

Patients' Perceptions of the Mechanisms Underlying Alcohol Use Problems after Bariatric Surgery: A Qualitative Systematic Review

Abstract

Alcohol-related problems increase after bariatric surgery. The objective of this review was to synthesize findings of qualitative studies on patients' perceptions of the mechanisms leading to problematic alcohol consumption after bariatric surgery. This review followed the Joanna Briggs Institute methodology for systematic review of qualitative evidence. A comprehensive search strategy was performed in MEDLINE, PsycInfo, Scopus and Google Scholar. Study selection, data extraction and critical appraisal of included studies were undertaken by two independent reviewers. Confidence in review findings was assessed using the ConQual approach. Four studies were included in this review and led to the development of four synthesized results: (1) persistence or reappearance of psychological problems after bariatric surgery; (2) using alcohol as a coping strategy, sometimes as a replacement for food; (3) changes in the physiological response to alcohol; and (4) importance of increased information about alcohol-related risks and long-term counseling. Confidence in the synthesized results ranged from moderate to low. The results indicated postoperative problematic alcohol consumption is a complex issue, involving psychological and physiological mechanisms. Several recommendations are formulated based on the results obtained. More qualitative and quantitative studies are needed to better understand this phenomenon given the few existing qualitative studies on this topic and some divergent results found between qualitative and previous quantitative research.

Keywords: obesity, bariatric surgery, alcohol, systematic review, qualitative evidence, etiology

1. INTRODUCTION

Obesity is considered to be a major health issue around the world, 650 million people suffered from this disorder in 2016 [1]. The psychological, physical, social and economic burden of obesity has led to the development of many and varied diets, but only bariatric surgery seems to enable long-term weight loss and improvement of obesity-related comorbidities [2-6]. Nowadays, roux-en-y gastric bypass (RYGB) and laparoscopic sleeve gastrectomy (LSG) are the most commonly performed procedures worldwide [7]. However, several studies have noted the occurrence of unexpected negative psychosocial consequences after the operation [8]. One of these widely discussed consequences is an increase in alcohol consumption and alcohol use disorder (AUD) rates postoperatively.

Over the last decade, several studies have documented the existence of this phenomenon [9-11]. King et al., [12] found that 20.8% of bariatric patients reported AUD symptoms within the five years following RYGB. Some more recent studies have suggested alcohol use problems might also appear after LSG [13]. In a retrospective cohort study, Maciejewski et al., [14] evaluated alcohol consumption from two years before to eight years after bariatric surgery among bariatric (n = 2608) and control participants. In each group, the researchers differentiated between participants with preoperative unhealthy alcohol use and those without. Results indicated an increase in mean alcohol use and prevalence of unhealthy alcohol use after both LSG and RYGB among bariatric participants without baseline unhealthy alcohol use, as compared with control participants. Moreover, the probability of not using alcohol decreased in the 8 years after surgery for bariatric versus control participants. As for participants with baseline unhealthy alcohol use (n = 215 for the surgical group), increased mean AUDIT-C¹ scores and unhealthy alcohol use prevalence were found among RYGB versus control participants. In line with previous research [16], this study underscored

¹ The Alcohol Use Disorders Identification Test-Consumption (AUDIT-C), composed of three items, is a screening tool for heavy drinking and alcohol abuse or dependence [15].

the increased risk of alcohol-related problems after bariatric surgery but also indicated that some of the patients suffering from AUD post-surgery are new-onset cases: they did not have alcohol problems before surgery. Problems related to alcohol generally appear two years after the surgery [9, 13], but reasons for this time lag are not well understood.

Previous quantitative studies identified several risk factors for alcohol use problems post-surgery. These include male gender, smoking, regular alcohol use, AUD before surgery, lower sense of belonging, recreational drug use and younger age [9, 11, 12, 17, 18]. However, these risk factors do not provide sufficient information about the mechanisms whereby patients develop alcohol use problems postoperatively. Understanding these mechanisms is crucially important to prevent the occurrence of new cases of postoperative problematic alcohol consumption (PAC) in the future.

Qualitative research can provide key insights into complex phenomena and deepen our understanding of such phenomena [19]. The aim of this review was to synthesize evidence from qualitative research regarding bariatric patients' perceptions of the mechanisms leading to alcohol use problems after bariatric surgery. Preliminary searches for existing qualitative systematic reviews on this topic were conducted in PubMed and PROSPERO, and no published or planned review on this specific issue was available. This review' results may provide more information regarding patients' own perceptions of the etiology of their alcohol use problems post-surgery and may consequently help to inform the development and implementation of specific measures to prevent and treat postoperative alcohol use problems.

2. METHODS

This review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for systematic reviews of qualitative evidence (i.e. meta-aggregation) [20, 21]. An *a priori* protocol was registered with PROSPERO for this review (CRD42021268700).

Eligibility criteria

Regarding participants, this review considered studies involving adults who had undergone bariatric surgery and had suffered from PAC. There was no restriction on the type of surgical procedure (e.g. LSG, RYGB, biliopancreatic diversion, etc.). Qualitative studies including individuals who developed a new-onset PAC post-surgery and individuals who started consuming alcohol again at a problematic level after surgery (i.e. alcohol relapse) were included.

The phenomenon of interest was patients' perceptions of the mechanisms leading to PAC postoperatively. In this review, the concept of PAC referred to a variety of clinical issues such as alcohol abuse or dependence, AUD, binge drinking, alcoholic intoxication or excessive alcohol consumption. The presence of PAC might have been evaluated by a healthcare professional, with validated assessment tools or based on the participants' own perception of their consumption (patients perceiving their consumption as problematic).

As regards the context, this review considered studies conducted in any country, any cultural context, and any setting (e.g. patients in aftercare centers, hospitals).

The review included qualitative studies written in French or English, which examined the phenomenon of interest. There was no restriction as to the methodology (grounded theory, phenomenology, thematic analysis, etc.) or the research method (interview, focus groups, etc.). Qualitative data arising from mixed-methods studies were also considered.

Search strategy

The search strategy was designed in order to retrieve published and unpublished literature regarding the phenomenon of interest. MEDLINE (Ovid), PsycInfo (Ovid), Scopus (Elsevier) and Google Scholar were searched in May 2021 to identify qualitative studies that explored patients' understanding and perceptions of the mechanisms leading to PAC post-surgery. A combination of controlled vocabulary and text words was used for the database

searching. All search strategies were developed with an information specialist with experience in evidence synthesis (ND). For Google Scholar, exceptionally, only the first 200 citations were reviewed as recommended in the literature [22, 23]. Examples of employed keywords included “bariatric surg*”, “gastric bypass*”, “biliopancreatic diversion*”, “duodenal switch”, “sleeve”, “weight loss surg*”, “alcohol*”, “drink*”, “drunk*”, “substance abus*”, “hermeneutic*”, “focus group*”, “grounded theor*”, “interview*”, “observation*”, “thematic analys*” and “phenomenolog*”. No limitation was set for the date, but limitations regarding study designs were applied on MEDLINE and PsycInfo, in addition to the above-mentioned terms. The detailed search strategies are presented in Supplementary File 1.

Selection Process

Following the search, all identified citations were collated and uploaded into Covidence (Veritas Health Innovation, Melbourne, Australia) and duplicates removed. The titles and abstracts of all the remaining studies were screened independently by two reviewers. Potentially relevant studies were read in full-text against the eligibility criteria. Reasons for exclusion of papers at full-text were reported in the systematic review. During the study selection process, any disagreement between the reviewers was resolved through discussion. Finally, the reference lists of all included studies were screened to find additional relevant studies.

The results of the search and the study inclusion process were reported in full and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flow diagram [24].

Assessment of methodological quality

All included studies were appraised independently by two reviewers (EE, CF) for their methodological quality using the JBI Critical Appraisal Checklist for Qualitative Research [21]. This scale consists of 10 items, to which the reviewer can answer “yes”, “no” or

"unclear" depending on whether the study meets the quality criterion assessed by the item. Any disagreement between the two independent reviewers regarding the evaluation was resolved through discussion. For the current review, studies with a score of less than 5 on this scale were considered to have low methodological quality, scores between 5 and 7 indicated moderate methodological quality and studies with a score greater than or equal to 8 were considered to have high methodological quality.

However, before doing the review and as stated in the protocol, it was decided no studies would be excluded based on the score obtained on the checklist. There were several reasons for this decision. First, the assessment of the methodological quality of qualitative studies is a subject of debate and is not always applied in qualitative reviews [21, 25]. Second, it was expected that there would be few studies on the phenomenon of interest of this review and, therefore, excluding studies on the basis of methodological quality could have resulted in the loss of important information on patients' experience and perspectives. Finally, the evaluation of the methodological quality of qualitative studies is a recent practice in healthcare [26]. Older studies may not meet current quality criteria but may still present interesting results. However, it was decided we would not include studies that did not provide sufficient quotations from participants, given the importance in qualitative studies of giving participants a voice.

Data extraction

Relevant data were extracted in three phases [20]. First, general details of included studies were extracted, including citation details, data regarding the country, methodology, methods of data collection, phenomenon of interest/aims, participants and main results. Secondly, findings from primary studies were extracted, with an accompanying illustration for each one. Findings considered in this review were themes, subthemes, categories and subcategories identified in the results section of qualitative articles; illustrations were

participants' quotations related to the findings. These first two steps were performed by one reviewer (EE). The last step in data extraction (which is also the first step in data synthesis) involved the assignment of a credibility level to each finding based on the "the reviewers' assessment of the degree of fit, or congruency between the data and the accompanying illustration" [21] (p. 183). Three levels of credibility are possible; they were assigned independently by two reviewers to each finding (EE and AME): (1) unequivocal, namely "findings accompanied by an illustration that is beyond reasonable doubt and ; therefore not open to challenge"; (2) credible, referring to "findings accompanied by an illustration lacking clear association with it and therefore open to challenge"; and (3) not supported, which means "findings are not supported by the data" [20] (p.55). Any disagreement between the two reviewers was resolved through discussion.

Data synthesis

Data synthesis was carried out in three stages [20]. The first step, as described earlier, was to extract all the findings from included studies, with an accompanying illustration, and to assign a credibility level to each finding. Only unequivocal and credible findings were included in the data synthesis. The second step was to group different findings together to form categories. In this review, findings were grouped on the basis of similarity of meaning. Finally, these categories were themselves grouped together to generate synthesized results.

Assessing confidence in the findings

The final synthesized findings were graded according to the ConQual approach for establishing confidence in the output of qualitative research synthesis and to generate a summary of findings table [27].

3. RESULTS

Study selection

The database searching yielded 756 references. After duplicates (n=186) were removed, two reviewers (EE and MVH) screened the titles and abstracts of the remaining 570 citations. From these 570 citations, 10 were selected for full-text reading. After full-text reading of all eligible studies, four studies and one doctoral thesis were retained. Given that the qualitative results of the thesis had also been published in one of the four scientific papers included, the decision was made to focus on the results of the scientific article. Studies excluded after full-text reading and the reasons for excluding these studies are documented in Supplementary File 2. The study selection process is represented in Figure 1.

Methodological quality

Included studies' methodological quality ranged from low to high. Most authors did not clearly state the philosophical perspective they based their study on. None of the studies located the researcher culturally or theoretically, and none addressed the researcher's influence on the research and vice-versa. Results of the methodological quality assessment are presented in Table 1.

Characteristics of included studies

Table 2 summarizes the general characteristics of included studies. All the studies were published between 2012 and 2019, in the United States (n = 2), Ireland (n = 1) and the United Kingdom (n = 1). They all concerned postoperative alcohol consumption with the exception of one study which concerned postoperative substance use in general [28]. This last study was still included because the vast majority of participants to the study presented alcohol use problems. The data collection method in all studies was semi-structured interviews. As to the methodology, two studies used grounded theory, one applied thematic analysis and one described a two-cycle coding process but did not seem to use a commonly

accepted method for data analysis. The studies included 8 to 24 participants. Most participants were female. One of the studies included two groups of participants: with and without problematic alcohol use [29]. For this review, the decision was made to focus only on results related to participants with PAC (which was possible since the authors distinguished clearly between themes emerging from the discourse of participants with PAC and those without). Just two studies clearly stated the proportion of patients reporting their PAC began after surgery versus those who already had a PAC before surgery. The presence of alcohol use problems was evaluated through participants' responses to a validated questionnaire in one study, through questions designed by the authors in two studies, and based on a previous research for one study. Two studies included only participants with a RYGB procedure. Only one included individuals who had undergone LSG.

Findings of the review

A total of 35 findings were extracted from the included studies. Of these, 26 were rated "unequivocal", 6 were rated "credible" and 3 were rated "not supported". Not supported findings were not integrated in the data synthesis and one finding was not taken into account since it concerned only medication use after surgery. Based on the remaining findings, seven categories were formed. These categories led to the development of four synthesized results. The process of grouping findings into categories and then into synthesized results is illustrated in a meta-aggregative diagram (Table 3). Because of the small number of studies found, one of the four synthesized results was based on a single category. In addition, one of the findings ("drinking motivation: coping and disinhibition") was used in the formation of three different categories because the authors had synthesized several important elements under this single theme. The extracted findings with illustrations are available in Table S1 (Supplementary File 3). Confidence level for each synthesized finding ranged from moderate to low (Table 4).

Synthesized result 1: Persistence or Reappearance of Psychological Problems after Bariatric Surgery

This synthesized result was generated from two categories formed on the basis of eight findings. It related to the psychological problems experienced by bariatric patients and their perceived changes after bariatric surgery. Many patients reported they had experienced difficult life events and they were suffering from psychological problems before their operation. These psychological problems seemed to continue after the operation; sometimes they reappeared after an initial period of well-being engendered by the operation and the rapid weight loss. Thus, it appears that the operation did not solve these patients' psychological problems, even when it resulted in significant weight loss.

Category 1: Persistence of Psychological Problems after Bariatric Surgery. This category was composed of five findings. It concerned the serious psychological problems some patients suffered from before surgery and highlighted the psychological fragility of certain bariatric surgery candidates. Most of the participants in one of the studies (7/8) reported having experienced difficult life events such as major losses, traumas, attachment difficulties in childhood [30]. Psychological disorders such as depression, anxiety, post-traumatic stress disorder and body dissatisfaction were also common among the participants before the operation. These psychological problems, including low self-esteem and body dissatisfaction, seemed to persist after the operation, despite the weight loss [28, 30].

“Psychologically, I spoke to many people in my town who also had the surgery and they all said the same thing—you still don't see yourself as thin. I still look in the mirror and see fat” [28] (p. 1311)

“All the stuff when I was younger; things that never came out when I was here; all the beatings that I'd had. Severe beatings. Sexual assault while I was in school. All that stuff came out, but that was later because I never would have allowed it to come out; that was so suppressed” [30] (p. 720)

Category 2: Postoperative Course: From the Honeymoon to the Return to Normality. This second category was developed based on three findings, which indicated an initial period of well-being, and intense happiness followed the surgery. This seemed to be related to the rapid and substantial weight loss, which caused positive changes in many areas of patients' life (e.g. physical health, social relations, and mobility). This postoperative period was referred to as a "honeymoon" in one of the studies and appeared to last approximately two years. However, the honeymoon ended for bariatric patients when they faced new psychosocial stressors or observed that their psychological problems had persisted or reappeared after the operation and that they remained the same people as before [30].

"The happiness went down, normality came back up, the realisation that nothing had actually changed" [30] (p. 720)

Synthesized result 2: Using Alcohol as a Coping Strategy, Sometimes as a Replacement for Food

This second synthesized result was generated from two categories formed on the basis of 13 findings. It concerned the alcohol use as a coping strategy by individuals who presented with PAC after the operation. Participants reported they resorted to alcohol after the operation to manage the difficulties they encountered. In some (but not all) cases, these same patients had used food to manage psychological difficulties, negative life events, and unpleasant emotions or stress before surgery. However, the severe restrictions the operation imposed on their eating behavior had led them to turn to alcohol as a replacement coping strategy. This result therefore underscored the transition from one coping strategy to another that was triggered by the occurrence of bariatric surgery.

Category 3: Using Alcohol as a Coping Strategy. Three findings were grouped into this category, which related to the use of alcohol as a coping strategy after the operation. These participants generally reported coping difficulties.

"I'm not able to cope." [30] (p. 720)

They seemed to use alcohol as a coping strategy. For some, it was a coping mechanism that already existed before the operation, while for the others it was a behavior that appeared after surgery [29, 31].

“...the worst times [were] when I was using it as a coping strategy” [29] (p. 2203)

This behavior occurred in response to stress or negative affective states generated by psychological problems already existing before the operation and that persisted or reappeared after the operation (see synthesized result 1); in some cases, it appeared in response to stressors specific to the operation, in particular, insufficient weight loss [31].

“...so that's what actually started it—the fact that I wasn't losing the weight as fast as I wanted to. [The alcohol] did make me feel better” [31] (p.1495)

This category's specific feature is that participants did not say alcohol had replaced food for them. The idea of replacing food with alcohol is discussed in the following category. Thus, individuals who reported they used alcohol as a coping strategy after the operation did not always report they used food to manage negative emotional states before surgery. This was particularly true for half of the participants in one of the studies [29, 31].

Category 4: Replacing Food with Alcohol. The fourth category was developed on the basis of 11 findings and was particularly salient in all the included studies. It involved replacing food with alcohol as a coping strategy. Some participants reported that, before surgery, they had used food to suppress or reduce unpleasant emotions' intensity and, in particular, to manage the distress caused by the psychological problems described earlier (see category 1) [28-31].

“There were a lot of problems at home. And then, I suppose, in hindsight, I was comfort eating” [30] (p. 720)

After bariatric surgery, several participants reported they began to use alcohol as a self-soothing or coping strategy, instead of food, to manage stress, negative emotions, boredom, psychological problems such as anxiety and depression, or to induce sleep [28-31].

"I think I drink more now because I can't eat. You know, [I'm an] emotional eater, [I] can't eat so I drink." [28] (p. 1312)

Moreover, several participants also reported using alcohol instead of food postoperatively as a source of pleasure.

"It gave me a buzz feeling, which obviously at the time I couldn't get from food anymore." [30] (p. 720)

The restrictions the operation imposed on their eating behavior seemed to be central to the shift from food to alcohol among the participants. In several studies, participants mentioned the physical discomfort associated with overeating behaviors after the operation. In addition, the consumption of foods that were too fatty or too sweet could cause dumping syndrome (i.e. negative physical reactions in response to eating too fatty or sweet foods including palpitations, nausea, dizziness, feelings of warmth, etc.) [32], which limited access to certain types of foods and particularly those they tended to use in response to unpleasant affective states [29-31]. Some participants expressed a feeling of frustration because they could no longer eat certain foods. In addition, several mentioned that, compared to food, alcohol (even in excessive quantities) did not cause physical discomfort (vomiting or pain) [29, 31].

"... Because I can't eat like what I used to eat. So instead of getting frustrated about what I can't eat, I'll go ahead and drink more" [31] (p. 1494-1495)

"...I could eat a sweetie bar and be crippled over with pain [laughs], but I could drink a bottle of wine and be absolutely fine" [29] (p. 2205).

All these restrictions had modified these individuals' relationship to food and contributed to their postsurgical PAC [29]. The notion of a « void » created by the difficulty of resorting to food emerged from certain participants' discourse. Alcohol came to fill that void [29-30].

“... drinking became something you could do because it wasn't eating.... I had a relationship with food that wasn't simple, and it was changed, and I wanted something to fill it” [29] (p.2205)

Synthesized Result 3: Changes in the Physiological Response to Alcohol

This third synthesized result was made up of four findings, grouped into one category, and appeared in all the qualitative studies. Participants perceived changes in their response to alcohol after surgery. These changes were characterized by increased sensitivity to alcohol's effects postoperatively.

Category 5: Changes in the Physiological Response to Alcohol. Patients described increased sensitivity to alcohol post-surgery and reported that, after the operation, alcohol's effects were stronger and appeared more quickly, leading to a feeling of rapid disinhibition after alcohol consumption [28-31]. Small amounts of alcohol could lead to significant intoxication effects [29]. These changes were mentioned both by patients who had undergone RYGB or LSG and, according to patients, played a role in their alcohol problems [31].

“A slam of wine felt just like a shot of heroin.” [28] (p. 1311)

« The feeling of being really drunk that you only experience at the end of the night, you've got that straight away » [30] (p. 720)

Synthesized Result 4: Importance of Increased Information about Alcohol-Related Risks and Long-Term counseling

The last synthesized result was generated from two categories formed on the basis of four findings. Findings indicated the importance of taking steps before and after surgery regarding the risks of PAC. Patients mentioned preoperative counseling, as well as the importance of receiving clear information about the risks associated with alcohol before being operated on. Participants also recommended postoperative counseling, as well as the need for long-term support from the bariatric team.

Category 6: Lack of Information Regarding Alcohol-Related Problems before Undergoing Surgery. This category comprised two findings. Several participants in two of the studies spoke about the lack or insufficiency of information regarding the risks associated with alcohol during the preoperative appointments and evaluation [28-29]. The lack of information concerned both alcohol's increased effects after the operation and the risks of developing a problematic consumption pattern after surgery.

"I was told not to drink alcohol, but was not told why...People need to know why" [28] (p. 1311)

Category 7: Need for Counseling and Long-Term Support after Bariatric Surgery. This final category was developed based on two findings. Several participants in one study mentioned the importance of counseling both before and after the operation, emphasizing the impact of the operation on their lives and the stress that may be associated with it [28].

"People need to have therapy while they are losing weight because it is such a big transition. Just getting on a scale is stressful, whether you lose weight or not" [28] (p. 1311).

At the same time, some patients emphasized that the support provided by the bariatric team after the operation was limited in time, suggesting a need for a more lasting follow-up by the bariatric team after the operation [29].

"Once those two years are up that's it, you know, they kind of cut the ties..." [29] (p. 2206)

Presentation of Findings Not Included in the Data Synthesis

Some unequivocal and credible findings from included studies could not be grouped or integrated into the categories and synthesized results described above. A theme related to regret about surgery emerged in only one study [28] and indicated most patients did not regret having had surgery, whereas some of them regretted or were ambivalent about the operation. Increased socialization was also cited in one of the studies [31]. Patients reported an increase in socialization following bariatric surgery, associated with a rise in occasions for alcohol use. Finally, a theme regarding honesty emerged from one study [28], indicating the importance

for candidates of not hiding certain information from the bariatric team because they fear they will be refused the operation.

4. DISCUSSION

The aim of this review was to synthesize qualitative evidence regarding patients' perceptions of the mechanisms leading to PAC after bariatric surgery. Only four qualitative studies of this issue were found. Although we did not expect to find a very large number of studies on this topic, it was surprising to find so few qualitative studies on a subject that is so debated and on which research has been carried out for more than 10 years. Nevertheless, four synthesized results emerged from the review.

The first synthesized result concerned psychological problems that persisted or reappeared after bariatric surgery. Many participants reported suffering from psychological problems and said they had experienced severe negative life events before the operation. This is consistent with previous quantitative studies showing a high prevalence of childhood maltreatment and psychological disorders (e.g., depression, anxiety disorders, eating disorders, post-traumatic stress disorder, personality disorders) among bariatric surgery candidates [33-35]. According to this review's results, preoperative psychological problems persist after surgery or reappear in some patients after an initial period of improvement. Some findings in the literature support these results. Ivezaj and Grilo [36] demonstrated that depressive symptoms improve in certain patients after the operation, whereas they are maintained or even worsen among other patients. Yen et al., [37] emphasized that despite a decrease in certain psychiatric symptoms, anxiety symptoms did not improve and suicide rate was still higher among operated individuals than the general population after surgery. Participants in the included studies seemed to consider that these persistent psychological problems had contributed to their postoperative PAC.

The second synthesized result from this review concerned the use of alcohol as a coping strategy, sometimes as a replacement for food after the operation. Some participants reported using alcohol as a coping mechanism after the operation to deal with their problems and the negative emotions they engendered. Indeed, studies indicate that alcohol can be used by some individuals to manage negative emotions, and its use as a coping strategy is associated with the development of AUD [38]. For some patients, alcohol replaced food after bariatric surgery because access to certain foods and overeating were now complicated by the operation. This relates to the addiction transfer theory, whereby patients who developed PAC after bariatric surgery are posited to have used food preoperatively in response to unpleasant emotions [18, 39]. This theory is partially supported by this review's results, but does not appear to be valid for all patients with postoperative PAC because, as mentioned earlier, some participants reported turning to alcohol postoperatively without mentioning they had used food to help them cope before the operation. However, it was not clear whether these patients definitely reported they had not used food as a coping strategy before the operation or whether they simply did not mention this phenomenon during the research interview. More importantly, although this research's results provide some evidence supporting addiction transfer theory, many quantitative studies do not support it [40, 41]. Further research should be conducted to determine why addiction transfer is found in all qualitative studies regarding bariatric surgery and PAC, while there are few quantitative studies supporting its validity. One possible explanation is that addiction transfer theory is intuitive and easy to understand. This could partially explain why patients seem to adhere to this theory.

The third synthesized result emerging from this study related to the changes in the physiological response to alcohol postoperatively both for participants with LSG and RYGB. Participants described stronger and faster appearing effects of alcohol after bariatric surgery. As regard the RYGB, these results are similar to those of previous quantitative studies [42,

43]. Woodard et al. [44] studied the blood alcohol levels of 19 patients who had undergone RYGB after ingesting 5 oz. of red wine before surgery and then at three and six months post-surgery. The results showed a higher blood alcohol level at six months post-surgery compared to the other measurement times. This rate was above the legal limit for driving, even though the participants had drunk only one glass of wine. As regard the LSG, contradictory results exist regarding a change in the pharmacokinetics of alcohol after this surgical procedure [45, 46]. It is thus interesting to note that five out of six participants with a LSG in one of the studies reported these increased effects of alcohol post-surgery.

Finally, the last synthesized result emerging from this review concerned the lack of information on the risks associated with alcohol before undergoing bariatric surgery and the importance of long-term follow-up. Several participants reported they had not been informed about the risks related to alcohol before surgery or had received insufficient information. In addition, many spoke about the need for pre- and postoperative counseling. After the operation, the participants wanted longer-term support from bariatric teams.

To sum up, participants identified both physiological and psychological mechanisms leading to PAC after bariatric surgery. Some results from individual studies also indicated the possible involvement of social or environmental factors in PAC postoperatively. These aspects underscore the complexity of the specific issue of postoperative PAC.

Recommendations

Several recommendations for practice can be made based on this review's results. First, patients with psychological disorders should undergo psychological treatment before having surgery, as these disorders seem to be at the root of the alcohol problems experienced by many of the participants in the included studies. Therefore, beyond eating behavior, the presence of psychological disorders in general and antecedents of major life events (e.g., trauma, abuse) must be systematically assessed before the operation (as recommended by

Sogg et al., 2016) [47]. Similarly, the results highlight the importance of assessing patients' coping skills prior to bariatric surgery. Treatment focused specifically on the acquisition of adaptive coping strategies could prevent patients from using alcohol as a coping strategy after the operation and ultimately reduce the risk of postoperative PAC.

The review's results also suggest assessing patients' expectations of the operation. Patients can have very high expectations of bariatric surgery [48]. Several participants in the included studies reported that ultimately the operation had not changed their psychological state and that they remained the same people. It is important to work with patients on their expectations early in the preoperative process in order to make sure they know that psychological problems may persist after the operation or reappear after an initial period of relief.

In addition, the need to inform patients emerged as an important clinical implication of this review. Practitioners should warn patients that they will react more strongly to alcohol after the operation and will be at more risk of developing alcohol use problems. In doing this, it would be useful to bear in mind that patients forget much (between 40% and 80%) of the information provided by professionals immediately after receiving it [49]. It would therefore be interesting to develop strategies aimed at facilitating the encoding of information on the risks related to alcohol. Patient expectations may also play a role here. If patients have very high expectations of the operation, they may not think that those kinds of problems could affect them after the operation. This refers to the concept of unrealistic optimism, whereby individuals tend to minimize their probability of experiencing a negative event and overestimate their probability of experiencing a positive event [50].

Finally, the importance of long-term follow-up after the operation was underscored by the participants. Each bariatric team should point this out and provide follow-up for an indefinite period. However, very few patients arrange for postoperative psychological follow-

up [51]. Future research should develop strategies to increase patients' motivation to attend their postoperative appointments.

Limitations

The present review has several limitations. The first concerns the limited number of included studies and the fact that one of them was of poor methodological quality. However, the meta-aggregative approach to qualitative evidence synthesis is robust even with a very limited number of studies [21]. In addition, confidence in the synthesized results from this research ranged from moderate to low, implying that this research' results should be interpreted with caution. Furthermore, included studies did not always distinguish between participants who developed new-onset PAC after surgery and those who relapsed after the operation; when they did, the results were not separated for relapsing patients and patients developing new-onset alcohol use problems. We may suppose that processes leading to the development of a new-onset PAC and a relapse after surgery are different. Alcohol use problems were measured in very different ways in the included studies and only one of them used a validated assessment tool to evaluate alcohol consumption. Finally, most of the studies (3 out of 4) included only patients who had undergone RYGB, whereas LSG is one of the two most common procedures in the world.

5. CONCLUSION

This systematic review highlighted four synthesized results regarding patients' perceptions of the mechanisms leading to PAC after bariatric surgery. These results indicate that it is probably the interaction of psychological and physiological, rather than addiction transfer or change in the alcohol pharmacokinetics alone that lead to alcohol use problems post-surgery. More qualitative and quantitative research should be conducted to better understand the mechanisms involved in postoperative PAC in order to prevent and treat this problem more effectively in the future.

Ethical Statement

This study did not require an ethical board approval because it was a systematic review of already existing studies.

Conflicts of Interest Statement

The Authors declare that there is no conflict of interest. This study was conducted as part of a doctoral thesis in progress at the University of Liège and was partially funded by the university. The Faculty of Psychology of the University of Liège to which the principal author belongs provided financial assistance for an interpreter to read the document and correct the English writing errors. The person responsible for this task appears in the acknowledgments of the article.

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Table 1: *Methodological quality of included studies (n=4)*

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total out of 10
Ivezaj et al. (2012)	U	Y	Y	N	N	N	N	Y	U	Y	4
Spadola et al. (2018)	U	Y	Y	Y	Y	N	N	Y	Y	Y	7
Yoder et al. (2018)	Y	Y	Y	Y	Y	N	N	Y	Y	Y	8
Reaves et al. (2019)	U	Y	Y	Y	Y	N	N	Y	Y	Y	7

Y: yes; N: no; U: unclear

The critical appraisal questions are: Q1: Is there congruity between the stated philosophical perspective and the research methodology? Q2: Is there congruity between the research methodology and the research question or objectives? Q3: Is there congruity between the research methodology and the methods used to collect data? Q4: Is there congruity between the research methodology and the representation and analysis of data? Q5: Were those delivering treatment blind to treatment assignment? Q6: Is there a statement locating the researcher culturally or theoretically? Q7: Is the influence of the researcher on the research, and vice-versa, addressed?; Q8: Are participants, and their voices, adequately represented? Q9: Is the research ethical according to current criteria or, for recent studies, is there evidence of ethical approval by an appropriate body? Q10: Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?

Table 2: *Characteristics of included studies*

Authors	Country	Methodology	Method	Phenomenon of interest /aims	Participants	Main results
Ivezaj et al. (2012)	USA	Grounded Theory	Semi-structured interviews	« ... the present study evaluated bariatric patients' impressions of how their postsurgical substance use disorders emerged and their future recommendations for those working with bariatric patients » (p. 1308)	24 participants with a history of bariatric surgery, in an inpatient substance abuse treatment program <u>Gender:</u> 75% females <u>Age:</u> 45.2 (±10) <u>Time since surgery:</u> 5.5 years (±3.1) <u>Surgical procedure:</u> RYGB <u>New-onset cases versus patients with antecedents of PAC:</u> 54.2% versus 45.8% <u>Substances:</u> <ul style="list-style-type: none"> ➢ 54.2% smoking cigarettes ➢ 83.3% consuming alcohol ➢ 12.5% using marijuana ➢ 8.3% using cocaine ➢ 66.7% using prescription opiates ➢ 58.3% using benzodiazepines 	8 themes: <ol style="list-style-type: none"> 1) Unresolved psychological problems: identified by 75% of the participants. 2) Addiction transfer/substitution: identified by 83.33% of the participants. 3) Faster onset or stronger effects from substances: identified by 58.33% of the participants. 4) Increased availability of pain medications: identified by 45.83% of the participants. 5) Counseling pre- and/or postsurgery: identified by 41.67% of the participants. 6) Increased knowledge of the associated risks of substance use postsurgery: identified by 70.83% of the participants. 7) Greater honesty: identified by 41.67% of the participants. 8) Bariatric surgery regret: theme identified by 41.67% of the participants, 70% of whom did not regret the operation, while 20% regretted having had surgery and 10% were ambivalent.
Yoder et al. (2017)	Ireland	Constructivist grounded theory	Semi-structured interviews	« The aim is to construct a theory to explain the development of AUD among a sample of individuals who reported problematic drinking following RYGB » (p.	8 participants <ul style="list-style-type: none"> • <u>Gender:</u> 4 women and 4 men • <u>Age:</u> 30 to 67 years old (M = 48) • <u>Surgical procedure:</u> RYGB • <u>Time since surgery:</u> from 3 to 12 years (mean = 8.5) • <u>New-onset cases versus patients with antecedents of PAC:</u> not specified, but seems to be only new-onset cases. 	Development of the « filling the void » theory regarding causes of the development of AUD after bariatric surgery; 2 main aspects: <ol style="list-style-type: none"> 1) Before the operation, the participants used food to neutralize or reduce the intensity of negative emotions and sometimes also to induce positive emotions. 2) They replaced food with alcohol as a coping strategy.

				717)		
Spadola et al. (2017)	USA	2 coding cycles : - Initial coding - Focused coding	Semi-structured interviews	« The purpose of this study was to qualitatively explore why problematic alcohol use after WLS might develop » (p. 1495)	12 racially/ethnically diverse young adults who had undergone bariatric surgery and reported an increase in their alcohol consumption <ul style="list-style-type: none"> • <u>Gender</u>: 10 women and 2 men • <u>Age</u> : 28.2 years (±4.5) • <u>Surgical procedure</u>: 6 RYGB and 6 LSG • <u>Time since surgery</u>: from 5 to 79 months • <u>Race/Ethnicity</u>: 58.3% Hispanic/Latino, 33.3% non-Hispanic Black, and 8.3% non-Hispanic White • <u>New-onset cases versus patients having antecedents of PAC</u>: patients reporting an increase in their alcohol consumption, but no information about the presence of PAC before surgery 	4 major themes: <ol style="list-style-type: none"> 1) Increased sensitivity to alcohol intoxication: reported by 75% of the participants. 2) Utilizing alcohol as a replacement self-soothing mechanism for food: reported by 58.3% of the participants. 3) Increase in socialization: reported by 66.7% of the participants. 4) Utilizing alcohol as a coping mechanism: reported by 50% of the participants.
Reaves et al. (2019)	United Kingdom	Thematic analysis	Semi-structured interviews	« ... to understand which factors influence the development of post-surgical alcohol misuse » (p. 2202)	14 participants, 6 with problematic alcohol use and 8 without* <u>Gender</u> : 4 women and 2 men <u>Age</u> : 51.83 years (only means provided) <u>Surgical procedure</u> : 5 by-pass and one person with another unspecified surgical procedure <u>Time since surgery</u> : 8.83 years <u>New-onset cases versus patients having antecedents of PAC</u> : 4 versus 2 cases	5 core themes for participants with PAC : <ol style="list-style-type: none"> 1) Drinking motivations: coping and disinhibition. 2) Self-image: negative self-image 3) Impact of restriction on eating behavior: “I drank because I couldn’t eat”. 4) Support needs: unmet emotional support needs reported by participants with PAC despite having supportive people around them, and sometimes lack of instrumental support from bariatric teams. 5) Surgical preparedness: underprepared.

PAC = problematic alcohol consumption

RYGB = roux-en-y gastric bypass

LSG = laparoscopic sleeve gastrectomy

*Are described only the characteristics of the participants with PAC

Table 3: *Meta-aggregative diagram*

Findings	Categories	Synthesized results		
Unresolved psychological problems (U)	Persistence of psychological problems after bariatric surgery	Persistence or reappearance of psychological problems after bariatric surgery		
Unresolved psychological issues (U)				
Psychological problems (U)				
Trauma (U)				
Loss (C)				
Internally unchanged (U)	Postoperative course: from the honeymoon to the return to normality			
The honeymoon (U)				
Honeymoon over (U)				
Coping challenges (U)	Using alcohol as a coping strategy	Using alcohol as a coping strategy, sometimes as a replacement for food		
Utilizing Alcohol as a Coping Mechanism (U)				
Drinking Motivations : coping and disinhibition (U)				
Addiction substitution (U)	Replacing food with alcohol			
Utilizing Alcohol as a Replacement Self-Soothing Mechanism for Food (U)				
Eating to cope (U)				
Drinking to cope (C)				
A new buzz (U)				
Behavioural substitution (U)				
Alternating behaviours (U)				
Drinking Motivations : coping and disinhibition (U)				
Impact of Restriction on Eating Behaviour : « I drank because I couldn't eat » (U)				
The void of unmet needs (C)				
The void as a vacuum previously occupied by eating (C)				
Faster onset or stronger effects from substances (U)			Changes in the physiological response to alcohol	Changes in the physiological response to alcohol
Increased Sensitivity to Alcohol Intoxication (U)				
Rapid effect of alcohol (U)				
Drinking Motivations : coping and disinhibition (U)				
Increasing knowledge regarding associated risks of substance abuse postsurgery (U)	Lack of information regarding alcohol-related problems before undergoing surgery	Importance of increased information about alcohol-related risks and long-term counseling		
Surgical Preparedness : underprepared (U)				
Counseling pre-postsurgery (U)	Need for counseling and long-term support after bariatric surgery			
Instrumental Support (C)				

U = unequivocal

C = credible

Table 4: *ConQual Summary of Findings*

<p>Systematic review title: Patients' perceptions of the mechanisms underlying alcohol use problems after bariatric surgery: a qualitative systematic review. Population: Adults who had undergone bariatric surgery and had suffered from alcohol use problems. Phenomena of interest: Patients' perceptions of the mechanisms leading to problematic alcohol consumption postoperatively. Context: Studies conducted in any country, any cultural context, and any setting.</p>					
Synthesized finding	Type of research	Dependability	Credibility	ConQual score	Comments
Persistence or reappearance of psychological problems after bariatric surgery	Qualitative : <ul style="list-style-type: none"> • Grounded theory 	Downgrade 1 level*	Downgrade 1 level**	Low	*Downgraded 1 level for no statement locating the researcher culturally or theoretically and no information about the influence on the research findings for all the included studies ** Downgraded 1 level for mix of unequivocal and credible findings
Using alcohol as a coping strategy, sometimes as a replacement for food	Qualitative : <ul style="list-style-type: none"> • Grounded theory • Thematic analysis • Two coding cycles 	Downgrade 1 level*	Downgrade 1 level**	Low	*Downgraded 1 level for no statement locating the researcher culturally or theoretically and no information about the influence on the research findings for all the included studies ** Downgraded 1 level for mix of unequivocal and credible findings
Changes in the physiological response to alcohol	Qualitative : <ul style="list-style-type: none"> • Grounded theory • Thematic analysis • Two coding cycles 	Downgrade 1 level*	High**	Moderate	*Downgraded 1 level for no statement locating the researcher culturally or theoretically and no information about the influence on the research findings for all the included studies ** Remains at the level due to the inclusion of only unequivocal findings
Importance of increased information about alcohol and long-term counseling	Qualitative : <ul style="list-style-type: none"> • Grounded theory • Thematic analysis 	Downgrade 1 level*	Downgrade 1 level**	Low	*Downgraded 1 level for no statement locating the researcher culturally or theoretically and no information about the influence on the research findings for all the included studies ** Downgraded 1 level for mix of unequivocal and credible findings