Psychosocial consequences of bariatric surgery: two sides of a coin: A scoping review

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Abstract

This scoping review summarizes current evidence with regard to the impact of bariatric surgery on psychological health in adults with obesity. While a large body of evidence reports major metabolic benefit and improved quality of life, there is also ample evidence suggesting an increased incidence of self-harming behavior, a greater likelihood of developing an alcohol problem and higher rates of completed suicide amongst bariatric patients. Being able to identify the 'at risk' patient population requires more longitudinal research into the risk factors for psychological complications after bariatric surgery. Bariatric surgery remains an extremely valuable long-term treatment option for managing obesity, however there is a need to invest in mitigating psychological complications after the surgery, such as depression, alcohol consumption, and other self-harming behaviors.

Key Points:

1. Quality of life improves in patients that undergo bariatric surgery.

2. Increased risk for depression, substance abuse, and self-harm after bariatric surgery.

3. More longitudinal research is necessary to identify at risk patient population.

4. Uniformity in screening methods, instruments are necessary to decrease complications.

1. Introduction

The ongoing obesity epidemic is one of the greatest challenges to the health and wellbeing of future generations worldwide, threatening to disrupt the steady increase in life expectancy that has been achieved over the last decades. Obesity is a chronic condition that effects approximately 650 million people worldwide (WHO, 2016); a number which is expected to increase to 1.12 billion people by 2030 [1]. This projection is of significant concern, given that an individual with obesity at the age of 40 is expected to live, on average, approximately seven-years less than their non-obese counterparts [2], largely due to the heightened risk of developing a number of chronic illnesses, such as hypertension, type 2 diabetes mellitus, dyslipidemia, cardiovascular disease and some types of cancer [2]. Furthermore, other co-morbidities such as gastroesophageal reflux disease, obstructive sleep apnea, osteoarthritis, chronic pain, depression, anxiety, eating disorders (e.g. binge-eating disorder (BED) and night-eating syndrome (NES)) and suicidal thoughts and behaviors may have significant impacts on overall quality of life and emotional wellbeing [3,4]. The long-term outcomes of weight management via lifestyle and pharmacological interventions are often disappointing, and can even have detrimental effects on the patient's health and wellbeing [5,6,7,8]. While dietary restriction and lifestyle modification may yield initial positive results, these effects are shown to be largely unsustainable over time [5,6]. Moreover, older pharmacological approaches for weight loss had a concerning incidence of cardiovascular mortality or severe psychiatric side effects, including suicide risk [7,9]. As an alternative

approach to weight management, bariatric surgery is considered the most effective treatment for achieving considerable and long-term weight loss in people with severe obesity, showing tremendous beneficial effects on numerous co-morbidities [10,11]. However, there are no roses without thorns, and complications still occur too often following surgery, sometimes despite careful preparation and lifestyle adaptations of the patients.

The significant psychosocial burden associated with obesity, including impairments in quality of life, body image, employment, intimate relationships and other areas of psychosocial functioning [12] contribute greatly to the decision to undergo bariatric surgery for some individuals. Reports from psychosocial and eating behavior evaluation studies post-bariatric surgery show an overall improved quality of life [13,14,15]. However, several reports paint a grimmer picture, suggesting an increased risk of completed suicides and high rates of alcohol and substance abuse amongst bariatric patients [16,17,18]. Previous studies have reported the presence of psychiatric disorders in patients undergoing bariatric surgery and their proposed contribution to post-operative outcomes, however most of these reports focused specifically on weight loss. Negative psychological outcomes are largely overlooked, as suicide attempts and substance abuse are fortunately rare and thus require large cohorts to draw firm conclusions [19].

Bariatric surgery is at this point the most effective treatment to alleviate the individual burden of obesity, however treatment outcomes with regard to longitudinal effects on mental health (i.e. suicidal thoughts and behaviors, substance abuse problems) are poorly understood. Therefore, the purpose of this scoping review is to explore the evidence on mental health benefits and risks after bariatric surgery.

2. Methods

2.1 Data search, literature search and overview of selection

We applied the PRISMA guidelines for Scoping Reviews [20]. Between 21-05-2020 and 14-06-2020 a PubMed search was performed. The search was limited to research published after 2010. Research focusing on the adolescent or pediatric population was excluded. Since gastric bypass and sleeve gastrectomy are the most commonly performed bariatric surgery procedures, these search terms were used as well as the following additional search terms: ("Obesity"[Mesh]) AND ("Mental Health"[Mesh] OR "Psychosocial health"[Mesh] OR "Psychosocial factors"[Mesh]) AND ("Bariatric Surgery"[Mesh] OR "Gastric Bypass"[Mesh] OR "Sleeve Gastrectomy"[Mesh]). In addition, we hand-searched the reference lists of all selected articles and reviews. Exclusion criteria included no full text, full text not in English, opinion, editorial, case report or non-relevant studies. Duplicates were removed. Certain clinical practice guidelines were used to underline arguments. Studies that research psychosocial predictors of response to specific treatments (e.g. Telephone-Based CBT) in bariatric patients were also excluded.

Initially, a total of 58 articles were found. After hand-searching the reference lists of all selected articles and reviews, 15 articles were added. After screening of titles and abstracts on topical relevance and inclusion criteria, we evaluated 51 articles, including 19 reviews, 2 recommendations, 1 editorial letter and 29 primary studies.

2.2 Data analysis

Since this is not a systematic review, no quality analysis of the selected studies was done. We did not use a review protocol, data charting was done independently. We performed a descriptive analysis of all articles using the following data: year, type of study, size of patient group, and outcome variables (weight loss, weight regain, quality of life, depression, alcohol, suicide, others).

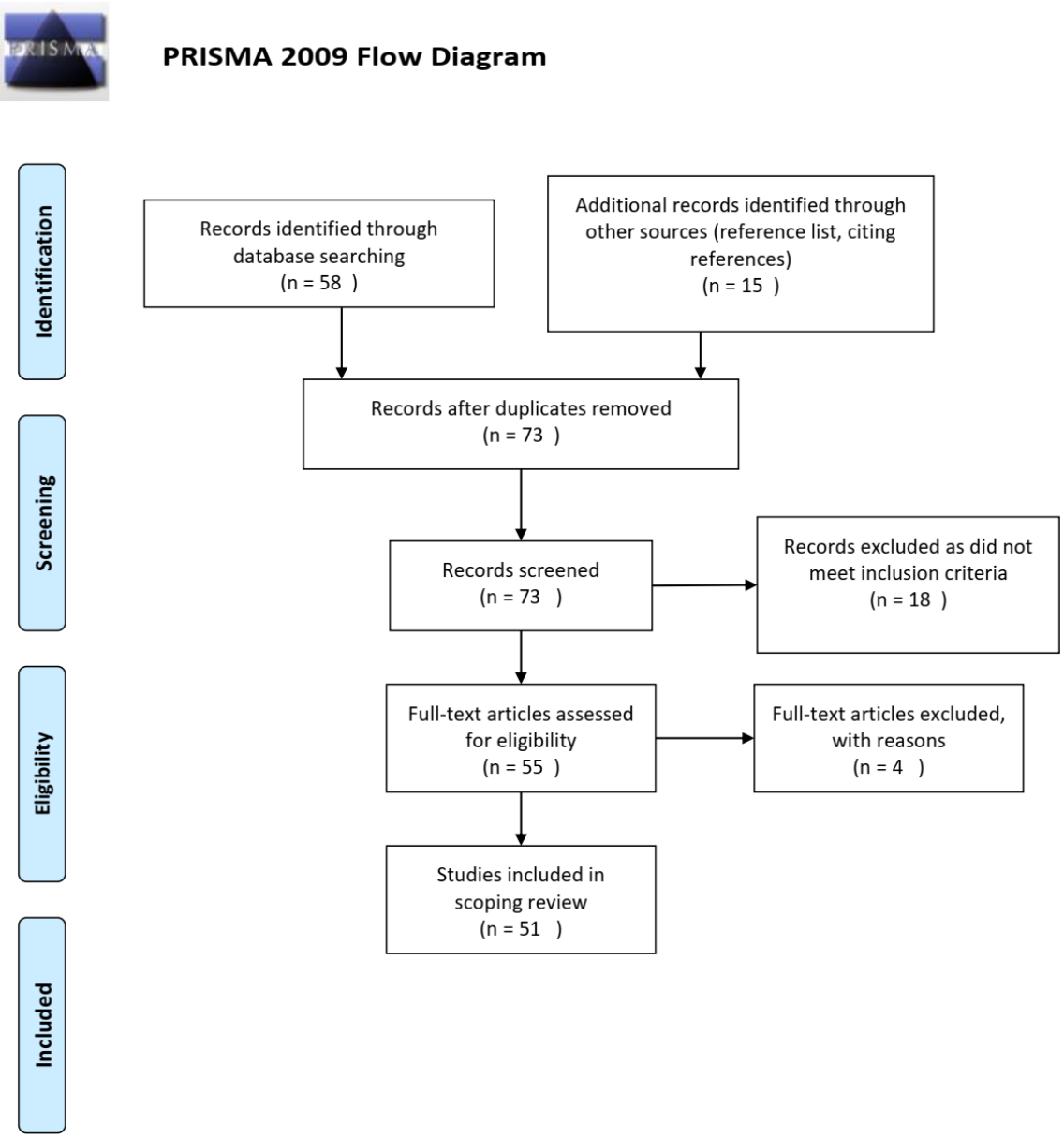

Fig. 1 Prisma flow diagram

3. Results and discussion

3.1 Psychological well-being after bariatric surgery

When reviewing the literature concerning quality of life after bariatric surgery, it's clear that physical, metabolic, and psychological functioning can be significantly improved in the vast majority of patients that undergo bariatric surgery. This is shown by a significant long-term loss of weight, improvement or remission of type 2 diabetes mellitus, improvement in cardiovascular risk factors, a reduction in mortality and an overall improved Health Related Quality of Life (HRQoL) [13,14].

Improvement in psychological functioning following bariatric surgery appears to be directly linked to changes in body weight. This is demonstrated by a reduced prevalence of depressive and anxiety symptoms amongst patients in the first year post-operatively when the majority of weight loss is observed [21]. By contrast, a relapse in the severity of depressive symptoms is associated with post-operative weight regain [22]. The first 12- to 24-months are often referred to as "the honeymoon phase" because of the rapid change in body weight and associated positive effects on psychological well-being, including improvements to self-esteem and body image. A 12-month follow-up study of bariatric patients [23] found significant improvements in HRQoL when comparing pre- and post-operative assessments. In addition to weight loss outcomes, improvements to psychological functioning post-operatively may also be attributed to a patient's sense of taking control of his/her life and making lifestyle changes to address their weight management. Patients invest more in the frequency and intensity of physical activity during the first 12-months following surgery [24], which likely contributes further to weight loss and associated psychological benefits. This can have additional positive effects on a patient's psychological well-being, such as improvement in employment and personal relationships [25]. The latter was illustrated In the Swedish Obese Subjects (SOS) study, which revealed, on the one hand, that bariatric surgery was associated with increased incidence of marriage or new relationship (adjusted hazard ratio [aHR] = 2.03; 95% CI, 1.52-2.71; P < .001) in those who were unmarried or single before the surgery [26]. On the other hand, the study also found a higher rate of divorce or separation (aHR = 1.28; 95% CI, 1.03-1.60; P = .03) in those patients with pre-existing relationships, illustrating how bariatric surgery may represent two sides of a coin when it comes to the assessment of psychosocial health outcomes. Regarding employment outcomes, a recent prospective cohort study of 164 bariatric surgery patients found that changes in depression, anxiety and HRQoL after surgery were predictors of change in employment [26]. This study investigated changes in work performance and employment outcomes during the first 12-months following surgery. The questionnaire they used in the study is The Lam Employment Absence and Productivity Scale (LEAPS), a validated self-report questionnaire used to assess impairment in work functioning [27]. The study

reported a significant reduction in employment impairment (change in total LEAPS score = −3.77 ± 6.30, $p < 0.0001$) as well as an improvement in work productivity amongst participants (change in LEAPS productivity sub-scale score = −1.21 ± 2.74, $p < 0.0001$). While patients with pre-existing mental disorders reported more severe employment impairment and worse productivity before surgery, these patients experienced the greatest improvements in employment outcomes after surgery [26].

Psychological counseling is an important point of concern given that it has been shown that asking for support from health care providers is a possible predictor for better post-operative psychological outcomes amongst bariatric patients. Recent evidence showed that patients receiving 6 or more counseling sessions after bariatric surgery reported better psychological well-being compared to those who attend fewer than 6 sessions [28]. In addition, patients who attended between 1 and 4 counseling sessions, reported improved psychological functioning, indicating that even minor intervention can have positive effects on a patient's well-being.

Therefore, it is reasonable to conclude that bariatric surgery can improve psychosocial well-being in people living with obesity and that psychological seems to enhance these positive effects . However, these results may also suggest that that individuals who attend counseling and are thus more open to psychological follow-up, are predisposed to have a more favorable outcome. In addition drop-out from the post-operative care is known to be frequent an may be an important source of bias as attrition makes it difficult to assess post-surgery outcomes similarly for all types of patients [29, 30].

With regard to long-term outcomes, a review from 2016 [31] showed a decrease in the prevalence and severity of major depressive disorder within the first three-years after bariatric surgery. This improvement in mental health was largely attributed to the weight loss and improvements in body image and self-esteem [21]. A Belgian pilot study [15] revealed that seven-years after gastric bypass surgery, patients were less depressed and more satisfied with physical health, body image, and functioning in daily life and hobbies compared to obese controls. However, this study [15] also showed

that despite the numerous positive health outcomes achieved, patients were no more satisfied with their social relationships and sexual performance compared to obese controls. Patients also reported that their eating behavior was more influenced by external cues (such as seeing other people eat, smelling food, etc.) after gastric bypass surgery. This is in contrast with previous short-term studies that reported an increase in restrained eating and a decrease in emotional and external eating behavior [32,33]. These studies shine a light on a common occurrence amongst bariatric patients, in which the positive outcomes of surgery can be lost over time. This is supported by a 2003 study [34], which concluded that initial improvements after surgery decline is associated with the decrease or disappearance of the post-operative clinic visits.

3.2 Potential psychosocial concerns after bariatric surgery

As mentioned previously, the first 12- to 24-months following surgery are often referred to as “the honeymoon phase”. However, improvements in weight often show a gradual decline over time [21] and ongoing struggles with weight loss, weight regain, and body image dissatisfaction can often increase the severity of depressive symptoms amongst bariatric patients [22]. In fact, several reports suggest an increased risk for depression, alcohol abuse, and suicide after bariatric surgery both shortly after surgery and in the long-term [16,17,18].

Identifying psychiatric disorders in candidates for bariatric surgery is of high importance, especially given the incidence of these disorders is higher in patients with obesity when compared to the general population [35,36]. Furthermore, it may be important because psychological disorders or psychosocial difficulties may be related to potential negative outcomes post-surgery. However, little is known in terms of the best tools to use when performing a pre-operative psychosocial assessment. When comparing HRQoL of bariatric patients with and without psychiatric disorders, a 12-month follow-up study [23] revealed that pre-existing psychiatric disorders were a clear determinant of improvements to HRQoL post-operatively. While patients without pre-existing psychiatric disorders showed significantly improved HRQoL 12-months after bariatric surgery, patients with pre-existing psychiatric

disorders (that persisted after surgery) had impaired HRQoL at equivalent time-points. However, when these psychiatric disorders were resolved after surgery, only minor impairments in HRQoL were reported.

The increased incidence of alcohol abuse is striking, with 28.4% of bariatric patients reporting a problem with alcohol in the first 24-months following weight loss surgery compared to just 4.5% prior to surgery [37]. A problem with alcohol was defined in terms of problems with alcohol management and control, particularly using more than expected and/or recommended. This term is yet to be distinguished from alcohol abuse or addiction. In addition, the prevalence of regular drinking doubled in the seven-years following surgery, with one-fifth of patients displaying onset of alcohol use disorder symptoms within five-years of surgery [38]. These studies suggest that bariatric patients may be more at risk of developing an alcohol abuse problem, both shortly after surgery and in the long-term. While the exact reasons that bariatric patients are vulnerable to developing problems with alcohol remain unclear, it may be that onset is related to a symptomatic shift from emotional eating to emotional drinking, in particular when expectations from surgery are not met [39,40]. However, a recent study [41] discusses this as a potential misperception because this “addiction transfer” or “cross addiction” hypothesis could not be confirmed in research. They imply that there is growing evidence for several mechanisms, including surgical- and non-surgical specific factors, likely to increase the risk of alcohol abuse disorder development. The data suggest that being male, younger age, smoking, regular alcohol consumption, pre-surgical alcohol abuse disorder and less social support predicted alcohol abuse disorder after bariatric surgery. In addition, the decreased capacity for solid food intake and hormonal changes after surgery, can likely explain some of the changes noted in the reward centers of the brain after surgery. Other research also suggest that an increased risk for alcohol abuse may also be due to changes in neurobiology and increased alcohol reward, as well as rapid and increased alcohol concentrations following a procedure associated with rapid gastric emptying, such as gastric bypass [18, 42]. In support of the latter, a Swedish study [43] found that there was a two-fold increased risk for alcohol abuse among gastric bypass patients compared with patients who had restrictive surgery

(e.g. gastric banding and vertical banded gastroplasty). Two additional studies [38,44] confirmed an increased incidence of alcohol abuse disorders amongst gastric bypass patients, and also found that being male, younger, a tobacco smoker or recreational substance user and having low social support were independently related to an increased likelihood of developing an alcohol use disorder after surgery. In combination with these risk factors, measuring eating compulsivity and determining a family history of addictive behaviors may help to identify patients most at risk for alcohol use disorders.

Self-harm behaviors, including suicidal thoughts and behaviors (ideation, plan, attempt and suicide), binge eating and substance abuse disorders [31] are common in candidates for bariatric surgery. These problems may also persist after surgery, leading to a higher rate of suicide [17,45] amongst bariatric patients compared to the general population. In fact, a recent longitudinal cohort analysis [46] showed a significant 56% increase in self-harm emergencies (e.g. medication overdose or physical trauma) after bariatric surgery. Patients who had a low-income status and lived in rural areas were found to be most at risk of these occurrences [46]. Furthermore, a state-wide population based linked data cohort study [47] in Australia found that being younger, without private health insurance, and with gastrointestinal complications after surgery were additional risk factors for self-harm hospitalizations after bariatric surgery. Importantly, having a psychiatric health disorder within the last five-years pre-operatively was found to be the strongest predictor, with 93% of self-harm emergencies occurring in such patients [46]. This reinforces the need for ongoing monitoring of patients after bariatric surgery.

In addition to self-harm behaviors, suicide (although rare) is a serious problem in people receiving bariatric surgery. Table 1 summarizes the following results. A systematic review [17] of 30 studies suggested that the risk for completed suicides in bariatric patients was four times higher than the general population. In the US, the incidence of deaths due to suicide following bariatric surgery totaled 13.7 (male) and 5.2 (female)/10,000 patient-years, significantly higher when compared to age- and sex-matched suicides rates of 2.4 (male) and 0.7 (female)/10,000 patient-years in the general population [46]. Interestingly, of the recorded suicides in bariatric patients, 30% occurred during the

first two-years, and 70% occurred within three-years following surgery [45]. More research is needed to understand why non-suicidal self-injury (NSSI) and suicide increases in the post-operative period, and how these risks might be mitigated.

Authors	*Sample size*	*Follow-up (years)*	*Study design*	*Bariatric Population*	*General population*
Peterhänsel et al. [17] (2013)	N= 23,885	/	Systematic Review – purpose: calculate an estimate for suicide rate.	Estimated suicide rate: **4.1/10,000** person-years (95% confidence interval [3.2,5.1]/ 10,000 person-years) ➔ Odds ratio of **0.25** (95% CI [0.20,0.31]): probability of bariatric patient committing suicide is four times higher when compared with general population!	WHO data, population around 26.8 million people: suicide rate **1.0/10,000** person-years
Tindle et al.[45] (2010)	N= 16,683	10-years	Population-based, longitudinal cohort study	**60.6/10,000** person-years → **5.2/10,000** person-years (women) → **13.7/10,000** person-years (men)	Age- and sex-matched in general US population: →**0.7/10,000** person-years (women) →**2.4/10,000** person-years (men)
Bhatti et al. [46] (2016)	N= 8,815	six-years (three-years pre- and post-surgery)	Population-based, longitudinal cohort study	Self-harm emergencies (including suicide ideation and attempt) significantly increased after surgery (**3.63/1000** patient years) compared with before surgery (**2.33/1000** patient years) → **72.8%** (115 of 158 emergencies) of all self-harm mechanisms was an intentional overdose → **increase of 56%** in self-harm emergencies	
Morgan et al. [47] (2017)	N = 12,062	five-years	A state-wide, population-based, self-matched, longitudinal cohort study	Three suicides occurred during the follow-up period, a rate comparable to the general population during the same time period (**Incidence Rate Ratio (IRR) 0.61**, 95% CI 0.11–2.27, *P* = 0.444).	

Table 1 Summary of discussed studies concerning suicide in the scoping review

3.3 Targeting strategies

Psychological complications after bariatric surgery are an example of how a careful weighing of the benefits and risks is key to medical decision making. All treatments, particularly surgical options for obesity management, come with potential risks and the main aim of health care workers should be to minimize those risks. Being able to identify those patients at greatest risk requires more longitudinal research into the various factors that determine psychological complications after bariatric surgery. There is also a need for predictive models that are, alas, still in development. While bariatric surgery remains an extremely valuable long-term treatment option for managing obesity at both the individual and the societal level, there is a growing need to invest further in mitigating psychological complications after surgery, such as depression, alcohol consumption and other self-damaging behaviors.

The American Society for Metabolic and Weight Loss Surgery (ASMBS) released recommendations for pre-bariatric surgery psychological consultation in 2004 and published an update of the recommendations in 2016 [48] and 2020 [49]. The focus of these consultations remains on assisting patients to better prepare for bariatric surgery through multidisciplinary treatment planning, rather than on preventing complex patients from proceeding to surgery [50]. ASMBS states that the inclusion of a clinical interview is an essential component of the pre-surgical psychological screening [48]. Central to the pre-surgical screening is the need to identify factors (i.e. social support, motivation, psychosocial history, eating disorder symptoms, substance abuse, etc.) that may pose challenges to optimal surgical outcomes, and to provide recommendations to the patient and health care workers on how to address these issues [48]. However, recommendations for specific psychometric testing (psychological questionnaires used in screening procedures) are needed to standardize the screening process.

Research suggests that patients referred to bariatric surgery have a higher incidence of obsessive-compulsive disorder, substance abuse/dependency, binge eating disorder, post-traumatic stress

disorder, generalized anxiety disorder, depression and schizophrenia when compared to the general population [51]. Furthermore, we know that patients with poorly managed psychiatric disorders can have suboptimal health outcomes following bariatric surgery [51], and yet there is no consensus regarding pre-operative psychological evaluation [52,53]. This prompts the question whether uniformity in screening methods and instruments are necessary to decrease the risk of psychological complications in patients after bariatric surgery. In addition, identifying patients at greatest risk will allow a more adequate and tailored follow-up which may largely prevent rare, but potentially life-threatening psychiatric complications after surgery. Finally, many studies suggest that health care professionals should closely monitor patients after bariatric surgery. As in the preoperative screening, there is no uniformity in the post-operative follow-up of patients. In our view, this is a major medical need that needs to be addressed globally and deserves thorough and well-conducted research.

4. Conclusion

Bariatric-metabolic surgery is an extremely valuable and effective tool to treat obesity and associated co-morbidities. However, the impact of bariatric surgery on psychosocial health is less straightforward. Increased attention for psychological complications after surgery in daily clinical practice and a better understanding of the mechanisms and risk factors, provided by state-of-the-art scientific evidence, is needed to optimally tackle these issues. Ultimately, the goal is to reduce psychological complications before and after surgery to improve the overall health and mental wellbeing of bariatric patients. In the era of evidence-based medicine this will require large clinical studies and therefore funding, which remains surprisingly hard to come by in view of the prevalence and societal cost of obesity.

Conflict of Interest: The authors (Amber Van den Eynde[1,2*], MS, Ann Mertens[1,2], MD, Phd, Roman Vangoitsenhoven[1,2], MD, Phd, Ann Meulemans[1,2], Phd, Christophe Matthys[1,2], Phd, Ellen Deleus[1,3], MD, Matthias Lannoo[1,3], MD, Phd, Ronny Bruffaerts[4], Phd, Bart Van der Schueren[1,2], MD, Phd.) declare that they have no conflict of interest.

Ethical Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Statement: Informed Consent does not apply.

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