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Internalized Weight Bias and Quality of Life Among Adults Considering or Having Undergone Metabolic and Bariatric Surgery: A Three-Group Comparison from Greece and Cyprus

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Research Article

Keywords:

Posted Date: November 18th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11426367/v1

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Additional Declarations: No competing interests reported.

Abstract

Introduction:

To date, research on internalized weight bias (IWB) in metabolic and bariatric surgery (MBS) has largely focused on candidates presenting for surgery, without a community reference group. In this study, we compared IWB, quality of life (QoL), and general decision-making styles across adults who had undergone MBS, adults considering MBS, and community adults.

Methods

A total of 394 Greek-speaking adults (201 postoperative, 91 considering MBS, 102 community) completed the Modified Weight Bias Internalization Scale, the WHOQOL-BREF, and the General Decision-Making Style questionnaire. Factorial models examined MBS status and gender, with sensitivity analyses adjusting for age, nationality, and current body mass index (BMI).

Results

Our analyses revealed significant differences in IWB across groups, $F(2, 388) = 49.90$, $p < .001$, partial $\eta^2 = .205$. Adults considering MBS reported the highest scores ($M = 4.74$), followed by postoperative ($M = 4.23$) and community adults ($M = 2.77$), and also reported the poorest physical, psychological, and social QoL. Although postoperative adults reported QoL comparable to that of community adults, their IWB scores were more than one standard deviation higher ($d = 1.09$). The IWB association persisted over and above current BMI (partial $\eta^2 = .120$), whereas QoL differences did not. Decision-making styles did not differ by status.

Conclusion

IWB is elevated among adults considering MBS and is substantially higher among postoperative adults than community adults, independently of current BMI and despite comparable QoL. Whether IWB assessment adds value to psychosocial care before and after MBS warrants evaluation.

Key Points

• Adults considering MBS reported the highest internalized weight bias.

• Postoperative adults reported far more weight bias than community adults.

• Group differences in weight bias persisted after adjustment for current BMI.

• Quality-of-life differences were largely accounted for by current BMI.

Introduction

In its broadest sense, internalized weight bias (IWB) refers to the extent to which individuals apply negative weight-based stereotypes to themselves and devalue themselves as a result, and reflects the self-directed component of weight stigma (i.e., as distinct from unfair treatment by others) [1, 2]. Importantly, IWB has been consistently associated with poorer mental health, disordered eating, and lower quality of life (QoL; for a review, see [3]). In the context of metabolic and bariatric surgery (MBS), these associations are particularly relevant, as individuals seeking MBS may encounter stigma concerning both their body weight and their decision to pursue surgery [4].

Accumulating evidence suggests that IWB is pertinent at multiple stages of the surgical process. Among adults presenting for MBS, higher IWB has been associated with greater psychological distress, lower self-esteem, and poorer QoL [5–7], and substantial internalization has also been documented among surgical candidates outside Western contexts [8]. Further, preoperative IWB has been associated with more depressive symptoms and smaller weight loss 12 months after surgery [9]. After surgery, IWB has been linked with poorer mental QoL and lower adherence to recommended health behaviors [10]. Crucially, although experienced stigma decreases substantially after MBS [11], postoperative adults continue to report residual stigma, including judgment about having had surgery and concealment of their surgical history, alongside IWB [12]. Longitudinal evidence on change in IWB itself remains limited [13], even though QoL improves considerably after surgery [14].

Despite this, few studies have examined IWB across surgical stages within a single design, and fewer still have included a community reference group. As such, it remains unclear how IWB among adults considering MBS and among postoperative adults compares with that of the wider community, and whether any such differences are explained by current body weight. Adults considering MBS are also a heterogeneous group, whose interest in surgery may reflect health, appearance-related, or social motives and considerable uncertainty [15, 16]. One way of understanding this group is to consider habitual approaches to decision-making, as assessed by the General Decision-Making Style (GDMS) questionnaire [17], although such styles are distinct from treatment-specific readiness [18]. Given evidence of gender differences in both IWB [19] and decision-making profiles [20], gender was also considered.

The Present Study

In the present study, we compared IWB, QoL, and general decision-making styles across three groups of Greek-speaking adults from Greece and Cyprus: adults who had undergone MBS, adults considering MBS, and community adults. Based on previous findings [5–8], we expected that adults considering MBS would report the highest IWB and the poorest QoL. In addition, we examined whether postoperative adults differed from community adults, and whether group differences would persist over and above age, nationality, and current body mass index (BMI). Decision-making styles, gender differences, and status-by-gender interactions were examined as secondary, exploratory questions.

Materials and Methods

Participants and Procedure

The study was carried out in accordance with the principles of the Declaration of Helsinki, and ethical approval for both surveys and the combined analysis was obtained from [blinded for review] (Protocol No. [blinded for review]). Data were drawn from two anonymous online surveys administered in Greek via Google Forms, and the study is reported in accordance with the STROBE statement [21]. Participants in the MBS survey were recruited between March 7 and April 11, 2025, via social media, messaging applications, email, and online bariatric communities. Participants in the community survey were recruited between July 2 and 15, 2025, via social media, emails to acquaintances who were asked to forward the survey, and in-person invitations using a QR code. Both surveys contained the same questionnaire. Participants were eligible if (a) they were at least 18 years of age, (b) fluent in Greek, and (c) they resided in Greece or Cyprus. All participants provided digital informed consent and were given contact details for psychological support services.

Participants were assigned to three groups based on survey, surgical history, and surgical intention. MBS-survey respondents who had undergone MBS formed the postoperative group, and those who had not but rated their likelihood of undergoing MBS within the next 5 years as 3–5 on a 5-point scale (1 = *extremely unlikely*, 3 = *uncertain*, 5 = *extremely likely*) formed the considering-MBS group, which therefore included uncertain respondents. Community participants had not undergone MBS; 14 (13.7%) nonetheless rated their likelihood of surgery as 3–5 and were retained, with their exclusion examined in sensitivity analyses.

The combined dataset comprised 396 records (294 from the MBS survey and 102 from the community survey). After removal of two exact duplicate records from the postoperative group, the final sample consisted of 394 participants: 201 postoperative adults, 91 adults considering MBS, and 102 community adults. There were no missing data on the study variables.

Measures

Demographics. Participants reported their age, gender, nationality, height, and weight, and BMI was calculated from height and weight (kg/m²). Surgical history was assessed with a yes/no item, and participants who had not undergone surgery rated their likelihood of undergoing MBS within the next 5 years.

Internalized weight bias. To measure IWB, participants completed the Greek translation [22] of the 11-item Modified Weight Bias Internalization Scale (M-WBIS [23, 24]). Items are rated on a 7-point scale and were scored so that higher scores reflect greater IWB, with an overall score computed as the mean of all items. Adequate psychometric properties have been reported for scores on the Greek translation of the

M-WBIS [22]. In the present study, scores on the M-WBIS were internally consistent (McDonald's ω = .92, 95% CI [.91, .93]).

Decision-making styles. To measure general decision-making styles, participants completed the Greek version [25] of the GDMS [17], which comprises 24 of the 25 original items (item 8 is not included) and assesses Rational, Intuitive, Dependent, Avoidant, and Spontaneous styles. All items were rated on a 5-point scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*, and subscale scores were computed as the mean of the respective items (four items for Spontaneous, five for all others), with higher scores reflecting greater endorsement of each style. In the present study, McDonald's ω was .76 [.70, .81] for Rational, .67 [.61, .73] for Intuitive, .78 [.73, .82] for Dependent, .87 [.85, .89] for Avoidant, and .83 [.79, .86] for Spontaneous.

Quality of life. To measure QoL, participants completed the 26-item WHOQOL-BREF [26] in its Greek translation [27], which assesses four domains: Physical Health, Psychological Health, Social Relationships, and Environment. Domain scores were transformed to a 0–100 scale following WHO guidance [28], with higher scores reflecting better QoL. Items 3 and 4 were reverse-scored; item 26 was administered in a positively keyed format and required no recoding. Adequate psychometric properties have been reported for scores on the Greek translation [27]. In the present study, McDonald's ω was .86 [.84, .88] for Physical Health, .87 [.84, .89] for Psychological Health, .81 [.77, .84] for Social Relationships, and .81 [.78, .84] for Environment.

Data Analysis

Differences in IWB were examined using a 3 (status) × 2 (gender) factorial analysis of variance (ANOVA), and the four WHOQOL-BREF domains and five GDMS styles using two separate factorial multivariate analyses of variance (MANOVAs; Pillai's trace). Given unequal cell sizes, Type III tests with sum-to-zero contrasts were used, and significant multivariate effects were followed by univariate tests with Holm correction within each outcome family. Pairwise status comparisons were based on estimated marginal means (EMMs) weighted equally across gender, with HC3 robust standard errors, *t*-based 95% confidence intervals (CIs), and Holm correction across the three comparisons within each outcome. Homogeneity of variance was examined using median-centered Levene tests. Effect sizes were reported as partial η^2 and as Cohen's *d* (pooled *SD*), interpreted using conventional benchmarks [29]. Internal consistency was estimated using McDonald's ω, with percentile 95% CIs from 1,000 bootstrap resamples.

To examine the robustness of our findings, we added age and nationality, and then current BMI, to each model while retaining the status-by-gender interaction; because current BMI reflects both preoperative differences and postoperative change, these estimates were interpreted descriptively. We also repeated the primary models after excluding the 14 community participants who reported surgical interest. For all analyses, $p < .05$ (two-sided) was considered significant.

Results

Participant Characteristics

The final sample consisted of 394 participants (women *n* = 318, 80.7%), ranging in age from 18 to 73 years (*M* = 40.32, *SD* = 10.58) and in self-reported BMI from 16.14 to 77.13 kg/m² (*M* = 34.74, *SD* = 11.43). In total, 290 (73.6%) participants were Greek and 104 (26.4%) were Cypriot. As can be seen in Table 1, the groups differed significantly in age, BMI, and nationality (all $p < .001$), as well as in gender composition ($p = .023$). Notably, mean BMI in the postoperative group (33.78 kg/m²) was markedly lower than in the considering-MBS group (46.94 kg/m²). Levene tests were non-significant for all 10 outcomes ($p = .128–.898$). Descriptive statistics for all study variables are reported in Table 2.

Table 1
Participant characteristics by MBS status

Characteristic	Postoperative (n = 201)	Considering MBS (n = 91)	Community (n = 102)
N	201	91	102
Women, n (%)	170 (84.6)	75 (82.4)	73 (71.6)
Men, n (%)	31 (15.4)	16 (17.6)	29 (28.4)
Greek, n (%)	165 (82.1)	71 (78.0)	54 (52.9)
Cypriot, n (%)	36 (17.9)	20 (22.0)	48 (47.1)
Age, years	43.61 (9.28)	39.40 (8.13)	34.68 (12.31)
BMI, kg/m²	33.78 (10.46)	46.94 (6.60)	25.76 (5.97)
Surgery likelihood 3–5, n (%)	—	91 (100.0)	14 (13.7)

Note. Continuous variables are reported as means (SDs). BMI = body mass index; MBS = metabolic and bariatric surgery. Nationality was self-reported and does not indicate ethnicity or country of residence. Surgical likelihood was rated on a 5-point scale for the next 5 years and was not assessed in postoperative adults. Community participants were grouped by recruitment source and included some adults considering surgery.

Table 2
Observed psychosocial scores by MBS status

Outcome and score range	ω [95% CI]	Postoperative (n = 201)	Considering MBS (n = 91)	Community (n = 102)
M-WBIS (1–7)	.92 [.91, .93]	4.23 (1.35)	4.74 (1.22)	2.77 (1.32)
GDMS rational (1–5)	.76 [.70, .81]	4.01 (0.67)	4.06 (0.63)	3.98 (0.62)
GDMS intuitive (1–5)	.67 [.61, .73]	3.80 (0.66)	3.70 (0.58)	3.66 (0.58)
GDMS dependent (1–5)	.78 [.73, .82]	3.08 (0.87)	3.31 (0.85)	3.18 (0.71)
GDMS avoidant (1–5)	.87 [.85, .89]	2.66 (1.05)	2.93 (0.93)	2.58 (1.02)
GDMS spontaneous (1–5)	.83 [.79, .86]	2.78 (0.99)	2.81 (0.95)	2.63 (0.92)
WHOQOL physical (0–100)	.86 [.84, .88]	65.21 (21.91)	49.14 (19.66)	70.41 (18.90)
WHOQOL psychological (0–100)	.87 [.84, .89]	60.18 (20.46)	45.38 (19.17)	64.71 (18.52)
WHOQOL social (0–100)	.81 [.77, .84]	65.34 (27.89)	51.10 (26.27)	70.34 (24.89)
WHOQOL environment (0–100)	.81 [.78, .84]	60.90 (17.53)	55.56 (17.07)	65.75 (16.08)

Note. Values are means (SDs). ω = McDonald's omega with bootstrapped 95% CI for the total analytic sample. Higher M-WBIS scores reflect greater internalized weight bias, higher GDMS scores reflect greater endorsement of each decision-making style, and higher WHOQOL scores reflect better quality of life. Cohen's *d* values reported in the text are based on these observed values; comparisons in Table 4 use estimated marginal means. M-WBIS = Modified Weight Bias Internalization Scale; GDMS = General Decision-Making Style questionnaire.

Internalized Weight Bias

Our analyses revealed a significant main effect of MBS status on IWB, $F(2, 388) = 49.90$, $p < .001$, partial $\eta^2 = .205$, representing a large effect (Table 3). Adults considering MBS reported the highest scores ($M = 4.74$, $SD = 1.22$), followed by postoperative ($M = 4.23$, $SD = 1.35$) and community adults ($M = 2.77$, $SD = 1.32$). As can be seen in Table 4, all pairwise differences remained significant after Holm correction. More specifically, differences between community adults and both the considering-MBS group ($d = 1.55$) and the postoperative group ($d = 1.09$) were large, whereas the difference between the two MBS groups

was small-to-moderate (d = 0.39; EMM difference = − 0.52, 95% CI − 1.00 to − 0.04, p = .035). Neither the main effect of gender nor the status-by-gender interaction was significant.

Table 3
Omnibus factorial tests of status and gender

Outcome family	Effect	Statistic	F (df1, df2)	p
M-WBIS	Group	ηp^2 = .205	49.90 (2, 388)	< .001
M-WBIS	Gender	ηp^2 < .001	0.15 (1, 388)	.696
M-WBIS	Group × gender	ηp^2 = .004	0.70 (2, 388)	.499
GDMS	Group	V = .018	0.69 (10, 770)	.732
GDMS	Gender	V = .030	2.38 (5, 384)	.038
GDMS	Group × gender	V = .019	0.74 (10, 770)	.690
WHOQOL-BREF	Group	V = .102	5.17 (8, 772)	< .001
WHOQOL-BREF	Gender	V = .017	1.70 (4, 385)	.150
WHOQOL-BREF	Group × gender	V = .009	0.43 (8, 772)	.904

Note. All models include MBS status, gender, and their interaction. IWB was examined using ANOVA; decision-making styles and QoL were examined using separate MANOVAs. *V* = Pillai's trace; ηp^2 = partial eta squared; df = degrees of freedom. The *p*-values shown are for omnibus tests before correction of follow-up tests within each outcome family. Gender and interaction analyses are exploratory.

Table 4
Pairwise status contrasts and the spontaneous decision-making gender comparison

Outcome	Contrast	Difference	95% CI	Holm p
M-WBIS	P – S	-0.52	-1.00 to -0.04	.035
M-WBIS	P – C	1.56	1.13 to 1.98	< .001
M-WBIS	S – C	2.08	1.57 to 2.58	< .001
WHOQOL physical	P – S	16.24	9.28 to 23.20	< .001
WHOQOL physical	P – C	-4.98	-10.52 to 0.57	.078
WHOQOL physical	S – C	-21.22	-28.16 to -14.27	< .001
WHOQOL psychological	P – S	13.71	6.42 to 20.99	< .001
WHOQOL psychological	P – C	-5.37	-11.12 to 0.39	.068
WHOQOL psychological	S – C	-19.07	-26.50 to -11.64	< .001
WHOQOL social	P – S	15.03	5.55 to 24.51	.004
WHOQOL social	P – C	-4.09	-11.75 to 3.58	.295
WHOQOL social	S – C	-19.11	-28.72 to -9.50	< .001
WHOQOL environment	P – S	5.36	-0.98 to 11.71	.195
WHOQOL environment	P – C	-3.83	-8.52 to 0.87	.195
WHOQOL environment	S – C	-9.19	-15.63 to -2.75	.016
GDMS spontaneous	Women – Men	0.38	0.14 to 0.62	.016

Note. P = postoperative; S = considering MBS; C = community. Differences are between estimated marginal means, with equal weighting across gender for status comparisons. Pointwise 95% CIs use HC3 robust standard errors and *t* critical values with 388 degrees of freedom. Status *p*-values are Holm-corrected across the three comparisons within each outcome. The *p*-value for the gender difference in spontaneous decision-making is from the univariate *F* test, corrected across the five subscales; its CI uses HC3.

Quality of Life

The MANOVA revealed a significant multivariate effect of MBS status on QoL, Pillai's $V = .102$, $F(8, 772) = 5.17$, $p < .001$. Follow-up univariate tests were significant for all four domains after Holm correction (partial $\eta^2 = .084$, .074, .043, and .024 for Physical Health, Psychological Health, Social Relationships, and Environment, respectively; all adjusted $p \leq .010$). Adults considering MBS reported poorer physical ($d = 0.76$ vs. postoperative; 1.10 vs. community), psychological ($d = 0.74$; 1.03), and social QoL ($d = 0.52$; 0.75) than both other groups, and poorer environmental QoL than community adults ($d = 0.62$; Table 4).

Importantly, postoperative and community adults did not differ significantly in any domain ($|d| \leq 0.28$). The multivariate effects of gender and the status-by-gender interaction were not significant.

Decision-Making Styles

Decision-making styles did not differ significantly by MBS status, Pillai's $V = .018$, $F(10, 770) = 0.69$, $p = .732$, and the status-by-gender interaction was not significant. Of the gender effects (Table 3), only spontaneous decision-making remained significant after Holm correction, $F(1, 388) = 8.80$, adjusted $p = .016$, partial $\eta^2 = .022$, with women reporting higher scores than men (difference = 0.38, 95% CI 0.14–0.62).

Sensitivity Analyses

After adjustment for age and nationality, MBS status remained significantly associated with IWB, $F(2, 386) = 47.38$, $p < .001$, partial $\eta^2 = .197$, and QoL, $V = .109$, $F(8, 768) = 5.53$, $p < .001$ (Table 5). When current BMI was added, the IWB association remained significant, $F(2, 385) = 26.33$, $p < .001$, partial $\eta^2 = .120$, whereas the QoL association was no longer significant, $V = .027$, $F(8, 766) = 1.33$, $p = .227$. Excluding the 14 community participants who reported surgical interest did not alter this pattern (IWB: $F(2, 374) = 47.83$, $p < .001$; QoL: $V = .103$, $F(8, 744) = 5.07$, $p < .001$; decision-making styles: $V = .021$, $F(10, 742) = 0.79$, $p = .641$).

Table 5
Sensitivity of the omnibus status association to covariate adjustment

Outcome	Model	Statistic	F (df1, df2)	p
IWB	Status and gender	$\eta p^2 = .205$	49.90 (2, 388)	< .001
IWB	Add age and nationality	$\eta p^2 = .197$	47.38 (2, 386)	< .001
IWB	Also add current BMI	$\eta p^2 = .120$	26.33 (2, 385)	< .001
QoL	Status and gender	V = .102	5.17 (8, 772)	< .001
QoL	Add age and nationality	V = .109	5.53 (8, 768)	< .001
QoL	Also add current BMI	V = .027	1.33 (8, 766)	.227

Note. Statistics refer to the overall status term. IWB = internalized weight bias; QoL = quality of life; BMI = body mass index; ηp^2 = partial eta squared; V = Pillai's trace. All models include the status-by-gender interaction. Because current BMI reflects both differences that preceded surgery and changes following it, BMI-adjusted associations are descriptive.

Discussion

The present study examined IWB, QoL, and general decision-making styles across adults considering MBS, postoperative adults, and community adults. In broad outline, our results showed that IWB was highest among adults considering MBS, and that postoperative adults reported IWB more than one

standard deviation higher than that of community adults. Importantly, group differences in IWB persisted over and above current BMI, whereas differences in QoL did not. Below, we discuss each of these findings before turning to their clinical implications.

IWB Was Highest Among Adults Considering MBS

Consistent with our expectations and with studies of surgical candidates [5–8], adults considering MBS reported the highest IWB. It is worth noting, however, that this group was defined by stated interest in MBS rather than by clinical eligibility or enrollment in a presurgical evaluation, and included individuals who were still uncertain about surgery. As such, our findings suggest that high levels of self-directed weight bias are present among adults contemplating MBS, irrespective of their position in the clinical pathway. Given that preoperative IWB among candidates has been associated with smaller weight loss after surgery [9], its role among adults contemplating MBS merits further investigation.

IWB Was Elevated After Surgery Despite Comparable QoL

Perhaps more importantly, postoperative adults reported IWB that, although lower than that of adults considering MBS, was substantially higher than that of community adults, with a mean score above the scale midpoint. This is consistent with recent evidence of residual stigma and IWB after MBS [12], and suggests that the substantial reductions in experienced stigma reported after surgery [11] do not necessarily extend to self-directed weight bias. Indeed, the persistence of this difference after BMI adjustment indicates that IWB is not simply a function of current body weight. Beliefs internalized over years of living in a larger body may change more slowly than weight itself or, alternatively, MBS may introduce a distinct source of stigma [4, 12]; future longitudinal studies would do well to distinguish between these accounts.

Conversely, postoperative and community adults did not differ significantly in QoL, consistent with long-term QoL improvements after surgery [14]. Moreover, QoL differences across groups were no longer significant after BMI adjustment, suggesting that they largely track current weight-related health burden. Put differently, favorable QoL after MBS need not coincide with low self-directed weight bias.

Other Findings

General decision-making styles did not differ across groups, suggesting that treatment-specific measures of knowledge, expectations, and decisional conflict [16, 18] may be more informative when studying decisions about MBS. In addition, the absence of a gender difference in IWB contrasts with meta-analytic evidence [19] and likely reflects the small number of men in the MBS groups.

Clinical Implications

Taken together, our findings have implications for clinical evaluation. The dissociation between IWB and QoL in postoperative adults suggests that IWB may warrant assessment during postoperative follow-up even when QoL appears satisfactory, with stigma-focused support offered where indicated [1, 2]. For adults considering MBS, brief measures such as the M-WBIS could complement the presurgical

psychosocial evaluation once individuals enter formal assessment [30]. Of course, whether such assessment improves outcomes has not been established and requires prospective evaluation.

Limitations

The present findings should be considered in light of several limitations. First, the cross-sectional design does not allow for conclusions about change within individuals or about the effects of surgery. Second, the two surveys relied on convenience sampling and were conducted at different times through different recruitment channels, so selection effects may have contributed to group differences and our samples may not be representative. Third, surgical eligibility and presurgical evaluation status were not assessed, so the considering-MBS group should not be equated with surgical candidates. Fourth, the groups differed substantially in BMI, which limits covariate overlap and makes BMI-adjusted estimates dependent on model assumptions; likewise, non-significant differences between postoperative and community adults should not be read as equivalence.

Fifth, all data were self-reported, and time since surgery, presurgical weight, and comorbidities were not assessed. Sixth, men were underrepresented, particularly in the considering-MBS group, limiting the precision of gender estimates. Finally, scores on the Intuitive subscale of the GDMS showed modest internal consistency. Future studies would therefore do well to assess the same individuals before and after MBS, with repeated measurement of experienced stigma, IWB, and QoL.

Conclusion

In conclusion, adults considering MBS reported the highest IWB and the poorest QoL, and postoperative adults reported substantially greater IWB than community adults despite comparable QoL. Importantly, group differences in IWB were not accounted for by current BMI, whereas differences in QoL largely were. These findings highlight IWB as a distinct psychosocial concern in MBS populations and support evaluating whether its assessment adds value to care both before and after surgery.

Declarations

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. The study, including both surveys and the combined analysis, was approved by [blinded for review] (Protocol No. [blinded for review]).

Informed Consent:

Informed consent was obtained from all individual participants included in the study.

Conflict of Interest:

The authors declare that they have no conflict of interest.

Funding:

This research received no external funding.

Author Contribution

T.G.: Conceptualization, Investigation, Data curation, Writing – original draft. M.M.: Methodology, Resources (Greek version of the GDMS), Writing – review and editing. M.A.: Conceptualization, Methodology, Formal analysis, Supervision, Writing – review and editing. All authors read and approved the final manuscript.

Data Availability

The data that support the findings of this study are available from the authors upon reasonable request.

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