationale, it did incorporate a reasonable amount of critical thinking and innovation that is imperative to make progress on a broader level. In addition, the study team included two clinical psychologists who were not only specialists in eating disorders, but also currently working in clinical practice. This provided specialist insight with straightforward application to the clinical setting that was incorporated into the study's design. Thus, the study creates a foundation for further research on pure self-help in AN for the mild to subclinical population and tried to take into account the scalability and dissemination needs in clinical practice.

Another key strength in the intervention was the self-referred demand for such an intervention. Despite many participants being unable to be included due to criteria and active recruitment interrupted by lockdowns, the need for the intervention remained relatively constant even when recruitment was paused. This is no surprise considering the difficulty in accessibility and increase in eating disorder prevalence due to COVID-19 restrictions. While the overall sample for the intervention was small, the level of interest in taking the intervention, which was transparent in its self-help workbook approach, was substantial. This aligns itself to the online platform for binge-eating in Australia developed by Linardon, Rosato et al. 2020 in which demand for such an intervention was also significant suggesting there is a crucial treatment need that this intervention or similar adaptations may have the potential of filling.

A final strength of the current study was the breadth of measurement incorporated. From a study design perspective, care was taken to include measures that not only examined illness-specific dimensions (EDE-Q and EDI-3) as well as more general measures of impairment and psychopathology (CIA and DASS-21.) These measures provided useful insight at the conclusion of the study. They allowed the teasing out of impact on AN symptomology, and more generally psychopathology, which is critical in a population that is characterised by high levels of comorbid mental health issues (Pollice, Kaye et al. 1997, Kaye, Bulik et al. 2008, Sternheim, Startup et al. 2012). While few discernible results were likely identified on neuropsychological assessment due to sample size, including cognitive assessment, psychometric and clinical interviewing in a study with a relatively small sample size and lack of control group adds robustness where validity typically would be gained by participant numbers. Furthermore, when considering the complex interplay of cognitive, genetic and environmental factors that contribute to AN, multi-faceted assessment that taps into a broad range of associated symptoms and traits is vital (Garner, 2002.) As a key objective is to inform larger-scale research, this breadth of measurement was also informative for other areas that may require further exploration, including measures of motivation, change readiness, and DOI.

As this was a feasibility study, weaknesses will not focus on elements such as lack of control groups as this was an expected aspect of the feasibility study design. Furthermore, as a pilot study, it was accepted that as a single-armed uncontrolled study, no concrete conclusion would be reached as to whether any observed changes were a result of the intervention or other confounding factors. The purpose was instead to establish if the intervention was feasible and warranted further evaluation which has been achieved. However, it cannot be ignored that the final number of participants that completed the intervention was small, even for an uncontrolled pilot study. Therefore, while a number of our pre and post measure tests were significant, even with a within-subjects design, it is difficult to establish any concrete conclusions in a sample of the current size. It also may mean that results that had moderate effect-sizes but were non-significant with wide confidence intervals, may hold more weight than the present study was able to establish. Thus, replication of these results with between-group comparison is essential.

Furthermore, due to recruiting methods (particularly flyers on university campuses) most of the group were undergraduate women of Pakeha or European descent. In fact, looking at the University of Auckland’s Equity report (2018) we should have expected 20% Māori/Pacific participants even with a primarily university-based sample. This raises some questions regarding the generalisability of results to those with AN in the broader New Zealand context in an already exploratory study design. While MANTRA is theoretically more cross-cultural in its application than other AN treatment, it is undeniable that MANTRA as a treatment model is intrinsically Western and was developed in the U.K. It is also suggested that despite presenting much less for treatment in NZ, it is estimated that lifetime prevalence is at least as high in Māori and non-Māori (Lacey, Cunningham et al. 2020). If this treatment is to be considered for widespread use in the NZ context, consultation with how content may be adapted for non-western ethnicities such as Māori is imperative. Suggestions for this will not be provided here on the basis that all researchers in the study team were Pakeha and no participants identified as Māori or Pacifica to provide first-person feedback. While it will be acknowledged that further work must be done in terms of cross-cultural application in the NZ context, it is also likely more appropriate that these were evaluated using a Kaupapa Maori or other indigenous methodology if and when the intervention reaches the potential of widespread usage (Pihama, Cram et al. 2002, Walker, Eketone et al. 2006).

A further limitation is that our participants generally had longer DOI than those typically used in early intervention studies and used to compare against those with severe and enduring AN (Treasure and Russell, 2011 Stice, Marti et al., 2009.) With early intervention the rationale for a self-help workbook such as the current intervention, not setting inclusion or exclusion criteria around the duration of illness may have resulted in the recruitment of individuals slightly outside the target population (enduring, despite their mild case status.) While the current study is too small for sub-analyses based on DOI, it calls to question whether this typically longer length of mild illness may have made a difference to the results in the current study.

An intervention specific limitation was the lack of personalisation the workbook offers participants. While the workbook offers accessibility through its mode of delivery and the treatment model itself is highly tailored to the individual (in its formulation-based approach), it is impossible that one workbook is going to suit everyone. As a workbook commonly delivered in inpatient treatment at a more severe level, the focus on nutrition was triggering for some. In contrast, others struggled with components of the workbook designed to target the ‘value of the illness. Furthermore, there was great variation in what chapters were typically regarded as helpful and not helpful, even in a small sample such as this. Regardless, it is essential to acknowledge that this will likely be a limitation of any pure self-help workbook treatment as it is impossible that one version will be appropriate for all individuals in an illness population.

5.3 Discussion of Study Aims

5.3.1 Limited Efficacy

In terms of evaluating limited efficacy, while just under half of the current sample underwent a clinically significant change in their initial AN case status at discharge, all observed changes were positive. That is that they were in the direction intended (an improvement) and of reasonable magnitude. Two participants were discharged with nil diagnosis, and no participants met clinical threshold by discharge. Keeping conclusions conservative, this suggests that not only that the MANTRA workbook as pure self-help does not tip the scales of causing more harm than benefit. While change in case status was only observed for 3 of 8 participants, considering the short duration of the intervention and small sample size a change rate of 38% is impressive. While differing definitions of recovery and has been a long-standing issue in the AN evidence-base making direct comparison is difficult, to observe 25% of the sample moving to nil diagnosis by 3-months in an illness where recovery is often protracted is a positive outcome (Guarda, 2008.) Furthermore, when considering this diagnostic change against key sample characteristics, these rates become more remarkable. Firstly, while the sample size was small, the average duration of illness for those that completed the intervention was 9.4 years indicating great illness entrenchment. While the case for early intervention is clear, most of the existing literature base defines those qualifying for an ‘early intervention’ having much shorter illness lengths than the current sample. For example, Treasure and Russell (2011) defined their AN ‘short duration’ illness group as having on average a duration of illness of 1.2 years, while the ‘long-history’ group, which was associated with poorer outcomes, had on average an illness length of 5.9 years.

Similarly, while Stice, Marti et al. (2009)’s 8-year longitudinal study of individuals with subthreshold eating disorders found 1-year recovery rates as high as 96%, these individuals were adolescents and had no lifetime history of threshold ED. This is a stark difference from the current sample, in which only 2 of the 8 participants who completed the intervention had a duration of illness (DOI) under 3-years and only one participant was assessed with no lifetime history. This means that while only mild to subthreshold individuals were allocated to the study, only one participant was assessed as never previously reaching the clinical threshold for

AN. This is unsurprising as it is often documented that treatment-seeking individuals have more extended DOI (Fichter and Quadflieg 2007) than those in non-treatment seeking community samples such as Stice, Marti et al. (2009). This may contextualise our results as most participants self-referred into the study. Perhaps an interesting observational finding in support of this was that two of the three participants that did undergo diagnostic changes had a DOI of under 3 years. While this may be merely coincidence with the sample size, it may also suggest longer DOI may be a critical area of exploration when considering significant clinical change for self-help interventions such as the current one.

While promising, any evaluation of a change in case status of three individuals must remain tentative. However, reductions in eating disorder behaviours and attitudes appeared more pronounced. At 12-week discharge, most EDE-Q subscale scores were reduced for the sample with moderate to large effect-sizes, particularly on eating concern and shape concern subscales which reached significance. These changes were sustained at 6-months, with significant changes observed across all EDE-Q subscales. While paired calculations increased statistical power in the small sample set, it is also important to acknowledge that without a control group some benefit that was observed may been due to the passage of time. However, assuming that the change was at least in-part due to the intervention, this could suggest benefit of the intervention contributed to a significant reduction in eating disorder attitudes and behaviours in our participants that was maintained over time. In addition, the EDE-Q is demonstrated as one of the more sensitive eating disorder inventories to change which is important as the current sample was mild to subthreshold in their AN presentation and few met clinical cut-off for the EDE-Q at baseline (EDE-Q global score of ≥ 4.0 (Luce, Crowther et al. 2008). This could indicate despite less significant symptomology, significant changes were still observed. While it is important to acknowledge at this stage this is far from cause and effect, to observe the magnitude of changes seen at the very least warrants further investigation using control arms.

Despite few participants meeting clinical cut-off, when examining participant's baseline EDE-Q global scores against large-scale norms for both clinical and non-clinical norms, the sample's scores were more clearly aligned with eating disorder groups than the general population (Aardoom, Dingemans et al. (2012). This is important as it suggests while mild in presentation, a certain level of maladaptive eating disorder attitudes and behaviours were present at baseline. This is supported by the levels of impairment in central coherence indicated in participants cognitive testing at baseline. It was also important to examine participants baseline and discharge scores with undergraduate norms, as that was the majority of the sample. Undergraduates are more likely in general to suffer from eating disorder psychopathology, such as eating concern, shape concern or restraint (Roberts 2006). Large-scale community samples of undergraduate women in the USA and Australia (Luce, Crowther et al. (2008) indicate that while at baseline our participants more closely resembled clinical populations, by discharge EDE-Q scores were much closer to healthy community undergraduates. With reductions observed across all time-points across eating disorder attitudes and behaviours and participants moving closer to healthy community norms when contextualised in the broader literature also, this provides further corroboration for the potential impact the intervention may have had.

Similarly noticeable results were observed for clinical impairment due to eating disorder psychopathology, in which significant reductions between baseline scores and discharge were observed. Based on total CIA scores, clinical impairment in our sample was high at baseline with 93% of participants exceeding the clinical cut-off (Reas, Stedal et al. 2016). In further support of this, when comparing our sample with clinical ED samples such as in Welch, Birgegård et al. (2011), our sample's CIA scores were very similar to those reported for the female clinical ED sample at study outset. This indicates that despite mild presentation, psychosocial impairment due to eating disorder psychopathology was substantial in the sample. This is consistent with Stice, Marti et al., 2009 which had a similar finding in regard to psychosocial impairment despite their sample having early subthreshold presentation in adolescence. However, when comparing to larger scale norms, by study discharge only three of the current studies participants still met clinical cut-off, a reduction of 59%. This was further sustained by 6-month follow-up with only one participant remaining in the clinical range, culminating in a total decrease of 85% from baseline. While all findings remain tentative, such substantive reduction in CIA scores provides further support for the reduction in eating disorder behaviours and attitudes observed. With the EDE-Q and CIA demonstrating strong convergent validity in our sample and scores reducing in a parallel manner across study time points, this strengthens the assumption that as eating disorder pathology was reduced, so was clinical impairment. With psychosocial impairment a critical feature in eating disorders, it would be unlikely to see substantial shifts in eating disorder psychopathology without corresponding reductions in clinical impairment.

It is interesting then that similar-strength patterns were not observed on general psychopathology (as measured by the DASS-21.) While moderate effects were observed for the reduction of depressive features and stress features by discharge, confidence intervals for wide and overlapped with zero. With far more modest decreases, 38% of participants indicated the same levels of depression and stress at discharge and 75% of participants had no observable change in anxiety. Despite anxiety being commonly cited as one of the more complex facets to record change on, a moderate effect on anxiety was still observed in the current study by follow-up (24-weeks) (Ronk, Korman et al. 2013). One possible interpretation of this may be that while the intervention may be confronting in early stages, leading to little change in anxiety, anxiety levels may fall as time passes and participants move through change phases (Cockell, Geller et al. 2003). This remains speculative and may simply be the product of time. However, this effects pattern for anxiety is quite similar to those reported by two other self-help adaptations of MANTRA, RecoveryMANTRA (Cardi, Albano et al. 2020) and iMANTRA (Schmidt, Sharpe et al. 2017). Both these studies included a component of guidance and therefore may be considered more intensive, a similar strength of effect on general psychopathology (d = 0.64, non- significant) was found at six increasing to significant for anxiety by the 12-month mark (Schmidt, Sharpe et al. 2017). Meanwhile, Cardi, Albano et al. (2020) found no significant differences in anxiety at any time point.

This could indicate two things; firstly, a strong case has been made in this research for the specificity needed in the treatment of adult eating disorders, not only for the stage of illness but also specific to AN (Treasure, Stein et al. 2015). Thus, it would be reductionist to assume that other general psychopathology, e.g., depression, anxiety and stress, would be resolved entirely through a specialist treatment targeted towards AN. The one MANTRA adaptation study that did demonstrate favourable results on general psychopathology was ECHOMANTRA which included a wrap-around carer component as well as individual guided self-help (Adamson, Cardi et al. 2019). This could suggest that while these interventions can make notable differences in eating disorder symptomology, a higher intensity separate intervention or longer duration of follow-up may be more beneficial for addressing co-morbid psychopathology. Secondly, our sample's levels of depression, anxiety, and stress were substantially lower than all the populations in the MANTRA studies mentioned above at baseline. In fact, when examining clinical cut-offs, the average scores across anxiety, depression and stress tended to remain in the normal range (>33) (Tran, et al. 2013). Thus, the lack of impact may have been reflective of the lack of elevated levels of this psychopathology present in the sample initially which all things considered, is a positive considering the high comorbidity often seen in AN (Wade, Bulik et al. 2000).

Surprisingly, minimal changes were observed across readiness for change, with this remaining relatively flat between baseline and discharge with no negligible effect. With an understanding that many individuals with AN may see their illness as helpful in coping with negative emotion or functional avoidance, it has been suggested that changes should be able to be observed as individuals progress through the pre-contemplation stage of change through to the action (Cockell, Geller et al. 2002). While it has been typically documented that changes in perceptions of the benefits of the disorder remain relatively stable over all stages of change, it is surprising that changes were not observed in perceptions of burden and insight into the illness or functional avoidance (Cockell, Geller et al. 2003). However, with the majority of our sample self-referred, one could argue that many had already, at least partially, reached the 'contemplation' stage by initiating entry into some form of treatment for their issues. This is reflected in the literature with treatment-seeking individuals more likely to be in contemplation change stage compared to those referred to treatment by a third-party (Vandereycken 2006). However, one may also query whether referral in the current was due to external pressure by family, friends or partners. This is a particularly salient consideration in a disorder commonly characterised by ambivalence. Regardless, the majority of participants remained in the pre-contemplation to contemplation range between baseline and discharge when compared to AN-specific norms in Cockell, Geller et al. (2002).

One way to interpret this finding may be that illnesses such as AN are characterised by a longer course. With much of our sample possessing longer DOI's compared to other defined 'subthreshold' populations, this may be a hint as to why no change was observed. Adolescents often have the highest success rates in AN and recovery is often a protracted and fluctuating process over the course of 5 to 6 years (Vansteenkiste, Soenens et al. 2005.) While many may verbalise or enter treatment with a desire to change, this may be motivated by a temporary reduction in psychological consequences of their behaviour as opposed to desire to gain weight or adjust eating habits. (Guarda, 2008). Cockell, Geller et al. (2002) describe the transition across these stages of change as first increasing self-awareness, followed by anxiety, making decisions and finally taking action. In qualitative feedback, many participants spoke about increased awareness and insight into their illness and how these concepts were at times confronting to deal with, particularly without external guidance. While further evidence would be necessary to confirm these observational insights, this could suggest that a longer duration of time is needed to measure readiness for change, or a better understanding of underlying motivational processes is required. With many of the other self-help adaptations of MANTRA having a follow-up of 12-months (Cardi, Albano et al. 2020), this calls to question whether any difference would have been observed had we included a 12-month and 6-month follow-up.

When examining these findings against the study aim of limited efficacy, it can be said that MANTRA as a self-help workbook intervention has promising utility for those with mild to subthreshold AN. Initial findings suggest beneficial outcomes for both eating disorder psychopathology and psychosocial clinical impairment as a result of eating disorder issues, that was retained and even improved upon at study follow-up. However, without a control arm, these large effects may be partially moderated by time. The impact on general psychopathology and change readiness was unclear and may require exploration before even tentative conclusions can be reached. While this sample is small, further investigation into the impact of DOI, intervention length, follow-up measures and level of support provided are all potential sources of refinement.

5.3.2 Acceptability

As this is a feasibility study, while an evaluation of limited efficacy is important, it is also critical to explore the acceptability, practicality and expansion of the current intervention in some detail. As outlined in Bowen, Kreuter et al. (2009), these aims will be primarily evaluated through participant feedback and uptake rates gathered throughout the study. When examining ratings of the intervention, it can cautiously be said that the intervention was generally positively rated with over half of the study group finding the workbook at least moderately helpful by discharge (63%), over half indicating they felt that the treatment length was ‘the right amount’ (63%) and was credible in that their expectations regarding the treatment were met. It is important to note that those with AN will frequently not attribute treatment as a major factor in their recovery but are more likely to attribute this to things such as maturation, supportive relationships or family reasons (Tozzi, et al (2002.) This may explain why the strong decreases observed in AN symptomology and clinical impairment measures are not directly mirrored in strength of evaluation of treatment helpfulness.

Many participants enjoyed the flexibility of accessing the intervention any time or place and repeat sections if desired. Furthermore, some valued the privacy of the intervention as they were not yet at a stage where they felt comfortable sharing aspects of their difficulties with others. While many mentioned the benefit of introspection and insight culminating from engaging with the workbook, common criticisms focused on problems processing next steps alone, emotions raised or maintaining motivational momentum. When considering the intrapersonal difficulties and emotional dysregulation that are often associated with AN (Treasure and Schmidt 2013), this is not a surprising finding. It appears the formulation aspect of MANTRA (first four modules) were highly rated by participants and allowed them to understand the drivers of their own illness. However, when considering emotional dysregulation there may have been difficulty in processing this or ‘what next’. Considering this in tandem with the stages of change discussed in Cockell, Geller et al. (2003) (e.g. the contemplation phase of anxiety is proceeded by action) this may indicate it was challenging for participants to move into the concrete action phases of behaviour change without external coaching or support.

5.3.3 Practicality

This evaluation of an intervention without external coaching or support moves us into our evaluation of practicality. When considering the practicality of the intervention, it is crucial to weigh-up the benefits provided by the current intervention (in this case, cost, accessibility and ease of dissemination) against the negatives for those who may need a higher intensity of engagement and support from an outside source. The ease of delivery for the intervention is high and it is undeniably low cost, requiring little resource. Other than the initial onboarding and discharge, which time was kept to a minimum, no clinician time was needed. Requiring a highly-skilled clinician can be a significant barrier to the scalability and dissemination of speciality psychological treatment (Fairburn and Wilson 2013). Thus, from a practical perspective, the benefits that the current intervention provides in these areas are clear.

Despite this, participants often commented that while the workbook was accessible at any time, it was at times perceived as time-consuming or difficult to work through without support. Furthermore, some participants commented that they found the cover, which contains the words ‘Anorexia Nervosa’, embarrassing and a deterrent to engaging in it when they had time to. Two participants also constructed a makeshift cover for the workbook to hide this wording. As a disorder that is notoriously difficult to treat and characterised by high levels of contradiction and internalisation (Racine and Wildes 2013), it is not surprising that the journey to change is not easy. In Vansteenkiste, Soenens et al. (2005)’s conceptualisation of change in eating disorders, it is argued that expecting individuals to have intrinsic motivation or find changing their behaviour fascinating and enjoyable is highly unrealistic. In fact, engaging in change behaviours such as gaining weight may initially come at a psychological cost to those with AN. In a supported setting clinicians to help guide and enhance these motivational processes, for example in both traditional MANTRA, and other specialist led AN treatment. However, in the current intervention this was a process participants had to navigate on their own.

Unsurprisingly, those with higher self-rated importance, confidence and effort at the outset of the intervention were more likely to undergo a diagnostic change at discharge. This appears consistent with research showing motivation to change a valuable indicator of positive prognosis in the early stages of AN (Hillen, Dempfle et al. 2015). However, from a practicality standpoint, the literature shows that those with longer DOI and lower baseline motivation may require additional resources, which our results align with (Treasure, Stein et al. 2015.) Regardless, it is essential to keep in mind the current barriers in access for those seeking treatment for eating disorders and whether some form of support (in a workbook) is better than no support. Many individuals remain on waitlists for traditional treatment for long periods, and self-help workbook interventions have been implemented with relative success for those on waitlists for ED treatment in the past (Treasure, Schmidt et al. 1996).

5.3.4 Expansion

When examining the expansion of the intervention outside of the U.K, most content appeared to relate and be helpful to participants. The most highly rated modules were modules 1 and 4, that covered pro-anoretic beliefs, values and individual formulation. This is not surprising these formulation chapters are designed to be highly flexible and personal in its approach. Thus, applying it in a slightly different mode of delivery through self-help, shouldn't cause significant issues in terms of content transferability. Furthermore, the section found least helpful consistently was nutritional health. This suggests potentially an issue not in the cultural expansion of MANTRA, but rather from the treatment being designed for those more severe or clinical in presentation and therefore likely lower in weight. Despite this, the study is limited in any cultural evaluation of expansion in the current study is limited by having a primarily Pakeha/European sample with no identifying Māori, Pacifica or Asian participants. Particularly in a multi-cultural context such as New Zealand.

5.4 Indicators of Response and Engagement

Evaluating indicators of response and engagement in a small sample, such as the current study, is not without obstacles. However, in an illness where there remains an apparent lack of forerunners in leading treatment, some form of evaluation of which sub-groups in the AN population may find the most benefit is required (Zeeck, Herpertz-Dahlmann et al. 2018). No significant results emerged, except relationship status which is unsurprising considering the role of close others are posited to play in AN (Treasure, Willmott et al. 2020). While close others responses to those with AN may perpetuate the illness, this finding also provides hopeful support for the impact of prosocial relationships can have on recovery in AN (Schmidt, Oldershaw et al. 2012.)

Despite lack of significance, it can be said with relative confidence that those who did not make it to discharge (henceforth referred to as non-completers) generally had higher levels of AN symptomology at the outset, as demonstrated by a greater proportion meeting EDE-Q and EDI-3 clinical cut-offs at baseline. To corroborate this finding, those who did not finish the intervention on average were older and had a longer illness length by approximately four years, as well as slightly higher levels of general psychopathology. The neuropsychological assessment also supported this, with slightly weaker performance on tasks such as the Brixton observed in non-completers with moderate effect sizes. While potentially type 2 error, this could also indicate slightly more cognitive inflexibility in non-completers, which are not only ‘hallmark’ cognitive deficits of AN but also facets on which performance worsens with duration and severity (Tchanturia, Morris et al. 2004, Van Autreve, De Baene et al. 2013).

Despite potentially more cognitive inflexibility, BMI ranges were similar across completers and non-completers, all falling within the normal range. While BMI is a crude measure of nutritional status, this is aligned with a study by Weider, Indredavik et al. (2015) that found minimal relationship between BMI and cognitive difficulties in AN. Instead, that cognitive difficulties were likely more associated with the severity and longevity of the illness. Combining these findings with the secondary analysis conducted by Ambwani, Cardi et al. (2020) in the Recovery MANTRA intervention, our results are in line with those defined as having enduring AN frequently seen to have more modest treatment gains and poorer overall mental wellbeing. Inversely, this provides further support for those in the current study who gained the most benefit from the current treatment having some of the shorter DOI. A point of difference in the present study was that while those who did not complete the intervention had higher levels of AN symptomology, no participants were defined past ‘mild’ in AN case status due to health risk and the intended population. While illness longevity is a commonly identified prognostic factor in AN (Touyz, Le Grange et al. 2013), it is rarely presented independently of severity. Case-status history was not recorded with the current participants (therefore, we do not know if they were once severe) however chronicity of illness of in isolation must be considered as having a potential impact.

In evaluating the potential differences in eating disorder psychopathology, those who did not complete the intervention were more likely to score at levels rarely seen outside of clinical populations on psychological facets elevated clinical risk for overcontrol, interpersonal insecurity and interoceptive deficits on the EDI-3 compared to those who completed. These scales encompass self-denial, social relationships and the ability to recognise and process one's own emotions. Given the more extended period of illness of those who did not complete the intervention, this is consistent with the extensive literature base indicating more significant deficits in social cognition with illness progression (Treasure and Schmidt 2013). Consistent with the current study, one particularly large-scale meta-analysis suggested that emotional dysregulation is often a key psychological predictor of drop-out over those who complete (Fassino, Pierò et al. 2009). This rings true of those non-completers in the current study having higher levels of disruption to emotional processing as indicated by the EDI-3 than those who continued through to discharge. Furthermore, with a higher proportion of single individuals not completing the intervention, this may provide evidence for the presence of social supports being even more imperative when dealing with enduring AN symptomology in a self-help setting (Albano, Cardi et al. 2021).

Considering the marked difficulties recognising and processing emotion at baseline by non-completers and comments that some participants found dealing with the confronting emotions in the workbook difficult, this calls to question whether this may have been a critical aspect as to why certain participants withdrew from the study. This may suggest that having a social element, such as the group-based MANTRA approach evaluated by Startup, Franklin-Smith et al. (2021), may have greater benefit for those with more significant deficits in social and emotional processing by providing a social 'arena' for practice. However, an evaluation of engagement indicators would not be complete without examining why participants withdrew early from the study. Non-completers have been defined in the current study as those who withdrew before discharge (3-months.) Despite a relatively high rate of non-completion, typical for both self-help and AN treatment, two-thirds (67%) of those who withdrew did so to engage in more intensive treatment. Understanding that those who withdrew were more likely to have greater clinical severity and potentially enough insight to self-refer (in most cases), it calls to question whether the default of considering these dropouts ‘losses’ in the traditional sense should be re-evaluated. As already mentioned, AN is an illness highly characterised by ambivalence, and this can be one of the greatest barriers to treatment (Wilson and Zandberg 2012, Treasure, Willmott et al. 2020). Thus, if the current intervention allowed some participants enough insight into the impact of their illness to seek more intensive treatment (face-to-face), this can hardly be considered a negative. It also makes sense that those with more severe AN symptomology, which made up the majority of our non-complete group, would be more in need of external guidance.

When re-examining drop-out rates with just those included who did not pursue treatment after withdrawal from the study, this brings drop-out down to just 14% of the total sample. While it is important to remember this is a small study, this would position the current intervention with lower drop-out rates than that traditionally seen in manualised self-help CBT and Recovery MANTRA (both approximately 18%) (Fichter, Cebulla et al. 2008, Cardi, Albano et al. 2020). With this link to the pursual of more intensive therapeutic care, this provides potential support for the leveraging the workbook for those waiting for more intensive or traditional therapeutic care. Regardless, all between-group statements made here remain purely observational without more rigorous exploration of potential effects.

5.5 Recruitment and Retention

This leads us to further discuss the recruitment and retention obstacles throughout the study and its application to the New Zealand context. Recruitment methods were made up of self-initiated methods (e.g., flyers) and professionally initiated methods (e.g., G.P. referral.) However, most contacts regarding the study were self-initiated. Flyers were the most popular source of referral, followed by those who found out about the study through the study website via search engine or promotion of the website through mental health forums. Considering the difficulty in accessing specialist treatment, there were few barriers to recruiting participants through self-referred methods with many contacts expressing interest in the study linked through flyers, study website and mental health channels online.

Interestingly the small proportion of participants referred via G.P were at the clinical level, as opposed to subthreshold. These low rates for referral are despite the study being widely shared with G.P.s and many agreeing to recruit for the study. Those suffering with AN who remain at a relatively healthy body weight are often less frequently urged to get treatment and can conceal their illness for far longer. It is plausible this may have been a barrier to G.P. recruitment in this current study. However, it does need to be recognised that the recruiting phase for the study was severely impacted by a number of COVID-19 lockdowns in New Zealand spanning 2020 and 2021. This may have affected G. Ps being able to assess individuals in-person and their ability to recognise signs or symptoms of the illness. In addition, many individuals with AN will also instead present for food allergies or digestive issues which can disguise AN symptomology (Rowe, 2017.) Self-referred recruitment methods appeared to bring the most participants into the study. Interestingly the literature reflects while those who self-refer may be further past contemplation stages of change, they are just as likely to be diagnosed with a clinical disorder or have comorbidity as those referred by a psychiatrist. Thus, consideration given to novel ways to target participants through self-referral channels will likely be an important recruitment challenge for future research (Ramirez et al. 2009.)

Unsurprisingly, retention was a challenge for the study as in many treatment studies for AN (Murray, Quintana et al. 2019). While 71% of those who indicated interest in the study assessed, just under half of these individuals were onboarded to the study. From onboarding, a further 43% dropped out of the study before discharge. Unfortunately, drop-outs from treatment studies for adult eating disorders is such a commonly occurring issue that countless meta-analyses and reviews have sought to identify contributing factors (Mahon 2000, Fassino, Pierò et al. 2009, Linardon, Hindle et al. 2018). In terms of loss between those who were assessed as eligible and onboarding, despite preventive measures in place, such as the rapid rescheduling of any cancellations, the COVID-19 lockdown also had an undoubtable impact with the inability to physically recruit via flyering or conduct onboarding sessions. While the potential of conducting this onboarding virtually was evaluated, the neuropsychological assessment component of the study was decided to be critical.

Regardless, only a very small proportion were lost due to scheduling, with the majority not retained found not to meet inclusion or exclusion criteria between initial contact, triage and onboarding. The key reason for exclusion from the study was prior or current specialist treatment for AN, with approximately 70% excluded for this reason. While it is heartening that a significant proportion of those interested in the study had been able to access prior treatment (most in adolescence), this supports what is known in the literature regarding only 46% every 'fully' recovering and many being left with residual symptoms (Steinhausen 2009). For many, access to specialist treatment is likely to only become more difficult in adulthood without familial support, depending heavily on if a level of independence is ever reached. Regardless, based on the current findings the current intervention may have had less impact on those with more protracted illness length or more severe symptomology.

It is worth considering that these excluded participants who have experienced prior treatment and potentially chronic illness lengths would benefit from a more intensive adaptation of self-help MANTRA, with some form of guidance while retaining the accessibility of a self-help approach. Thus, potential workbook adaptations examining benefit to those with residual symptomology or maintaining treatment outcomes could be an area for further evaluation. What this may confirm however, is that as suspected there is an unmet need for specialist treatment for AN in the New Zealand context. It also calls to question which recruitment channels may be utilised to best target those with shorter DOI and without specialist treatment histories into the study. The numbers who showed interest but were unable to be retained due to inclusion criteria clearly illustrates a large unmet need for interventions such as the current one and its adaptations. Of those onboarded, only 50% made it to discharge. Unfortunately, these rates are comparable with other published self-help treatments for eating disorders, with one systematic review indicating drop-out rates as high as 88% (Beintner, Jacobi et al. 2014). 83% ($n = 5$) of those who dropped out prior to discharge dropped out between baseline and 6-weeks.

Uptake rates of the intervention were fairly positive with 63% completing at least 5 of 10 modules in the workbook by 12-weeks, 50% completing 7 of 10 modules and 25% completing all 10 modules. By six-months, just under half of participants had completed all workbook modules. Unfortunately, it is difficult to compare this adherence with other self-help adaptations of MANTRA (RecoveryMANTRA (77%), iMANTRA 71%). The reason for this is differing intervention structure and definitions of intervention usage. Both these interventions had elements of guidance through peer sessions, access to internet materials, or email therapy that were counted to estimate adherence (Schmidt, Sharpe et al. 2017, Cardi, Albano et al. (2020). Additionally, in Cardi, Albano et al. (2020) any access to online self-help materials was counted within the adherence rate. As all our participants had completed at least the first two modules, trying to compare directly is like comparing apples with oranges. Furthermore, guidance was rated highly for impact by participants in both RecoveryMANTRA and iMANTRA which did also appear to be supported by our participants. Over half (63%) indicated they would have preferred to work through the intervention with a clinician or therapist. This, and our current study findings, appear to align with a systematic review of manualised pure and guided self-help conducted by Beintner, Jacobi et al. (2014), finding that guidance may be more likely to lead to higher intervention adherence rates. It is important to acknowledge however that workbook reading progress or simply accessing materials are similarly far from a perfect measure of engagement with an intervention.

5.6 Evaluation of Outcome Measures

When considering what has been reviewed thus far, several evaluations can be made regarding outcome measures. From a study design perspective, care was taken to include measures that not only examined illness-specific dimensions (EDE-Q and EDI-3) as well as more general measures of impairment and psychopathology (CIA and DASS-21.) These measures provided useful insight at the conclusion of the study. They allowed the teasing out of impact on AN symptomology, and more generally psychopathology, which is critical in a population that is characterised by high levels of comorbid mental health issues (Pollice, Kaye et al. 1997, Kaye, Bulik et al. 2008, Sternheim, Startup et al. 2012). The measures chosen also allowed clear comparison with other related studies and adaptations of MANTRA, which is critical if the current research is looking to add to the current evidence-base (Cardi, Ambwani et al. 2015, Schmidt, Magill et al. 2015, Schmidt, Sharpe et al. 2017).

Furthermore, the use of two different forms of self-report for eating disorder psychopathology (one more behaviourally based, the other psychological trait focused), combined with a semi-structured clinical interview, added further depth to outcome measures. As a significant focus of the current study was the identification of identifying characteristics and traits within the AN population that the current intervention may demonstrate the most benefit for, this breadth of measures spanning just AN-specific symptomology was critical. Furthermore, while all self-report measures were psychometrically sound, the inclusion of clinical interviews has been shown to be particularly good at clarifying ambiguity in symptoms, e.g. frequency of purge episodes and binge-eating over self-report measures (Fairburn and Brownell 2002). Thus, while time-consuming and of greater expense, this approach provided further confidence in final results in a smaller sample pilot study such as the current one.

With little change observed on decisional-balance measures between baselines and discharge, there are a few potential takeaways. The majority of the current study sample remained in the early change readiness stages at baseline, and readiness for change has been documented to be a helpful indicator for length of time until favourable treatment outcome (McHugh 2007). Thus, while using the Decisional-Balance scale still had utility in the current study, it may have had greater sensitivity as an outcome measure if it had also administered at 6-month follow-up or even at 12-months. With engagement to action often documented as a substantial hurdle to change in illnesses such as AN, where the illness is perceived with positive and negative traits, it may have been useful also to include a specific measure of type of motivation. While intrinsic autonomous motivation is frequently documented as resulting in sustained and more remarkable change, as previously discussed, many individuals with AN may initially enter into treatment due to external controlled pressures (such as a partner or familial dissatisfaction) (Carter and Kelly 2015). Including an outcome measure that examined how these autonomous and controlled motivational processes may have changed from baseline to discharge may have provided further insight into participants' internal motivational processes throughout the intervention. With the use of brief motivational interventions often used early in treatment to facilitate motivation (Denison-Day, Appleton et al. 2018) and the fact that many of our study drop-outs did so to engage in intensive therapeutic treatment (likely indicating motivational increase), this is likely an important area to examine in further research. Thus, a questionnaire often used in AN populations, such as the well-validated Autonomous and Controlled Motivation for Treatment Questionnaire (ACMTQ; Zuroff, Koestner et al. 2007), may also be a helpful outcome measure to include.

Perhaps the most obviously absent outcome measure in the current study is weight data and BMI at discharge, which is usually one of, if not the primary outcome for AN treatment studies. All participants had weight and BMI data recorded at baseline as part of their structured clinical interview; this was key for both ensuring that participants did not meet exclusion criteria (BMI > 17) as this was a pure self-help study in which participant monitoring was minimal. Weight and BMI data was also intended to be recorded at discharge however due to disruptions caused by COVID-19 lockdowns, these interviews were moved online, and the weighting component was lost. Fortunately, weight and BMI were never a primary outcome measure in the current study.

This was intentional from the study outset with a growing acknowledgement in the field of AN that internalised size biases and emphasis on weight can be particularly harmful to those with AN and is likely an inadequate measure of nutritional status (Mattar, Thiébaud et al. 2012). This is likely to only be more accurate in a population like the current study, which is primarily subclinical and atypical. It has been suggested that a weight-inclusive lens towards eating disorders that does not require a BMI threshold for diagnoses may potentially be part of the solution for avoiding the higher rates of suicide in those with an eating disorder who remain at a normal weight (Gaudiani 2018). Despite this, nutritional status remains challenging to measure through avenues other than weight without the use of invasive medical procedures. While not imperative, weight and BMI should be included as an outcome measure going forward for completeness of clinical interviews at discharge. They may also be used as limited indicators of support towards key outcomes, AN psychopathology and clinical impairment. However, this is far from a necessity in subclinical populations such as that in the current study.

It is still suggested that diversity of body types in the AN landscape should be prioritised over any weight outcomes.

5.7 Conclusion

The necessity of a low resource approach is absolutely imperative in a population which can rapidly deteriorate and where access to specialist services is limited. With early intervention well-established as key to recovery, barriers to the accessibility, scalability and dissemination of specialist treatment remain severe obstacles towards the long-term health and wellbeing of those struggling with the illness.

The current study sought to adapt a manualised specialist treatment for AN (MANTRA) and assess its feasibility as a pure self-help workbook intervention in the New Zealand context. While conclusions remain tentative due to the study design, the self-help workbook intervention trialled in the current study appears feasible and acceptable as an early intervention treatment option for mild to subthreshold AN. The change observed on AN psychopathology and clinical impairment at the conclusion of the intervention are promising findings and should be explored further in large-scale RCT. However, control arms are necessary to establish strength of effect on AN symptomology and potential impact of the intervention on general psychopathology, change readiness or cognitive indicators that predict engagement or retention.

Considerations of how specialist treatments can be delivered in novel and innovative ways, such as the current study, are helpful and even potentially life-saving contributions to a promising body of literature. Further implications will be discussed below.

5.8 Implications for Practice

One of the more interesting observations of the current study lay in the observed benefits on insight and motivation for those who completed the intervention and those who dropped out. Much of the participant feedback spoke of the intervention assisting with understanding the mechanisms of their illness and allowing insight and introspection. Furthermore, most of those who dropped out did so to engage in more intensive therapeutic treatment, potentially indicating a level of urgency that was not present before commencing the intervention. Pro-anorectic beliefs can be highly salient barriers to treatment and the module addressing this was rated highly by participants (Schmidt and Treasure 2006). With the MANTRA treatment model highly individual and formulaic in its approach, this suggests that this element may be successfully translated to the self-help adaptation of the intervention. However, while some participants valued the privacy of the intervention some indicated they may have preferred the support of a clinician.

While building formulation and motivation can be critical for treatment engagement, translating this engagement into action appeared to be a common barrier for those who dropped out of the study. This implies identifying concrete steps for change may be more difficult without external support. Therapeutic alliance has been identified as an important prognostic factor in AN, and it is within the realm of possibility that it was this shared establishment of treatment goals that may have been lacking for some participants (Stiles-Shields, Touyz et al. 2013). Additionally, as a highly ego-syntonic disorder (in that it is viewed as acceptable and self-aligned), this external guidance may be necessary for identifying the maintaining and perpetuating features of the illness – particularly for those with longer DOI or more complex AN symptomology (Treasure, Willmott et al. 2020).

In line with scalability and dissemination goals, one-way cognitive shifts could be supported to become concrete behaviour changes without requiring additional resources would be to establish a personal dietic or lifestyle goal at the start of the intervention. Considering that while individuals may have gained a level of insight into their behaviour, they may still feel unable to achieve desired outcomes or experience a lack of contingency when considering steps to complete their desired goals (Ryan and Deci 2000). Goal-setting has been found to be useful in the treatment of AN to create small concrete steps particularly when this goal is matched to stage of change (Treasure, Whitaker et al. 2005). While the MANTRA workbook does include a section on nutritional health, determining a unique dietic goal may assist with shifting participants from conceptual change to real behavioural change.

While not weight-based, this could target several nutritional areas, as simple as eating a variety of foods, establishing more consistent eating patterns or even including a protein goal that helps step individuals towards normal eating habits. Furthermore, if dietic goals are overwhelming this may be as simple as an overall quality of life goal such as engagement with supports (Treasure, Whitaker et al. 2005). This personal goal may assist individuals who do not relate with the dedicated nutritional section in the workbook, which was feedback from the current study, to remain focused on tangible behaviour change without requiring much extra clinician support. However, it is important to recognise that in a cohort that may have high levels of denial that any tracking of such a goal in a self-help setting may provide limited utility without proper safeguards.

5.9 Implications for Future Research

A potential exploration opportunity for future research would be establishing peer support alongside the workbook for those with mild to subthreshold AN. Participants provided feedback that, at times it was challenging to deal with the confronting thoughts and feelings that were raised by some aspects of the workbook. While a key objective of the current study is to reduce resource required, some form of non-specialist support could meet this need for external support with additional cost or training. In the SHARED trial, peer support was incorporated by those with lived experience (Schmidt, Sharpe et al. 2017). However, something as simple as a shared peer message board or platform could be used to connect participants. While the importance of social support in the traditional sense is clearly demonstrated in the current study, unfortunately, evidence for peer-support in eating disorders remains limited (Beveridge, Phillipou et al. 2019).

Despite this, a growing number of studies suggest that peer-support adjunct to treatment may be feasible in this area, providing mentorship, positive reframing and befriending that may be beneficial for recovery in eating disorders (Ranzenhofer, Wilhelmy et al. 2020, Peebles, Brown et al. 2021). One risk is that those with eating disorder symptomology have been documented to use these forums to collude in resisting treatment during inpatient treatment. However, most individuals in our sample were self-referred and treatment-seeking and are likely at lower risk of this. While it is not suggested there be no monitoring of potential forums, these may have the potential to add to an emerging evidence base and provide validation as well and allies on the difficult path to recovery.

In addition, the question of how engagement was defined as within the intervention, or any pure self-help intervention, requires improvement. While a simple workbook page count was incorporated in the current intervention, it's acknowledged that this is an overall imperfect measure. Moreover, as this intervention was pure manual self-help, there was no online or guided component to track as indicators as in other self-help adaptations of MANTRA (Schmidt, Sharpe et al. 2017). This was problematic for some reasons. The first being that if there is no measure of treatment engagement, it becomes difficult to attribute any results (beneficial or harmful) to the specific intervention – especially in a pilot feasibility trial where suggestions are already tentative.

Firstly, without an adequate measure of engagement there is no ability to tease out whether participants who had more significant treatment gains had greater engagement with the intervention, or this was by chance. Secondly, participants were asked to self-report their page progress at discharge in the current study. Considering that this population highly skews towards perfectionism and sensitivity to praise (Wade, Tiggemann et al. 2008), this may not account for social desirability bias when asked around progress. The measures employed in the current study did indicate that three participants who changed diagnostic status were also the three that had read over half of the workbook and had engaged with it since follow-up. However, there remains clear improvement in how this engagement metric is evaluated ongoing.

When looking at how other studies have handled this, one pilot study for a pure self-help mindfulness workbook instead asked participants about the number of exercises completed with the booklet and estimate percentage-wise how much of the book they had read (James and Rimes 2018). A similar approach was considered at the outset of the current study, with consideration to tick box stickers placed on pages for participants to tick as they completed exercises. However, this was foregone due to concerns regarding perfectionism and acquiescence bias. While discharges were impossible to conduct in person in the current study, one potential improvement to these engagement indicators would have been an in-person count of activities completed within the workbook that participants had completed - so long as participants were not primed to this beforehand. Furthermore, the percentage-based estimate of hand-outs and workbook completion may have been an improvement over a page count, as some participants reported page numbers earlier than first reported at discharge by 24-weeks. In line with qualitative comments, this likely was due to the repetition of particularly useful sections that support greater engagement that is not reflected in a page count. While there are several formal measures of treatment engagement, meta-analyses suggest it is difficult to generalise these across treatment settings and condition; thus the activities count is likely preferable in this context (Tetley, Jinks et al. 2011).

Another implication of the study is that a longer follow-up period may be required to detect enhanced change. This applies not only to measures such as general psychopathology and readiness for change but also to evaluate sustained change of AN symptomology. When considering that AN is a highly treatment-resistant disorder, it is important that any beneficial results observed were sustained over time (Abbate-Daga, Amianto et al. 2013). While our participants AN symptomology was required to be relatively mild for inclusion, many participants had longer DOI indicating an element of chronicity if not severity. It is well documented that while specialist treatments for AN often result in symptom improvement at the end of treatment, these changes are often not sustained at follow-up (Murray, 2018.) While the current study results appeared to be maintained at six-month follow-up, it must be acknowledged that this is a much shorter follow-up period than is commonly cited in the literature due to resource constraints. Evidence suggests that it may take up to 18-months post-treatment for relapse risk to be substantially reduced in AN (Carter, Relapse survival analysis, 2004.) Where resource allows, additional check-ins throughout the study may also be of benefit. One study by Wales, Brewin et al. (2016) indicated that those who respond positively to treatment in the first 6-weeks may be up to 18-times more likely to achieve an overall positive outcome. Thus, further explorations of the current intervention should focus on a follow-up period of at least 12-months with additional earlier check-ins throughout.

5.10 Policy Implications

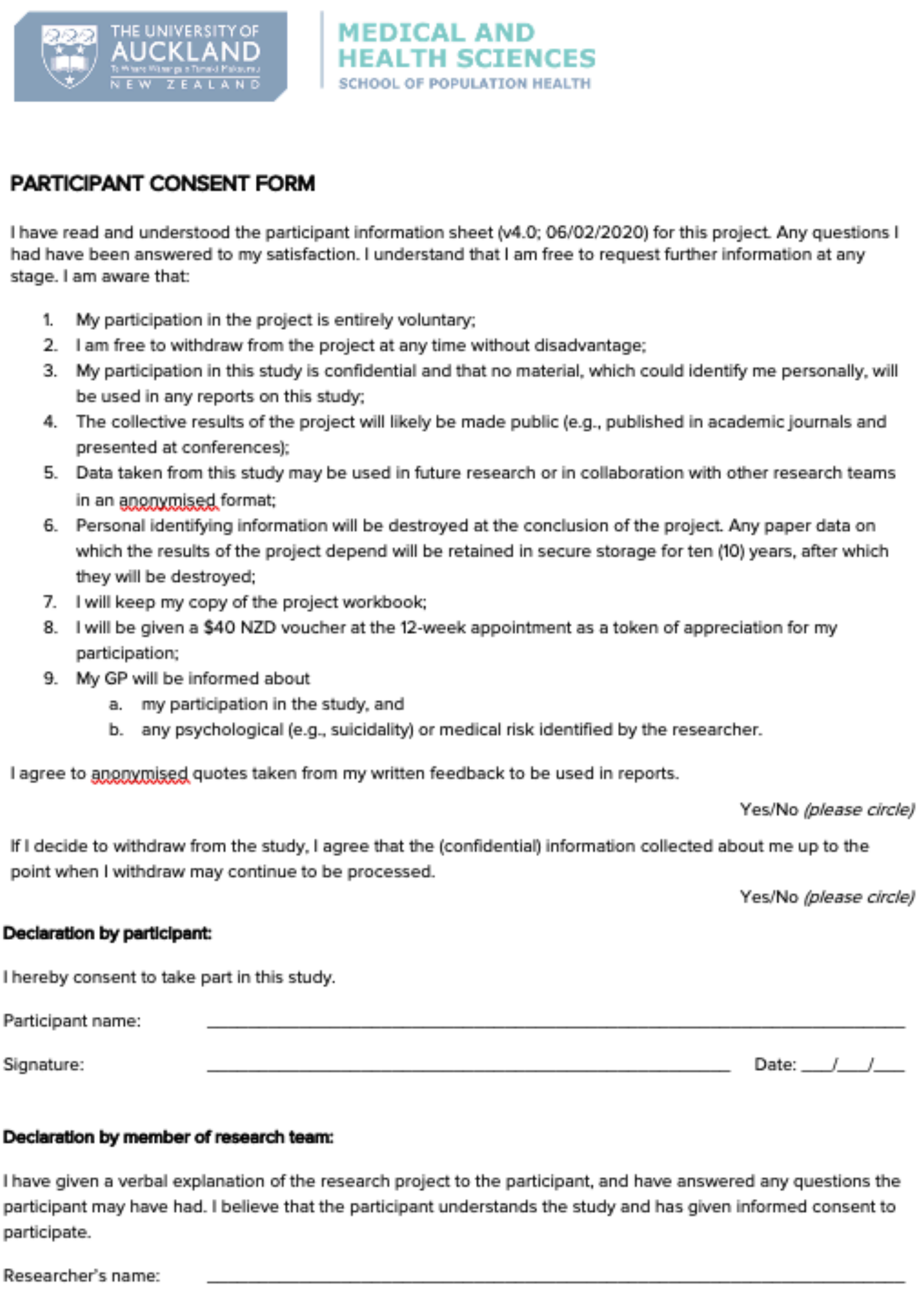
Research shows that it is becoming increasingly common for individuals with restrictive eating disorders to remain in a normal weight range (Whitelaw, Gilbertson et al. 2014). In addition, rates of recognition for AN are also documented to be low in the primary-care setting despite higher having overall higher interaction with G.Ps (Hoek and Van Hoeken 2003). It is important to combine this with the knowledge that eating disorders such as AN are only on the increase and more individual's suffering fall in healthy weight-ranges making them more difficult to detect (Smink, van Hoeken et al. 2016). This is particularly illustrated in the current study where all participants fell in a health weight-range despite suffering from subthreshold to even clinical levels of AN.

These assumptions that AN can only present as low body weight as a barrier to treatment pathways in primary-care can also be looked at from a cross-cultural lens. Some scholars suggest that a similar systemic bias may be at play for the recognition of Māori and Pacific peoples with eating disorders (Lacey, Cunningham et al. 2020). Likely, Māori are even further disproportionately affected in primary care due to differing body image ideals and lesser contact with healthcare (Lacey, Cunningham et al. 2020). With no Māori or Pacifica participants in our study, further education on differing presentations across body shape and culture may be critical in the primary healthcare sector. With such biases likely having a large impact on healthcare equity for those with eating disorders in NZ, this may suggest a need for further research into the exact mechanisms underpinning these biases for ethnic minorities and indigenous peoples.

Lastly, while this study focused on the intervention as the primary treatment – it is important to think of how it may be utilised in a context such as New Zealand where treatment waiting times are often extended. This time-period (up to 6-months in some specialist clinics) can be extremely dangerous for those with AN who may continue to progress further into the illness and health complications. Considering the success of self-help interventions to those on waitlists for bulimia (Treasure, Schmidt et al. 1996), the current intervention could be applied in a similar context. Currently there is no offering for those on waitlists, yet with public funded treatment so difficult to access, this provides a period of high-risk that no current healthcare policy addresses. Thus, the intervention could provide a low resource ‘pre-treatment’ option for those on waitlists, improving upon the lack of treatment currently offered. The MANTRA workbook takes a highly formulative approach and enhancing insight, motivation and subjective meaning of the illness have all been identified not only as strengths of the current intervention, but also as valuable tools to combat resistance (Abbate-Daga, Amianto et al. 2013). In Treasure, Schmidt et al. 1996 those who received a workbook while on a waitlist were 50% less likely to require further therapy sessions. Therefore, this approach may even reduce ongoing utilisation of care and have greater cost-reducing implications for the healthcare system.

6. Appendices

Appendix 1. Participant Consent Form



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NEW ZEALAND

MEDICAL AND
HEALTH SCIENCES
SCHOOL OF POPULATION HEALTH

PARTICIPANT CONSENT FORM

I have read and understood the participant information sheet (v4.0; 06/02/2020) for this project. Any questions I had have been answered to my satisfaction. I understand that I am free to request further information at any stage. I am aware that:

1. My participation in the project is entirely voluntary;
2. I am free to withdraw from the project at any time without disadvantage;
3. My participation in this study is confidential and that no material, which could identify me personally, will be used in any reports on this study;
4. The collective results of the project will likely be made public (e.g., published in academic journals and presented at conferences);
5. Data taken from this study may be used in future research or in collaboration with other research teams in an anonymised format;
6. Personal identifying information will be destroyed at the conclusion of the project. Any paper data on which the results of the project depend will be retained in secure storage for ten (10) years, after which they will be destroyed;
7. I will keep my copy of the project workbook;
8. I will be given a $40 NZD voucher at the 12-week appointment as a token of appreciation for my participation;
9. My GP will be informed about
    a. my participation in the study, and
    b. any psychological (e.g., suicidality) or medical risk identified by the researcher.

I agree to anonymised quotes taken from my written feedback to be used in reports.

Yes/No *(please circle)*

If I decide to withdraw from the study, I agree that the (confidential) information collected about me up to the point when I withdraw may continue to be processed.

Yes/No *(please circle)*

Declaration by participant:

I hereby consent to take part in this study.

Participant name: ______________________________

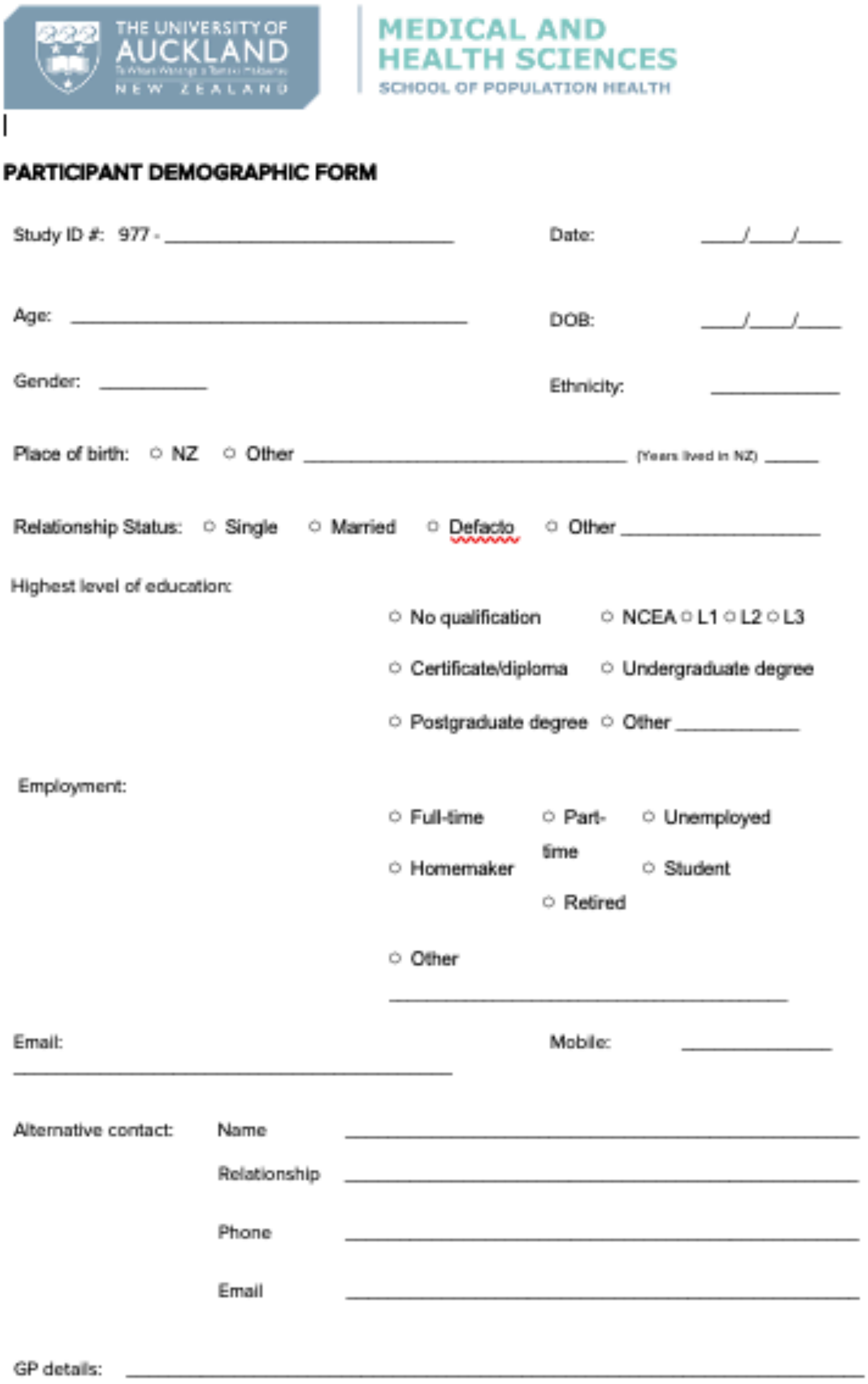
Signature: ______________________________ Date: ___/___/___

Declaration by member of research team:

I have given a verbal explanation of the research project to the participant, and have answered any questions the participant may have had. I believe that the participant understands the study and has given informed consent to participate.

Researcher's name: ______________________________

Appendix 2. Demographic Form



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PARTICIPANT DEMOGRAPHIC FORM

Study ID #: 977 - ____________________ Date: ___/___/___

Age: ____________________ DOB: ___/___/___

Gender: __________ Ethnicity: __________

Place of birth: ○ NZ ○ Other ____________________ (Years lived in NZ) _____

Relationship Status: ○ Single ○ Married ○ Defacto ○ Other ______________

Highest level of education:
○ No qualification ○ NCEA ○ L1 ○ L2 ○ L3
○ Certificate/diploma ○ Undergraduate degree
○ Postgraduate degree ○ Other __________

Employment:
○ Full-time ○ Part-time ○ Unemployed
○ Homemaker ○ Student
○ Retired
○ Other
____

Email: ______________________________ Mobile: __________

Alternative contact: Name ______________________________
Relationship ______________________________
Phone ______________________________
Email ______________________________

GP details: ______________________________

Appendix 3. Recruitment Flyer

- RESEARCH STUDY -

TREATMENT STUDY FOR PROBLEM DIETING, RESTRICTIVE EATING AND MILD ANOREXIA NERVOSA

Our University of Auckland research team are interested in increasing access to specialist treatment for eating disorders. We are working on a project looking at a self-help treatment for adults (18+) with problem dieting, restrictive eating or early signs of anorexia nervosa.

CAN I TAKE PART?

You may be eligible for the treatment study if you identify with any of the following:

~ are struggling with restrictive eating and dieting
~ have rules around food and eating or are limiting calories
~ are worried about your weight or have experienced weight loss
~ think you may be overexercising
~ feel that thoughts and behaviours around food are "taking over"
~ have been diagnosed with a mild form of anorexia nervosa

Full entry criteria are available on the study website. If you are interested in taking part or would like to discuss the study further, please email study coordinator anei697@aucklanduni.ac.nz.

WWW.EDSELFHELP.AUCKLAND.AC.NZ

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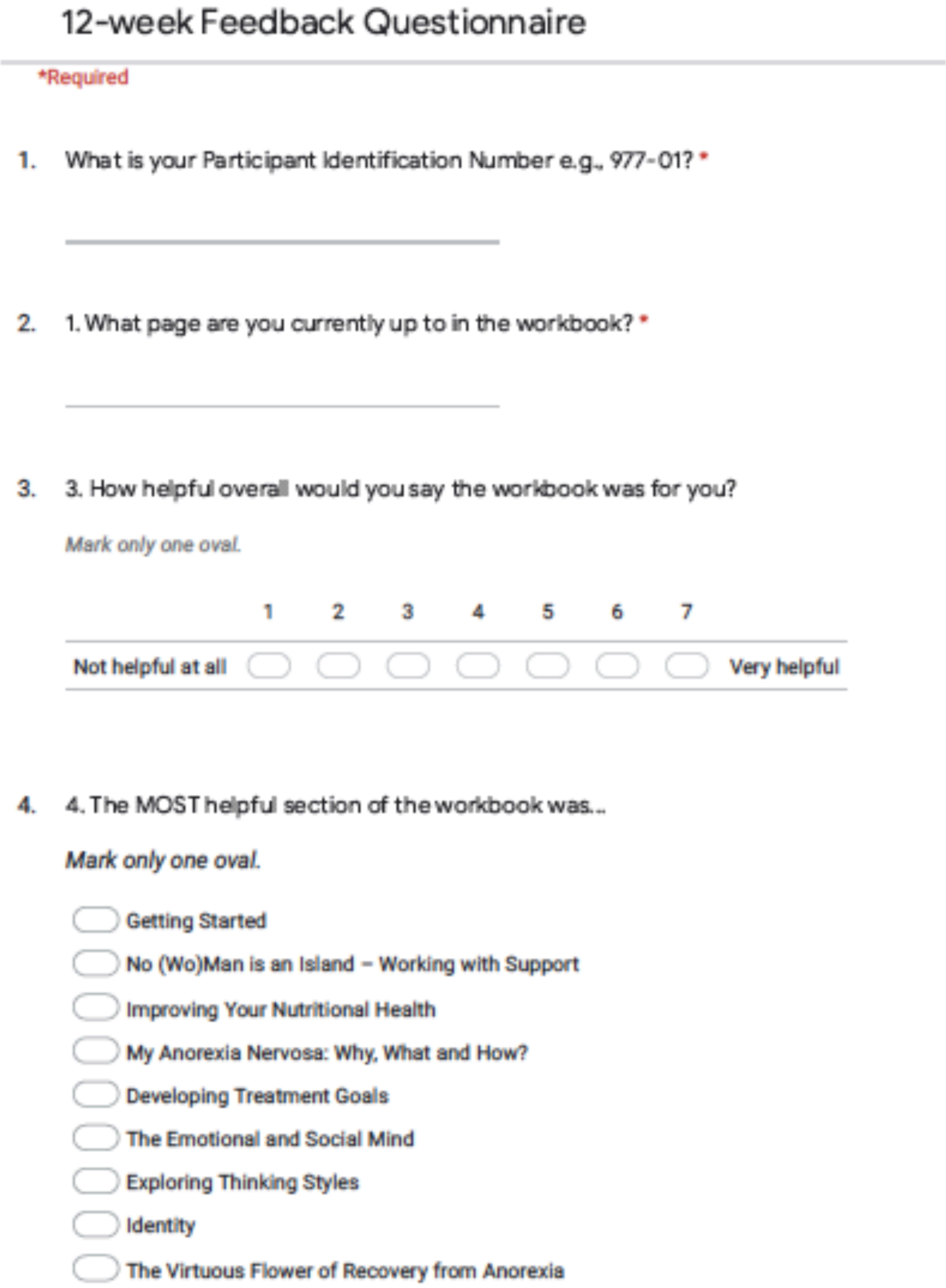
Appendix 4. Discharge Feedback Questionnaire



12-week Feedback Questionnaire

*Required

1. What is your Participant Identification Number e.g., 977-01? *

2. 1. What page are you currently up to in the workbook? *

3. 3. How helpful overall would you say the workbook was for you?

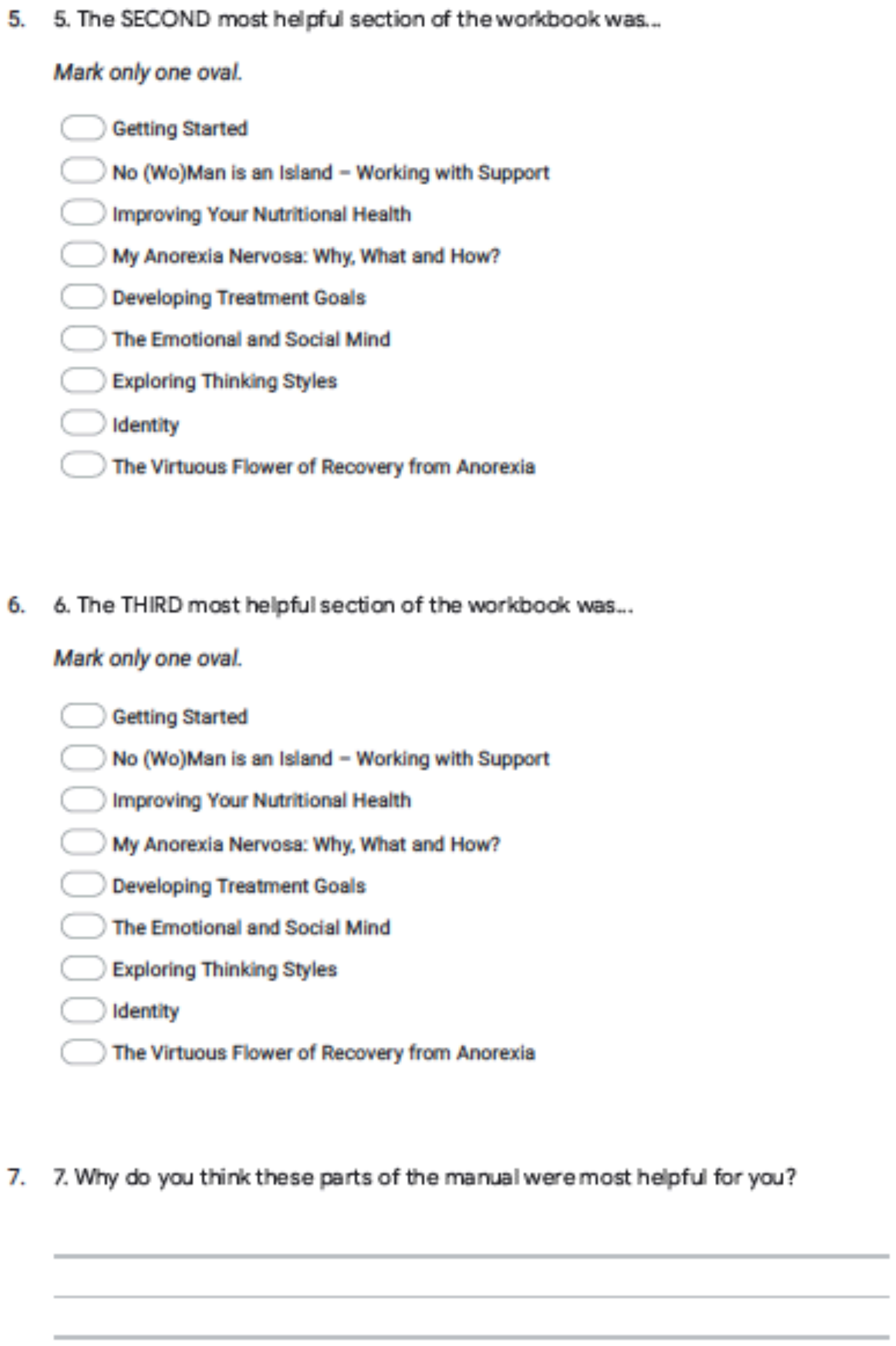
Mark only one oval.

	1	2	3	4	5	6	7	
Not helpful at all	○	○	○	○	○	○	○	Very helpful

4. 4. The MOST helpful section of the workbook was...

Mark only one oval.

○ Getting Started
○ No (Wo)Man is an Island – Working with Support
○ Improving Your Nutritional Health
○ My Anorexia Nervosa: Why, What and How?
○ Developing Treatment Goals
○ The Emotional and Social Mind
○ Exploring Thinking Styles
○ Identity
○ The Virtuous Flower of Recovery from Anorexia



5. 5. The SECOND most helpful section of the workbook was...

Mark only one oval.

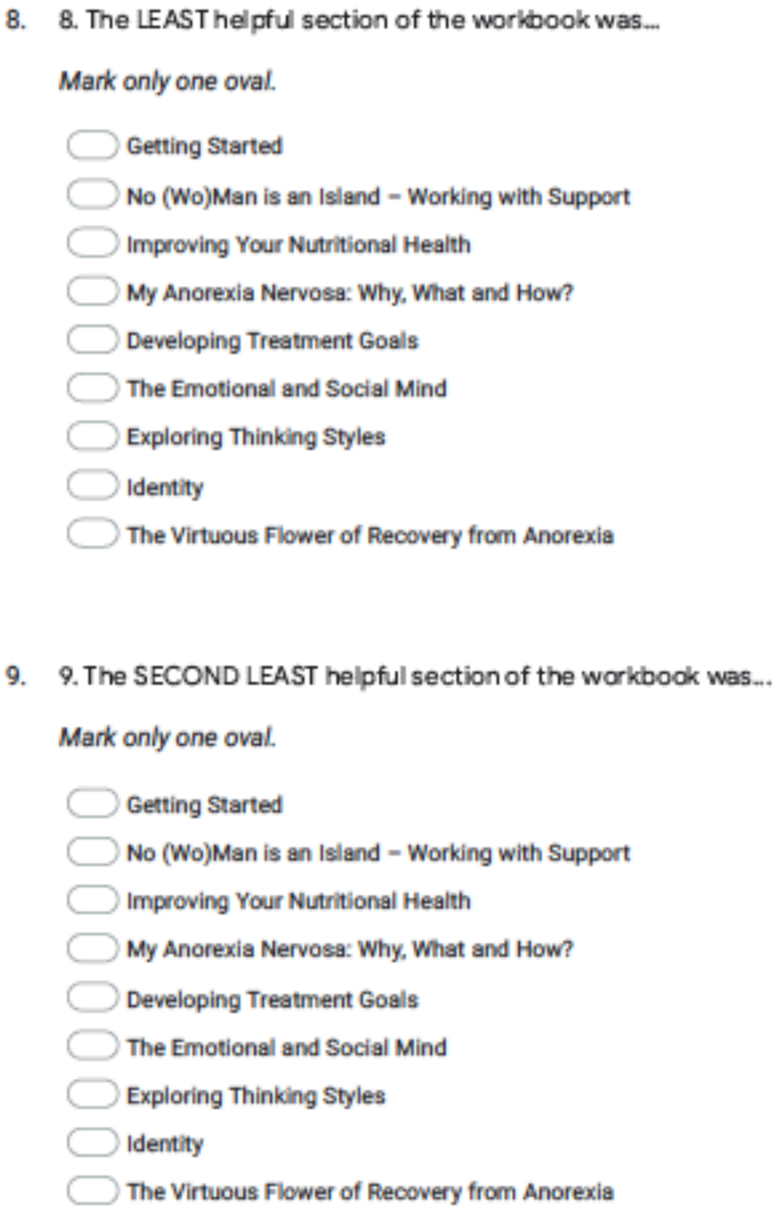
○ Getting Started
○ No (Wo)Man is an Island – Working with Support
○ Improving Your Nutritional Health
○ My Anorexia Nervosa: Why, What and How?
○ Developing Treatment Goals
○ The Emotional and Social Mind
○ Exploring Thinking Styles
○ Identity
○ The Virtuous Flower of Recovery from Anorexia

6. 6. The THIRD most helpful section of the workbook was...

Mark only one oval.

○ Getting Started
○ No (Wo)Man is an Island – Working with Support
○ Improving Your Nutritional Health
○ My Anorexia Nervosa: Why, What and How?
○ Developing Treatment Goals
○ The Emotional and Social Mind
○ Exploring Thinking Styles
○ Identity
○ The Virtuous Flower of Recovery from Anorexia

7. 7. Why do you think these parts of the manual were most helpful for you?



8. 8. The LEAST helpful section of the workbook was...

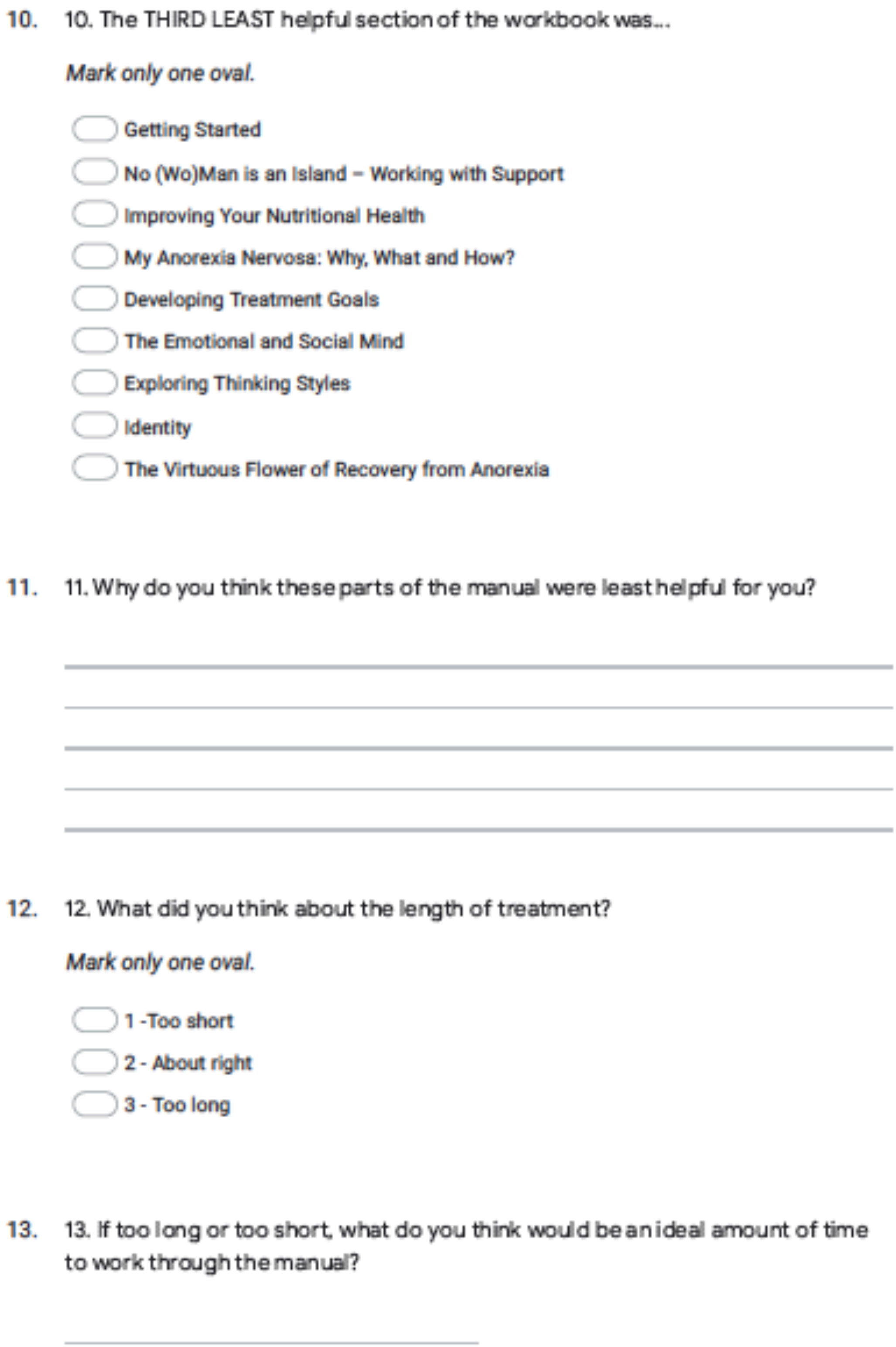
Mark only one oval.

○ Getting Started
○ No (Wo)Man is an Island – Working with Support
○ Improving Your Nutritional Health
○ My Anorexia Nervosa: Why, What and How?
○ Developing Treatment Goals
○ The Emotional and Social Mind
○ Exploring Thinking Styles
○ Identity
○ The Virtuous Flower of Recovery from Anorexia

9. 9. The SECOND LEAST helpful section of the workbook was...

Mark only one oval.

○ Getting Started
○ No (Wo)Man is an Island – Working with Support
○ Improving Your Nutritional Health
○ My Anorexia Nervosa: Why, What and How?
○ Developing Treatment Goals
○ The Emotional and Social Mind
○ Exploring Thinking Styles
○ Identity
○ The Virtuous Flower of Recovery from Anorexia



10. 10. The THIRD LEAST helpful section of the workbook was...

Mark only one oval.

○ Getting Started
○ No (Wo)Man is an Island – Working with Support
○ Improving Your Nutritional Health
○ My Anorexia Nervosa: Why, What and How?
○ Developing Treatment Goals
○ The Emotional and Social Mind
○ Exploring Thinking Styles
○ Identity
○ The Virtuous Flower of Recovery from Anorexia

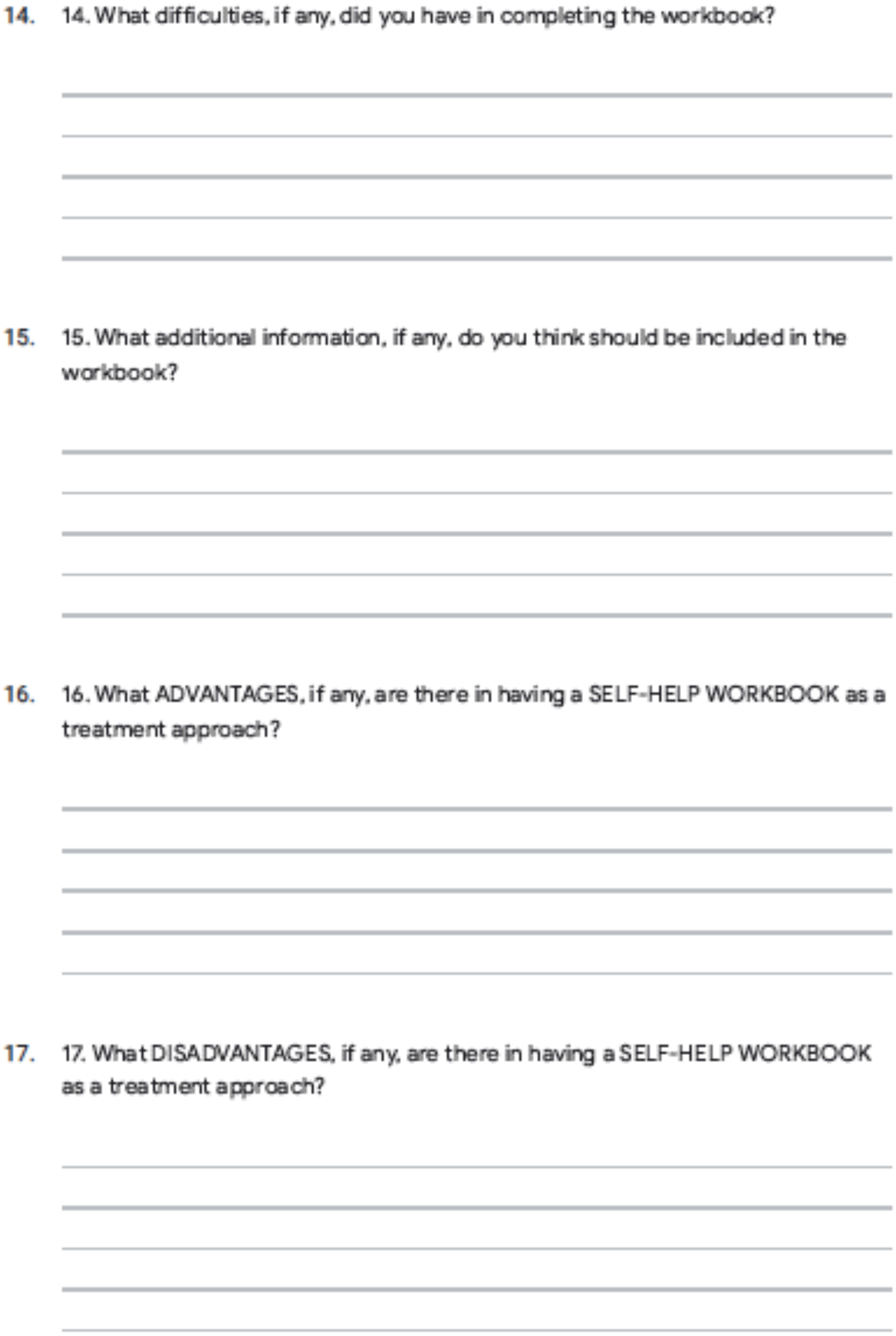
11. 11. Why do you think these parts of the manual were least helpful for you?

12. 12. What did you think about the length of treatment?

Mark only one oval.

○ 1 -Too short
○ 2 - About right
○ 3 - Too long

13. 13. If too long or too short, what do you think would be an ideal amount of time to work through the manual?

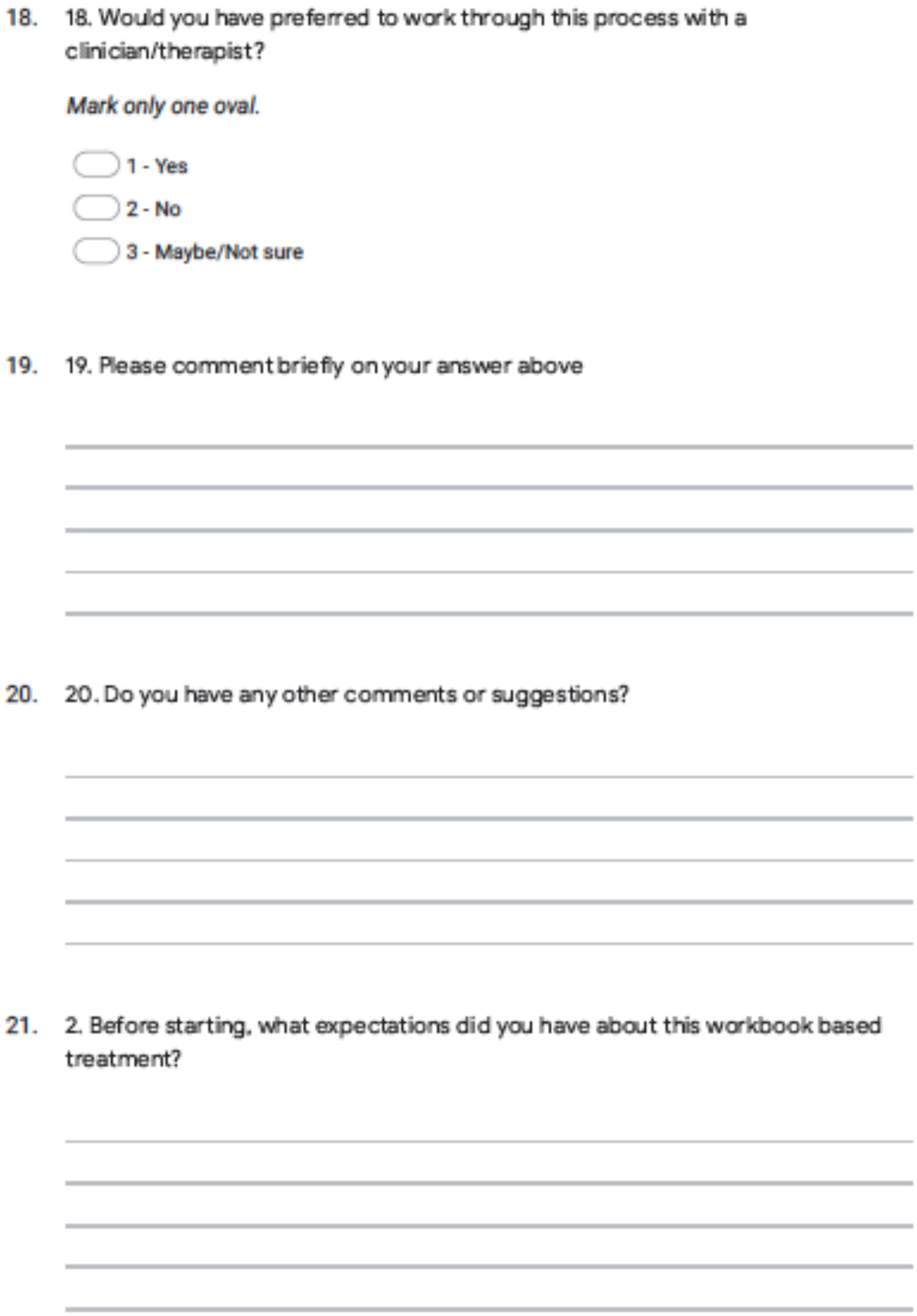


14. 14. What difficulties, if any, did you have in completing the workbook?

15. 15. What additional information, if any, do you think should be included in the workbook?

16. 16. What ADVANTAGES, if any, are there in having a SELF-HELP WORKBOOK as a treatment approach?

17. 17. What DISADVANTAGES, if any, are there in having a SELF-HELP WORKBOOK as a treatment approach?



18. 18. Would you have preferred to work through this process with a clinician/therapist?

Mark only one oval.

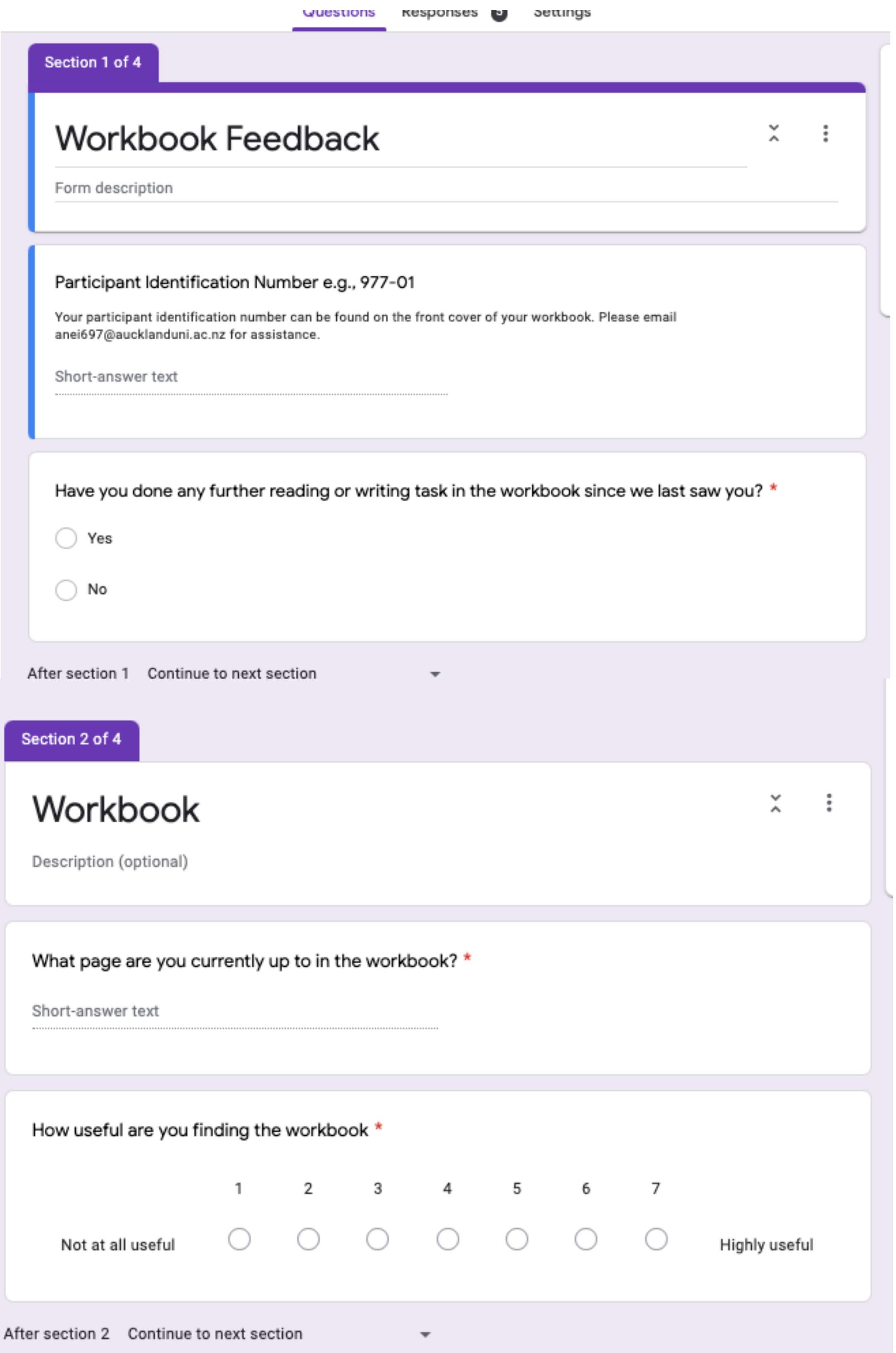
○ 1 - Yes
○ 2 - No
○ 3 - Maybe/Not sure

19. 19. Please comment briefly on your answer above

20. 20. Do you have any other comments or suggestions?

21. 2. Before starting, what expectations did you have about this workbook based treatment?

Appendix 5. Follow-up Questionnaire



Section 1 of 4

Workbook Feedback

Form description

Participant Identification Number e.g., 977-01

Your participant identification number can be found on the front cover of your workbook. Please email anei697@aucklanduni.ac.nz for assistance.

Short-answer text

Have you done any further reading or writing task in the workbook since we last saw you? *

○ Yes

○ No

After section 1 Continue to next section

Section 2 of 4

Workbook

Description (optional)

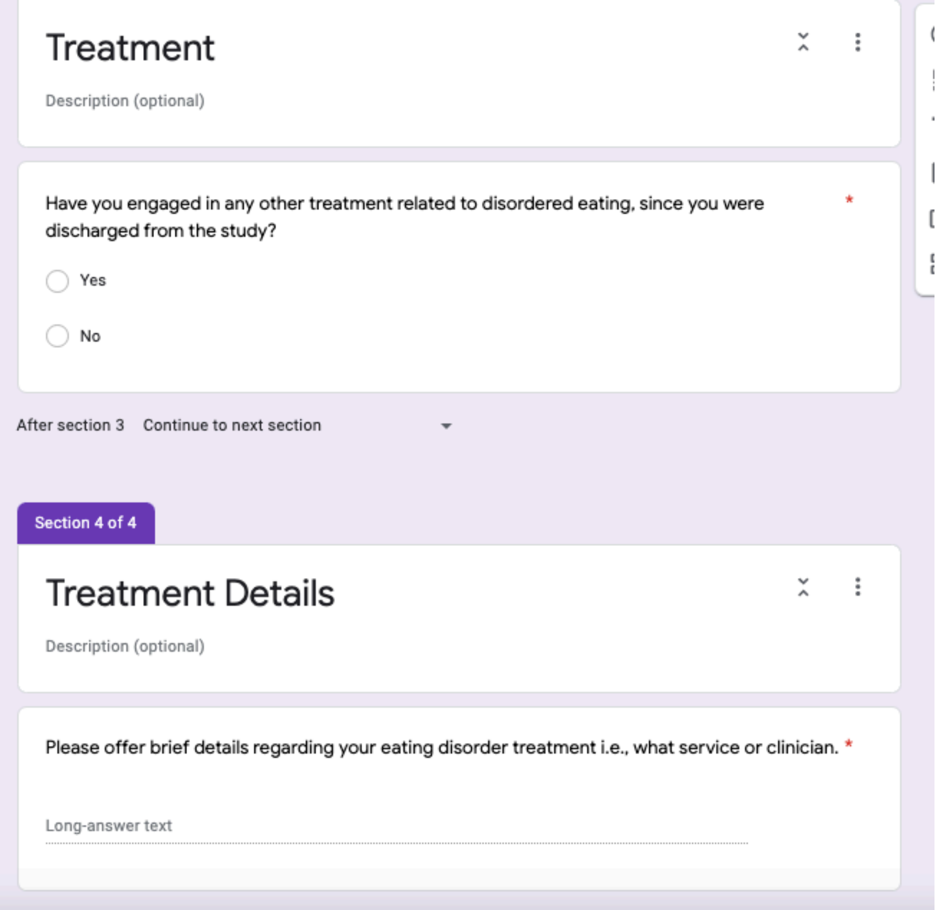
What page are you currently up to in the workbook? *

Short-answer text

How useful are you finding the workbook *

	1	2	3	4	5	6	7	
Not at all useful	○	○	○	○	○	○	○	Highly useful

After section 2 Continue to next section



Treatment

Description (optional)

Have you engaged in any other treatment related to disordered eating, since you were discharged from the study? *

○ Yes

○ No

After section 3 Continue to next section

Section 4 of 4

Treatment Details

Description (optional)

Please offer brief details regarding your eating disorder treatment i.e., what service or clinician. *

Long-answer text

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