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REVIEW

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Factors associated with progression or non-progression to bariatric surgery in adults: A systematic review

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Summary

Access to bariatric surgery is limited, and the factors related to undergoing or not undergoing the procedure are poorly understood.

To this end, a systematic review of PubMed, Embase, PsycINFO, and CINAHL was conducted to deduce the factors associated with progression or non-progression to bariatric surgery. Quantitative and qualitative English-language articles ranging in date from database conception to September 2023 were included. Eligible studies employed adult participants (18 years of age or above) who had been referred for bariatric surgery.

A total of 57 studies were identified. Fifteen key factors were found, alongside six less frequently studied factors: age, sex, BMI, race and ethnicity, distance to clinic, socio-economic status, insurance coverage, physical health, psychological health, eating history and habits, substance use and smoking, social influence and relationships, pre-surgery process and requirements, surgery-related concerns, choice of surgery, and others (emergency room visitation, COVID-19 virus, health literacy, appearance perceptions, time-off work, and stigma related to surgery).

No factors were found to be reliably associated with progression or non-progression to bariatric surgery; however, the nature of these findings is tentative considering methodological flaws and limited research. Further studies are required to elucidate potential inequities in bariatric surgery access and educate policymakers and health professionals.

KEYWORDS
bariatric surgery, bariatric surgery access, barriers to bariatric surgery, progression to bariatric surgery, severe obesity

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1 | INTRODUCTION

The World Health Organization estimated that in 2016, 13.1% of the global population had a body mass index (BMI) of 30 kg/m^2 or higher, with a BMI of 40 kg/m^2 or greater classed as severe obesity.[1,2] Severe obesity is associated with a range of physical and psychological health consequences, such as type 2 diabetes, hypertension, coronary artery disease, some cancers, sleep apnea, osteoarthritis, depression, and anxiety.[3–11] In addition, there are a range of economic impacts of obesity because of increased healthcare expenditure and indirect costs such as productivity loss. One study estimated the costs of individuals being overweight or obese across economically and geographically diverse countries to amount to an average of 1.8% of gross domestic product in 2019.[12]

Persons eligible for bariatric surgery include those with a BMI of 40 kg/m^2 + or a BMI of 35 kg/m^2 ≥ with obesity-related co-morbidities.[13] Fisher et al.[14] showed that patients seeking bariatric surgery were more likely than individuals pursuing other means of weight loss to consider it a "last-resort option," usually having exhausted other weight loss methods such as dieting and medications. Despite being perceived as a final resort, bariatric surgery is associated with a range of documented benefits, including the potential remission of type 2 diabetes, hypertension, and sleep apnea, along with a decreased chance of developing obesity-related cancers.[15,16] A 2021 meta-analysis by Syn et al.[17] further showed that median life expectancy is extended by 6.1 years for those with severe obesity who undergo bariatric surgery as compared with those receiving usual care.

Despite these findings, publicly funded access to bariatric surgery is limited. In 2017, Atlantis et al.[18] conducted a survey of obesity services in Australian public hospitals and identified 16 specialist departments offering bariatric surgery in the main cities. Six of them had more than 300 patients on a waitlist, leading to wait times ranging from months to years. Along with this, restrictions to public elective surgery, including bariatric surgery, introduced during the COVID-19 pandemic, led to a 9.2% decrease in admissions from waiting lists between 2018–2019 and 2019–2020.[19] The limited accessibility of publicly funded bariatric surgery might contribute to the fact that 93.9% of primary bariatric procedures occurred in private hospitals in Australia during 2018–2019.[20]

To date, there is no comprehensive systematic review that considers the range of factors potentially associated with completing bariatric surgery or not, otherwise termed progression or non-progression to bariatric surgery. Although Iuzzolino and Kim[21] published a related systematic review, there are several limitations to their approach. The authors employed a restrictive search strategy and only included 10 studies. By limiting their search to demographic barriers to surgery completion, and cross-sectional and cohort studies published between 2010 and 2020, Iuzzolino and Kim[21] narrowed the scope of their review.

The current systematic review builds upon the existing literature by including several newer studies (published since 2020) and incorporating qualitative data. It seeks to provide an overview for policy-makers, surgeons, and other healthcare staff regarding the potential barriers and enablers to receiving bariatric surgery.

2 | METHOD

The following section has been prepared in adherence with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[22]

2.1 | Inclusion criteria

Eligible studies included adult participants (18 years of age or above) referred for bariatric surgery. Studies involving people referred for revision surgery were also included. No restrictions were placed on the types of studies to be incorporated, thus, including quantitative and qualitative literature, mixed-methods studies, and reviews of primary research.

2.2 | Search strategy

The databases PubMed, Embase, PsycINFO, and CINAHL were searched for English-language articles between May and July 2022, and again in September 2023. The reference lists of eligible studies were searched for additional articles. No time specifications were set. The review protocol is registered on PROSPERO (ID: CRD42022349972).

An expert librarian was consulted when developing the search strategy. Keywords (not including variations) comprising the search were as follows: "bariatric surgery," "weight loss surgery," "surgical weight loss," "gastric bypass," "sleeve gastrectomy," "adjustable gastric band," "Roux-en-Y gastric bypass," "lap band surgery," "patient dropouts," "dropout," "adherence," "compliance," "completion," "attrition," "non-adherence," "disengage," "withdraw," "proceed," "patient trajectory," "self-removal," "removal," "access to care," "barriers to care," "utilization of bariatric surgery," "failure to progress," "progression," and "non-progression." The full search strategy can be accessed at https://www.crd.york.ac.uk/PROSPEROFILES/349972_STRATEGY_20220729.pdf.

2.3 | Study selection

Search results were uploaded to the online software Covidence to remove duplicates. The primary reviewer (MM) first screened article abstracts against the inclusion criteria, before assessing the eligibility and relevance of articles in full-text format. The approach yielded 57 articles (see Figure 1).

2.4 | Methodological quality assessment

Eligible studies were assessed for methodological quality using the Joanna–Briggs Institute (JBI) checklists[23] by MM. The checklists for qualitative research and systematic reviews were employed, along with a modified version of the checklist for analytical cross-sectional studies. ACH, JMA, and AB each independently evaluated a portion of

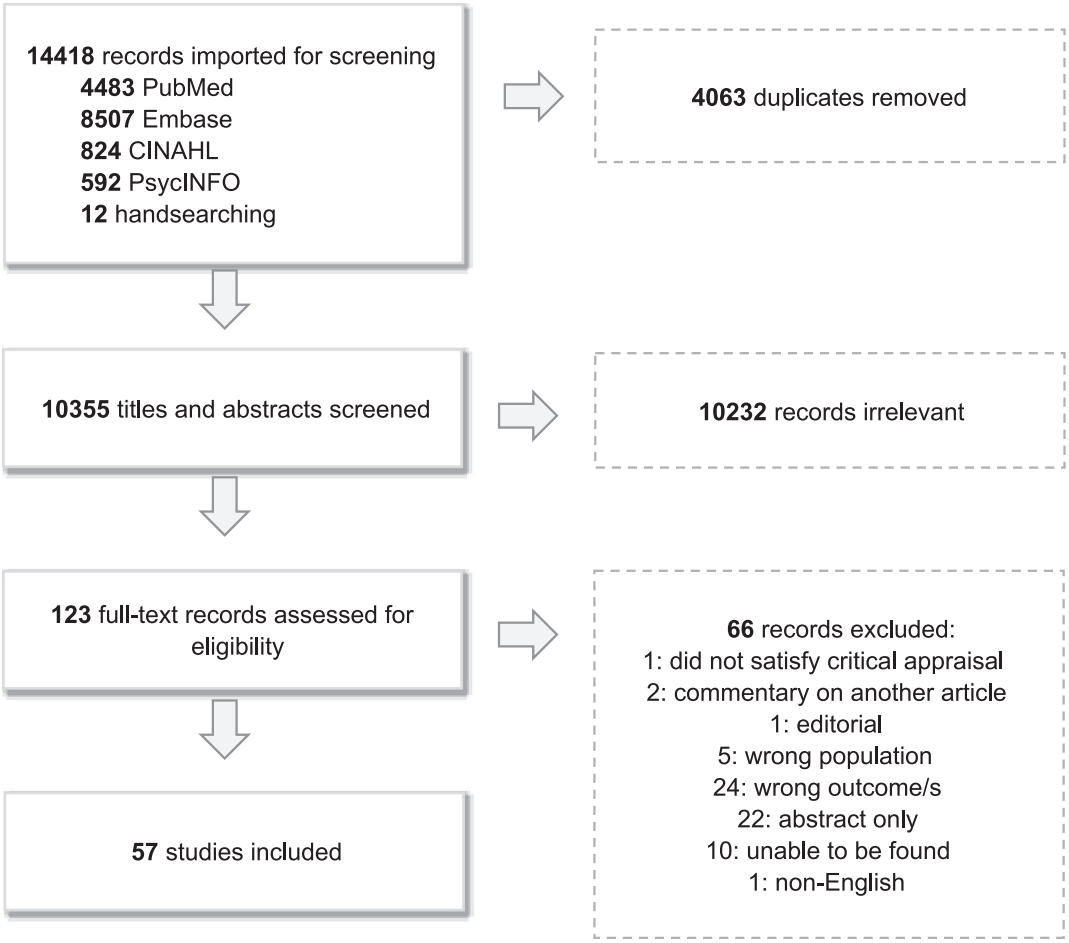

FIGURE 1 PRISMA flow diagram showing the study screening and selection process.

the pool of studies (see Data S2). Discrepancies in the appraisal of any study were discussed between MM and the respective researcher(s) to reach a consensus.

2.5 | Data extraction and synthesis

Information about each study, such as author/s, year, journal of publication, aim/s, setting, recruitment procedure, participant point of entry into a bariatric surgery program, study design, and results, was extracted using a specially developed data extraction tool. MM extracted the data, which were then independently checked by ACH, JMA, and AB. Disagreements were addressed through discussions between MM and the other relevant reviewer to reach a consensus.

The outcome of interest was progression or non-progression to bariatric surgery, defined as bariatric surgery being performed or not, and for qualitative research, the articulated barriers and enablers as discussed by participants. The use of varying terms throughout the review reflects the integration of different methodologies. No limits were placed on the types of predictor variables sought in relation to the outcome. Due to the high level of heterogeneity between studies, the lack of effect size measures reported, and the decision to include a variety of study types, the data were synthesized in narrative form.

3 | RESULTS

The following is a summary of the methods and quality of the studies included in the review. The results are then synthesized, including the conclusions of a previous review,[21] which contained some of the same studies as this current review. Table 1 below conveys the factors examined, along with the number and type of results available. Key study characteristics are presented in Table S1, and the results of the critical appraisal are shown in Table S2.

3.1 | Methods and quality assessment

In total, the review comprised 57 studies, with 45 quantitative studies, 8 qualitative studies, 3 mixed-methods studies, and 1 systematic review. Hlavin et al.[38] is one of the mixed-method studies, but the qualitative component was not included in the narrative synthesis because of poor methodology (see Table S2). Excluding the review, the studies were from the United States ($n = 39$), Canada ($n = 8$), New Zealand ($n = 3$), Australia ($n = 1$), Switzerland ($n = 1$), France ($n = 1$), Iceland ($n = 1$), Iran ($n = 1$), and Taiwan ($n = 1$). All were published between 2006 and 2023 (as shown in Data S1).

Overall study quality was moderate–high with most criteria achieved (refer to Data S2). However, several studies were poorly

TABLE 1 Table representing the various factors analyzed and the number and type of results gathered.

Factor of interest	Progression and/or non-progression (significant)	Progression and/or non-progression (non-significant)	Descriptives for progression	Descriptives for non-progression
Age	9, 15, 25, 53, 54 ($n = 5$)	1, 4, 5, 8, 14, 20, 27, 30, 34, 38, 40, 42, 45, 47, 48, 52, 55, 57 ($n = 18$)	7, 21, 45, 54 ($n = 4$)	3, 7, 21, 32, 40, 44, 45, 54 ($n = 8$)
Sex	8, 9, 15, 18, 20, 25, 40, 42, 46, 48, 54, 57 ($n = 12$)	1, 4, 5, 14, 27, 29, 30, 34, 38, 44, 45, 47, 52, 53, 55 ($n = 15$)	3, 7, 21, 45, 54 ($n = 5$)	3, 7, 21, 32, 45, 54 ($n = 6$)
BMI	3, 8, 29, 34, 38 ($n = 5$)	1, 5, 9, 14, 15, 16, 17, 20, 25, 27, 40, 42, 44, 45, 48, 52, 53, 54, 55, 57 ($n = 20$)	7, 21, 45, 54 ($n = 4$)	3, 7, 21, 32, 40, 44, 45, 54 ($n = 8$)
Race and ethnicity	15, 18, 25, 34, 41, 53, 54, 57 ($n = 8$)	2, 4, 5, 14, 15, 20, 21, 25, 27, 29, 30, 42, 45, 47, 54, 55 ($n = 16$)	21, 41, 45, 54 ($n = 4$)	21, 32, 41, 45, 54 ($n = 5$)
Distance to clinic	8, 20 ($n = 2$)	1, 4, 9, 38, 48, 52 ($n = 6$)	7 ($n = 1$)	7, 11, 20, 31, 32, 41, 44, 56 ($n = 8$)
Socio-economic status	4, 5, 9, 15, 18, 38, 47, 53, 54, 57 ($n = 10$)	1, 5, 9, 13, 14, 15, 20, 29, 42, 48, 53, 54, 55, 57 ($n = 14$)	7, 21, 54 ($n = 3$)	7, 18, 20, 21, 31, 32, 40, 54, 56 ($n = 9$)
Insurance coverage	15, 18, 27, 30, 47, 48, 53, 55 ($n = 8$)	1, 15, 20 ($n = 3$)	21, 43, 50 ($n = 3$)	12, 15, 18, 20, 21, 32, 43, 44 ($n = 8$)
Physical health	1, 3, 9, 15, 25, 27, 53 ($n = 7$)	1, 4, 9, 15, 20, 25, 27, 28, 38, 47, 48, 53, 54 ($n = 13$)	7, 22, 37, 43, 44, 50, 54 ($n = 7$)	3, 7, 10, 12, 38, 40, 41, 44, 54 ($n = 9$)
Psychological health	3, 5, 12, 16, 17, 23, 29, 36, 42, 45, 52, 57 ($n = 12$)	1, 5, 13, 15, 16, 34, 36, 45, 52, 53 ($n = 10$)	12, 22, 44, 50, 54 ($n = 5$)	3, 12, 31, 40, 41, 44, 54 ($n = 7$)
Eating history and habits	5, 12, 16, 17, 28, 34, 42 ($n = 7$)	5, 17, 34, 45, 52 ($n = 5$)	43, 50 ($n = 2$)	22, 31, 37, 40, 44, 56 ($n = 6$)
Substance use and smoking	8, 9, 15, 20, 24, 27, 29, 38, 52, 54 ($n = 10$)	1, 17, 38, 45, 52, 57 ($n = 6$)	21, 54 ($n = 2$)	3, 21, 40, 44, 54, 56 ($n = 6$)
Social influence and relationships	5, 15, 29, 45, 57 ($n = 5$)	1, 4, 5, 20, 42, 47, 48 ($n = 7$)	15, 21, 22, 37, 43, 45, 50, 51 ($n = 8$)	21, 31, 40, 45, 51, 56 ($n = 6$)
Pre-surgery process and requirements	1, 8, 9, 19, 20, 27, 33, 35, 47, 48, 55 ($n = 11$)	1, 26, 27, 30, 39, 49 ($n = 6$)	22, 37, 50 ($n = 3$)	6, 10, 11, 20, 32, 38, 40, 41, 44, 56 ($n = 10$)
Surgery-related concerns		28 ($n = 1$)		6, 10, 15, 18, 20, 22, 31, 37, 56 ($n = 9$)
Choice of surgery		14, 23, 28 ($n = 3$)	7 ($n = 1$)	7, 40 ($n = 2$)
Other factors				
Emergency room Visitation	9 ($n = 1$)			
Health literacy	13 ($n = 1$)			
COVID-19 virus				10 ($n = 1$)
Time-off work				20, 56 ($n = 2$)
Appearance perceptions	21 ($n = 1$)		22, 50 ($n = 2$)	
Surgery-related Stigma				6 ($n = 1$)

Note: Studies corresponding to the numbers in the table.
1. Alvarez et al.,[24] 2. Baz et al.,[25] 3. Benediktsdottir et al.,[26] 4. Bergmann et al.,[27] 5., Butt et al.,[28] 6. Chao et al.,[29] 7. Dash et al.,[30] 8. Diamant et al.,[31] 9. Doumouras et al.,[32] 10. Eghbali et al.,[33] 11. Funk et al.,[34] 12. Grothe et al.,[35] 13. Hecht et al.,[36] 14. Hecht et al.,[37] 15. Hlavin et al.,[38] 16. Holgerson et al.,[39] 17. Holgerson et al.,[40] 18. Iuzzolino & Kim,[21] 19. Jamal et al.,[41] 20. Ju et al.,[42] 21. Kapera et al.,[43] 22. Keeton et al.,[44] 23. Koball et al.,[45] 24. Kudsi et al.,[46] 25. Lee et al.,[47] 26. Lo & Hsu,[48] 27. Love et al.,[49] 28. Mahony,[50] 29. Marek et al.,[51] 30. Martin et al.,[52] 31. Martin et al.,[53] 32. Merrell et al.,[54] 33. Miletics et al.,[55] 34. Miller-Matero et al.,[56] 35. Monfared et al.,[57] 36. Ngenge et al.,[58] 37. Ofori et al.,[59] 38. Paolino et al.,[60] 39. Parnell et al.,[61] 40. Pitzul et al.,[62] 41. Rahiri et al.,[63] 42. Richard et al.,[64] 43. Roberson et al.,[65] 44. Sadhasivam et al.,[66] 45. Sala et al.,[67] 46. Schlottmann et al. (a),[68] 47. Schlottmann et al. (b),[69] 48. Schlottmann et al.,[70] 49. Shapiro et al.,[71] 50. Sharman et al.,[72] 51. Sloan et al.,[73] 52. Sockalingham et al.,[74] 53. Stanford et al.,[75] 54. Taylor et al.,[76] 55. Xie et al.,[77] 56. Yang et al.,[78] 57. Zhang et al.[79]

described, making it difficult to infer sample sizes and study designs. Inclusion criteria in quantitative studies were clearly defined, although participant data were gathered at different time points across studies, creating inconsistent timing of measurement(s). Most studies were conducted retrospectively using prospectively gathered information; making it likely that researchers were limited in their choice of

variables to what was available from standard intake questionnaires and administrative records, and the same confounding variables were rarely accounted for across studies. The nature of the study designs also prevented causality from being examined. Further, the methods used to measure certain variables, such as demographics and medical co-morbidities, were often not defined. There was also a lack of uniformity in the measurement of particular constructs across studies, such as psychiatric issues (for example, anxiety and depression) and substance use. Moreover, the use of multiple regression was common, but some studies presented a range of univariate associations and did not correct for type 1 error. Finally, several qualitative studies employed positivist approaches, for example, by comparing groups. The cultural and theoretical standing of researchers, along with their influence on the research products, was also rarely acknowledged.

3.2 | Age

A total of 28 studies examined age, with inconsistent results across the literature. The participants ranged from 18 to 80 years of age. Younger individuals appeared to be less likely to proceed to surgery in Lee et al.s[47] study (non-completers: 39.3 years, completers: 43 years). Taylor et al.[76] also showed that younger age was associated with non-progression, but only for the unemployed. Paradoxically, three studies identified that increasing age was linked with non-progression to surgery.[32,38,75]

3.3 | Sex

Thirty-one studies examined sex in relation to the outcome, with somewhat consistent results. Ten studies showed that males were significantly less likely to receive surgery than females and that a greater percentage of males do not complete, rather than complete, surgery,[31,32,38,42,47,64,68,70,76,79] which aligns with the previous review.[21] Pitzul et al.[62] also showed that a higher proportion of males self-withdrew from a bariatric program than were considered ineligible or completed surgery. In contrast, Merrell et al.[54] found that 78.3% of the participants who did not complete surgery were female, and in a separate study, 12% more females disengaged from a bariatric program than had surgery.[26]

3.4 | BMI

Twenty-eight studies examined BMI and the effects were mixed. BMI ranged from 35 to 115 kg/m^2 across the studies. Four studies linked higher BMI with a greater likelihood of progression to surgery (range: < 40 to > 60 kg/m^2).[26,31,51,60] However, Lee et al.[47] found that individuals who did not complete surgery had a higher mean baseline BMI than those who did (non-completers: 51.9 kg/m^2, completers: 48.1 kg/m^2). An additional two studies detailed patients being excluded from surgery because of a BMI that was either too high (> 70 kg/m^2) or too low.[62,66]

3.5 | Race and ethnicity

In total, 22 studies examined the factor of race and/or ethnicity, revealing moderately consistent results. Europeans or those of "white" race were more likely to progress to surgery when compared with individuals of American Indian, Filipino, Indian, Korean, Vietnamese, Other Asian, Māori, Pacific, Middle Eastern ethnicity, or "black" race,[38,63,79] as previously concluded in a review.[21] "Black" (relative to "white") race was associated with non-progression in another study but only for women.[56] Further, Taylor et al.[76] found that among employed individuals, those of Māori and Pacific ethnicity were two and six times less likely to progress to surgery, relative to Europeans. In contrast, Merrell et al.[54] found that a greater percentage of individuals who did not receive surgery were Caucasian as opposed to African–American or Hispanic.

3.6 | Distance to clinic

Fifteen studies examined the relationship between individuals' distance to a bariatric surgery clinic and progression or non-progression to surgery, with conflicting results identified. Ju et al.[42] found that residing within the same state as a bariatric center in the United States was associated with decreased odds of progression, relative to living out of state. Another study showed that patients who lived within 25–400 km of the surgery site had the highest odds of undergoing surgery though, even when compared to those who lived < 25 km or > 500 km from the center.[31] In contrast to some of the above, participants self-reported that travel concerns presented a barrier to surgery, but they were not considered a prominent barrier.[34,42,78]

3.7 | Socio-economic status

A total of 24 studies examined at least one measure of socio-economic status, with consistent trends across studies. Socio-economic indicators like receiving disability payments,[32,79] low-income,[69,75] accepting supplemental nutritional assistance packages,[28] holding immigration status, living in a poorer neighborhood,[32,38] and unemployment[32,38,60,79] were associated with greater chances of non-progression to surgery, which is consistent with the previous review.[21] The relationship between unemployment and higher odds of non-progression only applied to European patients in Taylor et al.'s[76] study. Conversely, those who completed surgery were employed full-time and more educated.[27] Patients self-reported that surgery-related costs and financial concerns influenced the termination of the surgery process as well.[42,78]

3.8 | Insurance coverage

Seventeen studies examined health insurance in relation to the outcome, revealing consistent results that support the findings of the previous review.[21] Not including the review, 15/16 of these studies were

based in the United States, and the remaining study was conducted in Australia. Holding private insurance predicted progression to surgery,[37,49,52] while having public insurance was associated with non-progression in samples of African–American and Hispanic patients.[69,70] In addition, participants were deterred from surgery because of insurance denial and complications,[42,54,66] with Xie et al.[77] further identifying that more surgery non-completers, relative to completers, were uninsured. Around 50% of the participants in Hlavin et al.'s38 study also "somewhat" or "strongly agreed" that the insurance process takes too long. Qualitative research by Roberson et al.[65] and Sharman et al.[72] additionally found that having insurance coverage influenced patients to proceed with surgery, with Sharman et al.[72] specifically noting the importance of private insurance.

3.9 | Physical health

Twenty-four studies considered at least one form of physical health factor, presenting varied findings in relation to the outcome. Four studies detailed patient discharge from bariatric programs for medical reasons, including type 2 diabetes, cardiovascular issues, hypertension, inflammatory bowel disease, osteoarthritis/degenerative spine disease, and obstructive sleep apnea.[62,63,66,76] The presence of type 2 diabetes was associated with non-progression to surgery in another two studies, but a different study linked the condition with progression to surgery.[32,38,49] Higher glycated hemoglobin levels were also related to surgical non-completion for patients with and without type 2 diabetes.[26,47] Coronary artery disease, hypertension,[24,38] heart failure,[32] chronic obstructive pulmonary disease,[49] and arthritis[75] were further associated with non-progression. In contrast, individuals with sleep apnea experienced higher rates of progression to surgery in the study by Doumouras et al.,[32] and Hlavin et al.[38] identified a greater percentage of polycystic ovarian syndrome among those completing the surgery. Having dyslipidemia was also associated with greater odds of receiving surgery in one study[26]; however, the use of blood lipid medication was linked with higher chances of non-progression in the same study,[26] and a separate research paper associated dyslipidemia with discontinuation instead.[26,38] Qualitative studies further reported participants seeking surgery to prevent or improve health conditions,[44,59,65,72] as well as to increase mobility[59,65,72] and energy levels.[44,65]

3.10 | Psychological health

Twenty-four studies examined at least one type of psychological health factor, with some contradictory results identified. More favorable psychological evaluations, determined according to aspects of patients' psychological history and weight evolution, were associated with progression to surgery.[64] Accounts of abuse were not independently linked to non-progression, but those who reported sexual and physical abuse and/or food addiction showed a higher rate of surgery non-completion, relative to individuals who screened negative for all three experiences.[39]

A history of psychiatric inpatient hospitalization and presenting with a psychiatric illness were associated with not receiving surgery.[51,79] Non-progression was also linked with a greater likelihood of taking psychotropic medication in one study, whereas another found the opposite to be true.[26,51] Suffering from depression, in particular severe depression, was identified as a predictor of non-progression to surgery in two studies[26,28]; however, a third study linked persistent depressive disorder with having surgery.[67] In addition, rates of past anxiety disorder, current generalized anxiety disorder, past panic disorder, current post-traumatic stress disorder, and past post-traumatic stress disorder were higher among those who did not complete the surgery.[74] In fact, Ngenge et al.[58] showed that individuals with a history of anxiety were 0.52 times less likely to complete surgery, compared to those without anxiety. Individuals who screened positive for probable bipolar disorder were also less likely to progress to surgery,[40] and in a separate study, the patients with bipolar disorder symptoms who did not complete the surgery reported more physical and emotional neglect, greater anxiety, and lower distress tolerance.[35] Displaying higher levels of distress tolerance seemed to be a protective factor, however, and was associated with greater chances of undergoing surgery.[45] Qualitative research also revealed concerns about the "emotional impacts" of excess weight, with participants pursuing surgery to remedy negative feelings about themselves and increase self-esteem.[44,72] However, some patients described mental health issues, such as anxiety, compelling them to withdraw from surgery, with associated thoughts of not being "ready" for the process.[53]

3.11 | Eating history and habits

A total of 17 articles examined some aspect of eating history and/or behavior in relation to the outcome, with similar trends across studies. Lower age of obesity onset (during childhood or adolescence) was linked with greater experience dieting and a higher likelihood of receiving surgery.[50] Qualitative findings were consistent with this, evidencing that failed weight loss attempts and lifelong weight problems motivated individuals to seek surgery.[65,72]

Further, more favorable dietary evaluations (based on the stability of weight/eating behavior and one's overall relationship with food) were associated with a greater likelihood of progression.[64] Additionally, experiencing food addiction has been linked with lower chances of having surgery,[39,40] and patients with bipolar disorder symptoms who did not receive surgery reported less confidence in controlling eating.[35] Binge eating was also found to predict non-progression but only for women.[56] Qualitative findings highlighted concerns about adapting to and sustaining post-surgery dietary changes as patient-identified barriers to progression.[44,53,59,78]

3.12 | Substance use and smoking

Nineteen studies examined substance use and/or smoking and demonstrated mixed results. Surgical ineligibility because of substance use

(including drug abuse) and smoking was featured in the literature.[62,66,76] Further, active substance use (drug use, alcohol consumption, and/or smoking), as well as substance use disorder in remission, past substance use disorder, and past substance dependence disorder, were each associated with non-progression to surgery.[31,51,74] In contrast, Kudsi et al.[46] showed that non-drinkers were less likely to undergo surgery when compared with social and problem drinkers (defined as individuals who met the criteria for heavy/binge drinking or alcohol abuse), who experienced similar chances of receiving surgery. Moreover, five studies identified that smoking (tobacco) predicted non-progression to surgery.[32,38,42,49,60] However, Taylor et al.[76] found that this effect only applied to Māori and Pacific islander individuals, and the unemployed, regardless of ethnicity.

3.13 | Social influence and relationships

Twenty studies examined some type of social factor, with findings focused on the role of other people in decisions about whether to undergo surgery. When examining relationship status, widowed and single individuals were less likely to have surgery.[38,67,79] More broadly, family problems predicted non-progression to surgery.[51] Qualitative research further illustrated the role of familial perceptions of surgery (both positive and negative) and caretaking responsibilities in patients' decisions about whether to continue with surgery or not.[73,78] Most commonly, the direct and indirect support and influence of significant others have been shown to facilitate individuals' choices to seek surgery,[44,59,72] with themes around wanting to be present with family members[65,73] and set a "good example" for children and other family members.[65,73] Knowledge of a family member, friend, or acquaintance having undergone surgery also affected patients' decisions to continue with the procedure,[44,59,65,72,73] as did experiences of public discrimination.[44,59]

3.14 | Pre-surgery process and requirements

Altogether, 27 studies examined at least one pre-surgery process or requirement, with contradictions evident in the literature. In terms of orientation session format, Shapiro et al.[71] and Parnell et al.[61] found no effect, but Miletics et al.[55] identified a higher non-progression rate among online attendees (compared with in-person attendees), while Monfared et al.[57] discovered the opposite to be true. Furthermore, telehealth appointments (versus in-person consultations) were associated with surgical completion among samples of African–American and Hispanic patients.[69,70]

Insurance and program requirements, such as providing a primary physician letter, advanced laboratory testing, urine drug screening, medical evaluations (cardiology, respiratory, endocrinology, and hematology), additional psychological evaluation, longer dieting time, medically supervised weight loss documentation, and extra dietitian sessions predicted greater odds of non-progression to surgery.[24,49] Two additional studies identified a relationship between dietary consultations and discontinuation, while a decreased number of surgeon visits was associated with non-progression to surgery.[41,42] Results also indicated patient exclusion based on unsatisfactory program compliance and failure to meet pre-operative requirements, including reaching pre-surgery weight loss targets.[54,62,63,66] Longer wait times, in terms of time from orientation to multi-disciplinary evaluation and overall wait time to surgery, were further barriers to surgery.[24,32,33,60] Moreover, Xie et al.[77] found that surgery completers reported better satisfaction with their patient–physician relationship than non-completers.

Previously mentioned barriers also appeared in qualitative form, including challenges meeting pre-operative requirements,[34] and time to surgery concerns.[72,78] Specifically, Chao et al.[29] reported that participants became disillusioned with the surgery-seeking process because of the number of pre-operative requirements and prolonged wait times. Other barriers described by patients were "inadequate" orientation sessions,[78] "poor" care coordination,[34] and reported miscommunication with physicians.[78] The importance of the information and support provided by health professionals in facilitating decisions to seek surgery was re-iterated,[44,59,72] in addition to the influence of information sessions.[29,72]

3.15 | Surgery-related concerns

Ten studies considered surgery-related concerns, with consistent findings across them. Iuzzolino and Kim[21] described "fear of surgical risks" as a barrier to surgery in their review. They cited two studies to support this claim, both of which were identified in the present review (see Ju et al.[42] and Yang et al.[78]). Hlavin et al.[38] also found that around 50% of the participants in their study "somewhat" or "strongly agreed" that fear of complications was a deterrent. Additional studies mentioned fears about mortality during surgery, as well as concerns about post-surgery complications and challenges (e.g., weight regain, loose skin, relying on supplements and liquids, dumping syndrome, metabolic changes, and delayed pregnancy), as barriers to surgery.[29,44,53,59]

3.16 | Choice of surgery

Five studies examined the influence of surgery type on the outcome, but no compelling and consistent results were identified. Pitzul et al.[62] observed that 4% of those who self-removed from their bariatric program did so because of interest in a procedure other than laparoscopic Roux-en-Y gastric bypass. Another study compared rates of surgery completion versus non-completion across patients who chose Roux-en-Y gastric bypass and sleeve gastrectomy; the non-progression rates were zero for both procedures, meaning no relevant conclusions could be drawn.[30]

3.17 | Other factors

In addition to the factors already mentioned, attending a hospital emergency room (for any reason) in the six months before referral

was associated with increased odds of non-progression to surgery,[32] as was inadequate health literacy.[36] During the COVID-19 pandemic, fear of contracting the virus or having COVID-19 were additional barriers.[33] The need to take time off work was also noted as a deterrent to proceeding with surgery, although not as a major barrier.[29,42,78] In addition, two qualitative studies described concerns about physical appearance and body image as facilitators to surgery, with participants wanting to look and feel better in their bodies.[44,72] Kapera et al.'s[43] study further showed a relationship between body appreciation and surgical completion, although the relative strength of this association is unclear given the methodology. Finally, the qualitative study by Chao et al.[29] reported stigma related to bariatric surgery, such as perceptions of it as an option for the "weak" or those unable to "control" their weight with diet and exercise, as a barrier.

4 | DISCUSSION

4.1 | Summary of findings

In the 57 studies identified, 15 factors were clearly present in the existing literature, along with 6 less frequently mentioned factors. This review involved a comprehensive search of the literature and the identification of a variety of factors that have not been previously summarized (see Iuzzolino & Kim[21] for an earlier review). The addition of qualitative, in conjunction with quantitative, research also provides a broader picture of the literature.

Socio-economic status and insurance coverage presented consistent results in relation to the outcome, with better financial circumstances facilitating access to bariatric surgery. Results within the factor of eating history and habits were also consistent, with past weight loss attempts being associated with progression to surgery but dysfunctional eating patterns serving as a barrier. However, most other factors revealed conflicting and/or counterintuitive results. For example, certain physical co-morbidities that bariatric surgery has been evidenced to address, such as cardiovascular problems and hypertension,[5,6] were shown to limit some consumers' access to surgery. Furthermore, only one study[29] mentioned bariatric surgery-related stigma as a barrier, even though bariatric surgery and weight-related stigma have been documented as systemic throughout society and within health systems more specifically.[80,81]

Based on the current literature, it could be suggested that a consistent, robust, and fair method of evaluation for the delivery of bariatric surgery internationally is lacking. Given the paucity of research, combined with the considerable number of non-significant findings and methodological weaknesses across studies, only tentative conclusions can be made at this point though. Considering the correlational nature of the findings, it is also possible that certain factors may be associated with confounding variables, such as access to *effective* care, which may be driving progression to bariatric surgery instead.

A limitation of this review is that the search string excluded non-English terms, presenting a predominantly Western account of the literature. Gray literature was also not reviewed, meaning that potentially relevant articles may have been missed because of publication bias. Further, we considered race together with ethnicity; however, the construct of race has been criticized for perpetuating biases and healthcare disparities.[82]

4.2 | Future research directions

Even though the overall research in this area is relatively scarce, particular factors have been studied more than others. Dedicating additional high-quality research using diverse samples to interrogate factors such as distance to clinic, insurance coverage, surgery-related concerns, and health literacy might allow for stronger conclusions regarding the predictors of progression or non-progression to bariatric surgery. However, it should also be noted that there may be factors that have not yet been explored in previous research.

Moreover, research has been conducted in a range of different settings and hospitals, most likely with diverse healthcare guidelines and practices. Future studies should describe settings and practices in greater detail, including the surgery eligibility criteria subscribed to, in order to allow researchers to better contextualize the findings. The majority of studies included in the current review were conducted in the United States, and these findings may not translate to other healthcare systems and societies. This review did not divide studies according to country or whether they were conducted in private or public healthcare settings; therefore, future research could make these distinctions to explore whether the factors associated with (non)progression to surgery differ across these domains. It is unclear whether decisions regarding progression or non-progression were patient-driven, practitioner-driven, or derived from a shared decision-making process. It would be useful to understand whether particular factors influence patients to conclude that they are not suitable or prepared for surgery, whether health professionals are applying certain criteria or contraindications, or whether (non)progression decisions are more dynamic. Hence, studies should provide the source of the decision to proceed or withdraw. Prospective, longitudinal studies that allow researchers to gather this information and give them greater control over the selection and measurement of variables would be useful. It is also worth noting that the scope of this review did not include barriers and enablers to bariatric surgery before referral. Therefore, prospectively capturing the entire process—from pre-referral experiences to surgery (or not)—would provide a broader understanding of factors linked with (non)progression. Interviews and surveys with bariatric surgeons and other healthcare professionals involved in the pre-surgery process might also help to disentangle the reasons for progression or non-progression to bariatric surgery.

4.3 | Conclusions

The current literature does not provide consistent and convincing evidence regarding which factors affect progression or non-progression

to surgery, otherwise termed the facilitators and barriers to bariatric surgery. Greater attention to factors including age, BMI, physical health, psychological health, substance use and smoking, and pre-surgery process and requirements, is needed to ensure that the public healthcare system delivers fair, equitable and evidence-driven service, and adequate support, to adults referred for bariatric surgery.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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