

## REVIEW

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# Mind the gap! Factors that predict progression to bariatric surgery indicate that more psychological treatment may be required

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## Summary

In the UK, the number of adults living with obesity is increasing. Bariatric surgery is an available treatment for those living with a BMI (kg/m<sup>2</sup>) ≥40 and above, or ≥35 with obesity-related comorbidities. Guidelines highlight the importance of providing psychological support pre- and post-surgery owing to the complex psychopathology present in those living with obesity. There are a lack of studies examining which patients proceed to surgery and the factors that predict progression. Routine patient data were collected within one NHS regional service in the UK, comprising 733 patients between 3 August 2018 and 26 July 2019, aged between 17 and 76 years ( $M = 43.20$ ,  $SD = 12.32$ ). The only exclusion criteria were patients still awaiting a final decision for surgical outcome at the point of analysis ( $N = 29$ ), which resulted in 704 patients included in analysis. Binary Logistic Regression revealed those who were more likely to progress to surgery had a lower-level use of maladaptive external substances; lower level of self-harm and/or suicidality, were older in age; had a lower BMI; and had less comorbidities than those who did not progress. Findings support existing literature in that bariatric patients often present with physical and mental health complexity. Two thirds of patients in this study did not progress to surgery. Service commissioning decisions meant that these patients did not have access to

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psychology treatment. Consequently, in cases where bariatric surgery is considered, a final treatment option and otherwise clinically appropriate, lack of access to specialist services may result in unmet patient need owing particularly to a lack of psychological treatment provision.

#### KEYWORDS

bariatric surgery, commissioning guidelines, mental health, psychology

## 1 | INTRODUCTION

The number of adults living with obesity in the UK is increasing with a 10% rise since 1993, and with the North-East of England representing the highest rates of obesity in the country.<sup>1</sup> Bariatric surgery is recommended by the National Institute for Health and Care Excellence (NICE) Obesity Management Guidelines<sup>2</sup> as a treatment option for people living with obesity based on a BMI measurement ( $\text{kg}^2/\text{m}^2$ ). The criteria are defined as BMI  $\geq 40$  or 35 with obesity-related comorbidities, such as Type 2 Diabetes.<sup>2</sup> Bariatric surgery is recommended as the treatment of choice for patients with a BMI  $\geq 50$ , and/or for people living with uncontrolled Type 2 Diabetes. Prior to a referral for bariatric surgery, patients must have attempted sufficient non-surgical weight loss interventions, such as, pharmacological, dietary and physical activity.<sup>2</sup> Current guidelines state that patients must receive 'intensive management' within a Tier 3 weight management service.<sup>2,3</sup> A Tier 3 Service must include a range of healthcare professionals, including a Clinical Psychologist, Dietitian, Nurse, Pharmacist, Physician and Surgeon with patients only progressing to surgery if a bariatric service can provide adequate psychological support pre- and post-operatively. Support should include a comprehensive pre-operative psychological assessment to highlight factors that may have a negative post-surgical impact.<sup>2</sup>

People who seek bariatric surgery need to be aware of, and prepare for, the impact of bariatric surgery on their lives, and to commit to making permanent lifestyle changes to behaviours relating to eating, physical and social activity.<sup>4,5</sup> Long-term health behaviour change is challenging. Common difficulties can include low motivation, planning and time pressures, environmental and social pressures, adverse life experiences, negative thoughts and moods, socioeconomic constraints, gaps in knowledge and awareness, and a lack of support.<sup>6</sup> Bariatric patients benefit from additional and extended follow-up support post-operatively, particularly from clinical psychology, to facilitate health behaviour change.<sup>7,8</sup> Studies have consistently demonstrated that poor mental health and unresolved psychological difficulties are significant predictors of a less successful physical and psychological outcome from surgery. For example, poor psychological outcomes include an increased risk of self-harm and/or suicidality, instability in mental health and the transfer of addictions to other substances.<sup>9,10</sup> Poor physical outcomes include weight regain or failure to lose weight; chronic nausea and/or vomiting; and acid reflux.<sup>11-13</sup>

### 1.1 | Common considerations for people living with obesity

A significant number of bariatric surgery-seeking patients present with complex psychopathology.<sup>14</sup> There is a well-established, bi-directional relationship between patients living with obesity and living with mental health difficulties<sup>15,16</sup>; an increased level of obesity is associated with poor mental health and vice versa.<sup>17,18</sup> Patients living with a BMI  $\geq 50$  are more likely to present with a range of complex physical and mental health comorbidities, context-specific eating disorders and substance abuse.<sup>19-21</sup> Patients living with obesity can often present with co-morbid context-specific eating disorders, including Binge Eating Disorder (BED) and Night Eating Syndrome (NES),<sup>22</sup> with the prevalence of BED significantly higher in a bariatric population (21.3%) in comparison to the general population (2.6%).<sup>23,24</sup> These can act as maintaining factors, alongside the stigma attached to both underlying mental health difficulties and living with obesity.<sup>25,26</sup>

The aforementioned complexity is often a result of untreated and unresolved trauma.<sup>27,28</sup> Patients who have experienced significant psychological adversity are more likely to be living with obesity.<sup>29</sup> Approximately half of the adults referred to Specialist Weight Management Services (Tier 3) in the UK have reported adverse childhood experiences,<sup>30,31</sup> including various forms of abuse, family mental illness, trauma and family conflict. A history of childhood sexual abuse has been reported as having the greatest impact.<sup>32</sup> One theoretical perspective on this is the use of food as an emotional regulatory strategy.<sup>33</sup> Patients presenting with unresolved or untreated trauma are more likely to present with psychological difficulties post-surgery. This can include an increase in alcohol use, eating difficulties, minimal weight loss and an increase in risk of suicidality and/or self-harm.<sup>34,35</sup>

At the time these data were collected, in the UK, BOMSS guidelines<sup>3</sup> stated that an assessment must identify those who are unsuitable for surgery including:

Untreated or unstable mental health presentations, active alcohol or substance misuse (including cannabis use), active eating disorder such as binge eating without psychological treatment, bulimia nervosa, self-harm and suicidal behaviours in the past 12 months, current non-engagement with treatment and recent significant life event, bereavement or relationship breakdown<sup>3</sup>

The BOMSS-endorsed psychology guidelines<sup>36</sup> have reframed the identification of those unsuitable for bariatric surgery to those requiring additional support *before* progressing to bariatric surgery. The purpose of the psychological assessment is not to screen out patients from the bariatric pathway per se, but rather to identify for the wider Multidisciplinary team (MDT) the specific support needs required. Ogden et al. specifically outline a detailed list of presenting issues that 'need to be addressed pre-operatively' (Table 1<sup>36</sup>). Research studies have not yet examined the impact of the implementation of these guidelines within clinical practice (i.e., to systematically examine which clinical and non-clinical factors predict progression to bariatric surgery). The purpose of this current study was to address this gap.

## 2 | MATERIALS AND METHODS

### 2.1 | Design

This study employed an observational cohort research design. A binary logistic regression was utilized to investigate the clinical and non-clinical predictors of progression to bariatric surgery. The independent variables were based upon existing guidelines<sup>36</sup> and informed by clinical practice. The first group of independent variables (patient health profile) included current or historic mental health conditions; smoking and alcohol status; current or historic maladaptive use of external substances (drug addiction, alcohol addiction and binge eating); current or historic comfort eating; and current or historic self-harm and/or suicidality. These variables were based on known reported information. Given some of the information may not have been fully disclosed in previous reports or hospital visits this is likely to be an underestimate of the true extent of difficulties. Binge eating was classified as a separate variable to comfort eating and had to include the presence of 'loss of control' and eating excessively large volumes of food in a 2-h period or less (i.e., in line with DSM-V Criteria). The second group of independent variables (demographic characteristics) included age, gender, BMI, number of medications, number of comorbidities and index of deprivation rank (tertiles).

### 2.2 | Participants

Routine patient data collected within one NHS Regional Service in the UK was used for a retrospective analysis. Records identified 733 patients referred between 3 August 2018 and 26 July 2019. Patients were aged between 17 and 76 years ( $M = 43.20$ ,  $SD = 12.32$ ); 174 identified as male ( $M = 46.17$ ,  $SD = 12.46$ ), 558 identified as female ( $M = 42.31$ ,  $SD = 12.13$ ); 1 patient was born biologically female and identified as male. Exclusion criteria included removal of patients who were still awaiting a final decision for a surgical outcome at the point of analysis ( $N = 29$ ). This resulted in 704 patients whose data were included in the analysis. Ethical approval was received from both the host NHS Foundation Trust and

local University. Patient confidentiality was maintained throughout; all information was anonymized in line with Trust guidelines.

### 2.3 | Materials

Clinical and demographic information data were extracted from bariatric nursing and dietetic reports (based upon face-to-face clinical assessment interviews); General Practitioners (GP's) reports; hospital records (e.g., Accident & Emergency admission reports); and psychological reports.

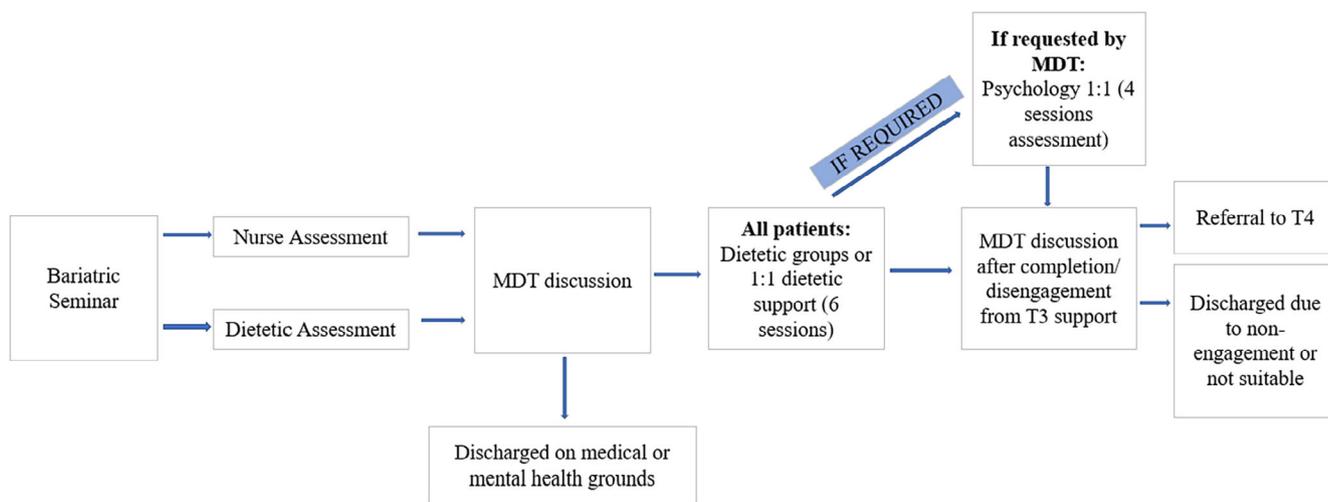
### 2.4 | Data handling and analysis

SPSS Statistics 27 software was used for the analysis. The dataset was divided into patients who progressed to surgery and those who did not, to determine any differences between the means of the groups. Continuous variables (age, BMI, number of medications, number of comorbidities) were computed into a natural logarithm and entered into a binary logistic regression to test for the linearity of the logit; the assumption was met. A linear regression with collinearity statistics tested for multicollinearity. The assumption was met (tolerance values above 0.1 and the VIF values below 10). Therefore, a binary logistic regression using a hierarchical approach was used. The first step included the Health Profile variables (Group 1) and the second step added the demographic characteristics (Group 2).

As shown in Figure 1, all patient referrals accepted into the bariatric pathway were triaged by a lead clinical (Bariatric Surgeon) before attending a bariatric seminar. All patients were allocated a face-to-face initial assessment appointment with a Bariatric Nurse and a Bariatric Dietitian. Reports from these initial assessment appointments were then submitted to a Bariatric MDT for further assessment/discussion. Patients who were known to be contraindicated for surgery and/or those who did not meet the current NICE inclusion criteria were discharged from the pathway at this point. The remaining patients were all required to attend six sessions of dietetic groups, or 1:1 dietetic support. If further psychological assessment was deemed necessary by the MDT, then a referral was made to Clinical Psychology. The psychological assessment involved a combination of work, including a detailed review of additional background mental health reports (via Primary and Secondary Mental Health Care Records) alongside up to four face-to-face assessment appointments with a Principal Clinical Psychologist.

## 3 | RESULTS

Table 1 shows the descriptive information for the total sample and the Group 1 and Group 2 variables. This confirms that of those referred ( $N = 704$ ; 100%), almost two thirds did not proceed to surgery ( $N = 452$ ; 64%). More women were referred ( $N = 540$ ; 76.7%) than men ( $N = 163$ ; 23.2%). The average age was 43 ( $SD = 12.31$ ),



**FIGURE 1** Summary of the bariatric pathway.

BMI was 46.54 ( $SD = 7.18$ ) and deprivation score was 2 ( $SD = 0.82$ ). Most patients were prescribed a number of medications ( $M = 4.36$ ,  $SD = 3.96$ ), and had a number of diagnosed comorbidities ( $M = 5.57$ ,  $SD = 3.58$ ). Almost two thirds of those referred were known to have a current or historic mental health condition ( $N = 511$ ; 72.6%), with a higher percentage of those patients not progressing to surgery (77.7% vs. 63.5%). Most patients self-reported that they smoked or drank alcohol (73.6%). Over one third reported current or historic use of external substances (alcohol, drugs, binge eating) ( $N = 265$ ; 37.6%), with a higher percentage recorded in those who did not progress to surgery ( $N = 195$ ; 43.1% vs.  $N = 70$ ; 27.8%). Almost half of those referred disclosed current or historic comfort eating ( $N = 312$ ; 44.3%), with a higher percentage recorded in those who did not proceed (216; 47.8% vs. 95; 37.7%). More than one in five of those referred reported current or historic self-harm and/or suicidality ( $N = 152$ ; 21.6%). Those who did not proceed to surgery had a higher recorded percentage in current or historic self-harm and/or suicidality (120; 26.5%) than those who did proceed to surgery (32; 12.7%). In summary, those who did not progress to surgery had higher recorded level of deprivation score, were younger, had a higher BMI, were prescribed more medications and had more comorbidities.

### 3.1 | Binary logistic regression analysis

Binary logistic regression analysis using a hierarchical approach was adopted to assess the impact of the health profile variables and then the contribution that the demographic characteristics made to the model variance. A stepwise approach was deemed inappropriate due to the elevated risk of Type 1 and Type 2 errors.<sup>37</sup> A forced entry was inappropriate due to the large number of independent variables.<sup>38</sup>

The outcome for Step 1 indicates whether a patient's health profile variables impact on the progression to bariatric surgery. This predicted approximately 7.4% of the variance in surgical outcome. The

inclusion of demographic characteristics within Step 2 of the model lead to an increase in the variance to approximately 11.9%. The results revealed five significant predictors of surgical outcome as shown in Table 2.

A lower level of current or historic maladaptive use of external substances ( $\text{Exp}(B) = 1.675$ ; 95% CI [1.134–2.475],  $p = .010$ ) and current or historic self-harm and/or suicidality ( $\text{Exp}(B) = 1.706$ , 95% CI [1.072–2.715],  $p = .024$ ) as well as an older age ( $\text{Exp}(B) = 1.023$ , 95% CI [1.005–1.040],  $p = .010$ ), lower BMI ( $\text{Exp}(B) = 0.972$ , 95% CI [0.948–0.996],  $p = .023$ ) and less comorbidities ( $\text{Exp}(B) = 0.909$ , 95% CI [0.843–0.980],  $p = .013$ ) predicted the likelihood of progression to surgery.

None of the following variables were significant: current or historic mental health conditions ( $\text{Exp}(B) = 1.428$ ; 95% CI [0.967–2.108],  $p = .073$ ); smoking and alcohol status ( $\text{Exp}(B) = 0.832$ ; 95% CI [0.570–1.215],  $p = .342$ ); comfort eating ( $\text{Exp}(B) = 1.001$ ; 95% CI [0.689–1.453],  $p = .997$ ); index of multiple deprivation rank ( $\text{Exp}(B) = 0.890$ ; 95% CI [0.599–1.322],  $p = .563$ ); gender ( $\text{Exp}(B) = 0.756$ ; 95% CI [0.498–1.147],  $p = .188$ ); and number of medications ( $\text{Exp}(B) = 0.984$ ; 95% CI [0.920–1.054],  $p = .650$ ).

## 4 | DISCUSSION AND IMPLICATIONS FOR POLICY AND PRACTICE

This is proposed to be the first UK study investigating factors that predict progression to bariatric surgery. There was a critical need to undertake this work to inform practice and policy. This study contained more women than men, and mainly middle-aged patients from a deprived background. These patients had a complex mental and physical health presentation, with a high number of comorbidities and medications. This gender profile is representative of those referred for bariatric surgery. Existing literature has explored the reasons for this disparity<sup>39,40</sup> and cites a higher prevalence of body image issues and societal pressures experienced by women<sup>41,42</sup> and greater

**TABLE 1** Participant demographics.

		All (N = 704)	Proceeded to surgery (N = 252)	Did not proceed to surgery (N = 452)
Index of deprivation rank		2.00 (0.82)	2.02 (0.82)	1.98 (0.82)
Age		43.06 (12.31)	43.89 (11.47)	42.60 (12.75)
BMI		46.54 (7.18)	45.48 (6.18)	47.12 (7.62)
Medications		4.36 (3.96)	3.81 (3.47)	4.67 (4.18)
Comorbidities		5.57 (3.58)	4.95 (3.15)	5.92 (3.76)
Gender	Male	163 (23.2%)	54 (33.1%)	109 (66.9%)
	Female	540 (76.7%)	198 (36.7%)	342 (63.3%)
MH conditions	Yes	511 (72.6%)	160 (63.5%)	351 (77.7%)
	No	193 (27.4%)	92 (36.5%)	101 (22.3%)
Smoking/alcohol	Yes	518 (73.6%)	190 (75.4%)	328 (72.6%)
	No	186 (26.4%)	62 (24.6%)	124 (27.4%)
External substances	Yes	265 (37.6%)	70 (27.8%)	195 (43.1%)
	No	439 (62.4%)	182 (72.2%)	257 (56.9%)
Comfort eating	Yes	312 (44.3%)	95 (37.7%)	216 (47.8%)
	No	392 (55.7%)	156 (61.9%)	236 (52.5%)
Self-harm/suicidality	Yes	152 (21.6%)	32 (12.7%)	120 (26.5%)
	No	552 (78.4%)	220 (87.3%)	332 (73.5%)

Note: Descriptive statistics (mean and standard deviations) and frequencies (and percentages).

Abbreviation: MH, mental health.

concern regarding fertility and pregnancy complications as a consequence of living with obesity.<sup>43,44</sup>

In this study, the majority of patients were referred from a low socioeconomic background with almost two thirds representing the lowest tertile (index of multiple deprivation rank). The relationship between living with obesity and high levels of deprivation have consistently been demonstrated.<sup>45,46</sup> Given the strength of this relationship, a focus on personal agency for change alone is unlikely to be sufficient for long-term change effects to be maintained.<sup>46</sup> Marteau et al.<sup>47</sup> argues that removing or reducing social and environmental drivers of unhealthy behaviours and replacing them with

healthier behaviours (particularly by addressing poverty as a primary barrier), would be nationally beneficial with the largest impact being upon those living in areas with high levels of deprivation. Areas with high levels of deprivation have fewer opportunities for accessible physical activity groups and typically have higher numbers of fast-food outlets.<sup>45</sup> These broader considerations of contributions to weight are commonly referred to as obesogenic,<sup>48</sup> and the complexity of obesity in this regard is well documented.<sup>49</sup> It is noteworthy that the geographical and socio-economic context of where this study was conducted has high levels of deprivation and obesity.<sup>1</sup>

**TABLE 2** Binary logistic regression showing predictors of progression to surgery.

Predictor	Beta	SE	Odds Ratio	Lower CI	Upper CI	p
External substances	.516	.199	1.675	1.134	2.475	.010**
SH/suicidality	.534	.237	1.706	1.072	2.715	.024**
Age	.022	.009	1.023	1.005	1.040	.010**
BMI	-.029	.013	0.972	0.948	0.996	.023**
Comorbidities	-.096	.039	0.909	0.843	0.980	.013**
MH conditions	.356	.199	1.428	0.967	2.108	.073
Smoking/alcohol	-.184	.193	0.832	0.570	1.215	.342
Comfort eating	.001	.190	1.001	0.689	1.453	.997
Deprivation	-.117	.202	0.890	0.599	1.322	.563
Gender	-.280	.213	0.756	0.498	1.147	.188
Medications	-.016	.035	0.984	0.920	1.054	.650

Abbreviations: MH, mental health; SH, self-harm.

\*\*Statistical significance ( $p > .05$ ).

In this study, almost three quarters reported a current or historic mental health condition that supports previous findings that confirm a high level of psychological adversity amongst people living with obesity presenting to a bariatric pathway.<sup>30,31</sup> The binary logistic regression analysis also identified that patients who were younger, with a higher BMI, more comorbidities and more complex mental health presentations (current or historic maladaptive use of external substances; current or historic self-harm and/or suicidality) were less likely to progress to bariatric surgery.

There are a large proportion of patients who do not progress to bariatric surgery, despite meeting the criteria provided by the NICE Obesity Management Guidelines.<sup>2</sup> Consequently, many patients are left without a treatment option other than to try to continue to self-manage their condition. This situation represents a serious clinical and ethical dilemma because a series of failed efforts to self-manage were the rationale for referral for bariatric surgery in the first place. The rejection and failure through engagement with weight management services may increase internalized-stigma and prevent further help-seeking efforts if patients are not appropriately supported.

The data indicate that once in the pathway, women were more likely to progress to surgery than men. Existing literature shows that men are significantly more likely than women to voluntarily drop out of a bariatric pathway (OR = 0.527,  $p < .001$ )<sup>50</sup> suggesting that motivation levels in women to engage with the demands of a pre-surgical pathway may be greater than men. Findings also revealed a higher percentage of patients not progressing to bariatric surgery when they have current or historic mental health conditions, alongside more complex mental and physical health presentations. Both the Tier 3 Commissioning Guidelines<sup>3</sup> and the BOMSS-endorsed psychology guidelines<sup>36</sup> highlight the need for unresolved psychological difficulties to be identified, highlighted, and treated pre-operatively using a stepped care model. This suggests that the bariatric MDT that were responsible for the decision-making process regarding progression to surgery in this study were operating in a way that was entirely consistent with current guidelines. However, if no stepped care model has been commissioned within the bariatric service itself or at Tier 3, a critical consideration is who is commissioned to support these patients to progress to be eligible for consideration for bariatric surgery?

A related consideration is why some patients, who are clearly contraindicated at the point of referral, were accepted into a bariatric pathway (e.g., a suicide attempt within the previous 12 months) in the first place? It questions whether this is due to a failure at the point of referral from Primary Care, or failure at the point of initial triage. The Tier 3 Service, in which this study was conducted, received no specific funding to provide the psychological treatment required to address the underlying contraindications. As such, any contraindicated patients were discharged back to their GP.

The Stepped Care Model outlined by Ogden et al.<sup>36</sup> in the BOMSS-endorsed psychology guidelines recommends three steps of input depending upon the patient's presentations. The third step involves a referral to a suitably qualified clinical psychologist (if there is no resolution after Step 1 and Step 2, or if the significance of the

issues requires further assessment). The Step 3 assessment is undertaken by a suitably qualified clinical psychologist. Following the assessment, the clinical psychologist has two choices; the first being to provide a 1:1 treatment intervention working within the bariatric service; the second being to refer the patient on to another external service. In our clinical experience, patients who were presenting with higher risks and more complex mental health presentations were not offered sufficient support to help them progress to surgery within this Tier 3 specialist service specifically. This is because the bariatric-led Tier 3 service offered a dietetic-led service with a psychological assessment only, not a psychological treatment intervention, at Tier 3 (see Johnston et al.<sup>51</sup> for a comprehensive commentary on the implications of routinely implementing BOMSS guidance). Based upon the Stepped Care Model,<sup>36</sup> patients are receiving minimal support pre-surgery or being discharged and referred elsewhere rather than receiving specialist 'in-house' bariatric psychology support from within the bariatric pathway. In the current service, the bariatric MDT were made aware of the complexity in patient presentations but without a suitably commissioned bariatric psychology service, it would be very high risk to proceed with surgery for those patients who are known to have pre-existing difficulties, which remain untreated. This generates further considerations for patient care—where can those who are deemed unsuitable for surgery be referred to for suitable support? For example, should they be seen by a clinical psychologist in a specialist weight management service (Tier 3), should they be referred to mental health services or should they be seen within a specialist eating disorder service for those with a higher body weight?

The clinical psychologist working within bariatric services is expected to deliver in-house interventions where possible to allow patients to progress to surgery, referring onto external services for more complex cases, which require longer-term input (Stepped Care Model<sup>36</sup>). Based upon our data, with one clinical psychologist working within the service, there were 452 patients who did not progress to bariatric surgery. This extreme ratio means the demand far outweighs available resource, which leads to a service limited to assessments only and thereby limits the potential for patient care. If there is no commissioned 'in-house' specialist treatment, with an equitable patient–psychologist ratio, the only option left is to decline surgery and refer on to generic mental health services, such as Improving Access to Psychological Therapies (IAPT). IAPT was created in 2008 and aims to treat people with common mild to moderate mental health conditions (e.g., anxiety, depression) in accordance with the NICE guidelines. However, as previously outlined, living with obesity is complex and often patients are living with multiple comorbidities. It is therefore unlikely that the IAPT service can respond to such complexity.

A key clinical issue that this clinical team have encountered when trying to refer patients to an external service is that the services are often not commissioned to work specifically with patients who are living with complex obesity and eating disorders. In the region where this study took place, three Specialist Weight Management Services (Tier 3) were decommissioned and not replaced. Furthermore, the Regional Eating Disorder Service was not commissioned to work with

patients with an eating disorder who are also living with obesity; rather, their focus is on patients who present with anorexia nervosa or complex bulimia and those who are living with a BMI of  $\leq 17$ . This may suggest there is a potential bias within commissioning nationally, which warrants further investigation and redress.

The lack of a commissioned psychological treatment service for pre-surgical bariatric patients may explain why so few patients progressed to surgery in this study. Clearly, surgery should not be viewed as a panacea and not all patients who are referred into a Bariatric Pathway will be suitable for surgery. Furthermore, some patients will experience post-surgery complications (e.g., replacing food with an alternative maladaptive coping response<sup>51</sup>). For those who are referred as a final treatment option, but who fail to be accepted because of complex psychological presentation and who do not have access to treatment, the prognosis is poor. This can leave a perception of little hope for some patients within the UK NHS system, and patients may seek private options abroad where the surgery is often perceived to be both cheaper and easier to access. Recent reports have highlighted the significant dangers associated with this type of 'health tourism' and for which it is difficult for the NHS to provide follow-up care for patients who have travelled abroad for bariatric surgery. Reasons include lack of patient medical information pre- and post-operatively (e.g., notes, hand-over of information and managing patient expectations.<sup>52,53</sup>

The main strength of this study was in the use of routine clinical data to examine progression to surgery. Data collected in a real-life settings allows participant samples to be representative and therefore generalizable.<sup>54</sup> Data were readily available, minimizing costs and effort.<sup>55</sup> The use of a binary logistic regression to analyse the data allowed the exploration of multiple independent variables. The data entry approach also meant that the statistical analysis was clinically informed. There has been a lack of research into predictors of progression to bariatric surgery. The current study is, to our knowledge, the first in the UK to examine the influence of age, BMI and number of comorbidities upon progression to bariatric surgery. This study's ability to collect data on groups of patients who are traditionally less represented in research studies is a key strength. Volunteers for studies, and those who respond to data collection requests, tend to have a higher socio-economic profile,<sup>56</sup> which means that those with lower socio-economic profiles tend to be less visible in research. It is also noteworthy that the current study reflects a design that is informed by clinical practice with the support of robust statistical analysis rather than something that is wholly academically driven. We have discussed the challenge of translating academically informed research into routine (clinical) practice previously<sup>57</sup> and it is anticipated that the findings of this study have both academic value and clinical credibility and relevance.

Whilst the use of routine clinical data provided strong ecological validity, it also acknowledged that because this study was not *a priori*, there was a lack of control over the variables measured. For example, there was some lack of psychological assessment information (e.g., NES), and therefore arguably, opportunity for missing variance from the binary logistic regression model. This means that there were additional unknown factors, which predicted progression to bariatric surgery which were not included in the analysis.

A common limiting factor in research that incorporates clinical interview/patient reports is the reliance on self-reported data, and the current study is no exception. One of the largest limitations with self-reported data is self-presentational biases.<sup>58</sup> This is representative of a patient's desire to represent themselves favourably, largely due to their strong desires to progress to bariatric surgery. Within clinical practice, it is well-known that some patients may tend to minimize their responses due to their desire to progress to bariatric surgery and this presents a risk of compromising the validity of the data.<sup>59</sup> The clinical nursing and dietetic assessment reports utilized for data generation in this study cover a range of highly personal and sensitive topics. It is understandable that the patient may choose not to fully disclose pertinent information on an initial assessment interview especially in areas where high levels of internalized emotion (e.g., anger, shame, embarrassment) may be triggered (e.g., disclosing the extent of a BED within the context of living with obesity). Consequently, if anything we believe there would be an under-reporting of potential psychological difficulties rather than an overrepresentation.

There is potential for future research to build upon the current findings to better understand the profile of the patient group who do not proceed to surgery and the reasons for this. It may be useful to conduct further qualitative work to understand more fully the reported gaps in service provision. This may help to inform practitioners and commissioners on how best to support patients in the future, whilst giving patients an opportunity to openly discuss their experiences to inform patient-centred care. Further exploration of the impact of health inequalities in bariatric patients living with obesity is also warranted.

In our clinical experience, patients who are declined bariatric surgery are often unable to receive the treatment they require to progress to surgery. This may largely be a result of gaps in commissioning and service provision. For example, to better support the needs of people seeking bariatric surgery, commissioning of eating disorder services may need to be broader to support a full spectrum of clinical presentations including those living with obesity. In the area where this study was conducted, a non-surgical Tier 3 Weight Management Service is clearly required to support patients who do not desire a surgical intervention and also for those for whom bariatric surgery is not currently suitable.

In sum, this study has demonstrated the need for a review of commissioning arrangements for psychological treatment within Tier 3 weight management services in the region in which this study was conducted. Such a review needs to consider the unintended consequences/limitations of implementing the BOMMS guidance<sup>3</sup> and critically, how those who do not progress to surgery can be better supported, especially given the psychological complexity and management required.<sup>60</sup> It is clear that there is a current gap in treatment provision in this regard.

#### AUTHOR CONTRIBUTIONS

Lynne Johnston, Charlotte Hilton and Kacey Jackson, designed the review, Kacey Jackson led on the statistical data analysis, Lynne Johnston, Charlotte Hilton, Kacey Jackson and Yitka N H Graham wrote the paper.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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