Brazilian Journal of Psychiatry
bjp
Revista Brasileira de Psiquiatria

Braz J Psychiatry. 2024;46:e20233384
doi:10.47626/1516-4446-2023-3384
Brazilian Psychiatric Association

BRIEF COMMUNICATION

A randomized controlled trial of a dissonance-based eating disorder prevention intervention for body-dissatisfied Brazilian men: results from a 1-year follow-up

Maurício **Almeida**,[1,2] Tiffany A. **Brown**,[3] Priscila Figueiredo **Campos**,[1] Thainá Richelli Oliveira **Resende**,[1] Pedro Henrique Berbert **de Carvalho**[1,2]

[1]*Núcleo Interprofissional de Estudos e Pesquisas em Imagem Corporal e Transtornos Alimentares, Universidade Federal de Juiz de Fora, Governador Valadares, MG, Brazil.* [2]*Programa de Transtornos Alimentares, Instituto de Psiquiatria, Universidade de São Paulo, São Paulo, SP, Brazil.* [3]*Department of Psychological Sciences, Auburn University, Auburn, AL, USA.*

Objective: To test the efficacy of a dissonance-based (DB) intervention in targeting risk factors for eating disorders (EDs) and predisposing factors for muscle dysmorphia (MD) symptoms in body-dissatisfied Brazilian men over 1 year of follow-up and evaluate whether reductions in body-ideal internalization would mediate the intervention's impact on ED and MD symptoms.
Methods: Participants were randomized to a two-session DB intervention (n=89) or assessment-only control (AOC) (n=91), and completed validated measures assessing body-ideal internalization, body dissatisfaction, ED, and MD symptoms at baseline, post-intervention, 1-month, 6-month, and 1-year follow-ups.
Results: The DB condition showed significantly greater reductions in MD symptoms and body dissatisfaction compared with the AOC group over a 1-year follow-up, while significant differences were not observed for body-ideal internalization and ED symptoms. Changes in body-ideal internalization from baseline to 1-month follow-up completely mediated the relationship between condition and the changes observed in both ED and MD symptoms.
Conclusion: These results provide further evidence of the efficacy of the tested intervention through 1-year follow-up in reducing body dissatisfaction and MD symptoms, but no such result was observed for body-ideal internalization and EDs. Our findings provide support for theoretical models of eating pathology and MD symptoms in Brazilian men.
Clinical Trial Registration: Brazilian Registry of Clinical Trials (ReBEC): RBR-27dc264.

Keywords: Body image; feeding and eating disorders; body dysmorphic disorders; young adult; men

Introduction

Men with muscle dysmorphia (MD) often worry that their bodies are too small or not muscular enough, even if they have a normal or very muscular body.[1] In the latest version of the DSM-5, MD is categorized as a specifier of body dysmorphic disorder (BDD) within the category of obsessive compulsive and related disorders.[2] However, authors have continued to question the nosological classification of MD, debating whether it should be considered a specifier of BDD, an eating disorder (ED), or a distinct psychiatric condition.[3-5] There is still insufficient evidence to definitively determine the most appropriate classification for MD.[3] Regardless, it is widely agreed that MD is a serious psychological disorder which significantly impacts physical health and psychosocial functioning.[3,4,6-8] Indeed, individuals with MD have shown excessive concern with physical training and diet, a higher frequency of suicidal ideation, reduced quality of life, and higher frequencies of substance use disorder and anabolic-androgenic steroid (AAS) abuse.[9] MD symptoms are also strongly associated with body-ideal internalization,[10] body dissatisfaction,[11] and ED symptoms.[12]

ED and MD symptoms are increasingly prevalent in men.[13] Despite the physical and psychosocial impairments associated with these symptoms, men are less likely to seek treatment, mainly due to social- and self-stigma.[14] Additionally, preventive efforts have disproportionately targeted women.[14,15] Indeed, of all preventive interventions developed for university-aged individuals, only 11.1% have included men in their samples.[15]

Correspondence: Pedro Henrique Berbert de Carvalho, Núcleo Interprofissional de Estudos e Pesquisas em Imagem Corporal e Transtornos Alimentares, Universidade Federal de Juiz de Fora, Rua São Paulo, 745, Centro, CEP 35010-150, Governador Valadares, MG, Brazil.
E-mail: pedro.berbert@ufjf.br
Submitted Sep 12 2023, accepted Dec 09 2023.

How to cite this article: Almeida M, Brown TA, Campos PF, Resende TRO, de Carvalho PHB. A randomized controlled trial of a dissonance-based eating disorder prevention intervention for body-dissatisfied Brazilian men: results from a 1-year follow-up. Braz J Psychiatry. 2024;46:e20233384. http://doi.org/10.47626/1516-4446-2023-3384

To address this gap and reduce risk for EDs and predisposing factors for MD in North American men, Brown et al.[16] developed the Body Project: More Than Muscles (BP/MTM), a dissonance-based (DB) preventive intervention in which participants voluntarily critique the pursuit of the lean, muscular appearance considered ideal for men through verbal, written, and behavioral exercises. The study's results demonstrated significant and small-to-large-effect-size reductions in body-ideal internalization, dietary restraint, bulimic symptoms, drive for muscularity, MD symptoms, body fat, and muscularity dissatisfaction immediately post-intervention and at 1-month follow-up when compared to a waitlist condition.[16] Additionally, the changes in body-ideal internalization partially mediated the effect of condition on both bulimic symptoms and MD symptoms.[16] Given the relevance of ED and MD concerns for young men in Brazil,[1,17] the efficacy of the BP/MTM has also been tested among Brazilian male university students.[18] As in the original study, results demonstrated significant and small-to-large-effect-size reductions across ED and MD risk factors compared to assessment-only control (AOC) for body-ideal internalization, body dissatisfaction, ED, and MD symptoms at 1- and 6-month follow-ups.[18]

Although the results of both studies are promising,[16,18] a brief follow-up period (i.e., a maximum of 6 months)[18] was evaluated compared to previous studies conducted with women, in which effects were maintained over a 4-year follow-up period.[19] A recent systematic review suggests that preventative studies should evaluate at least 1 year of follow-up to understand whether effects persist over time.[15] Additionally, while Brown et al.[16] found that the reduction in body-ideal internalization mediated improvements in ED and MD symptoms after BP/MTM, this relationship has not been tested in Brazilian men. Confirming whether the mechanisms for BP/MTM established in the United States hold across men in Brazil is important to further evaluate the program's efficacy.

Extending previous research,[16,18] the present study aimed to evaluate the efficacy of the BP/MTM in targeting risk factors for ED and predisposing factors for MD symptoms over a 1-year follow-up and to evaluate whether reductions in body-ideal internalization would mediate the intervention's impact on ED and MD symptoms in body-dissatisfied Brazilian men. Based on previous literature,[16,18] we hypothesized that: 1) participants allocated to the DB condition would report significant reductions in body-ideal internalization, body dissatisfaction, ED, and MD symptoms over a 1-year follow-up; and 2) the DB program's impact on ED and MD symptoms would be completely mediated by reductions in body-ideal internalization.

Methods

Sample, procedure, and intervention

Brazilian men who met the following criteria were included: i) identified as heterosexual; ii) 18-30 years old; iii) endorsed body image concerns (dissatisfaction with body weight, shape, or muscularity); and iv) did not meet criteria for EDs or MD (namely, self-report of previous diagnosis of any ED or MD by a clinician).

Participants were invited to participate via campus advertisements, including banners, posters, and online forums, as well as via announcements in classes. Those who provided informed consent filled out a sociodemographic questionnaire in paper-and-pencil format designed to collect the following information: age, height, and weight (for calculation of body mass index [BMI]); race/ethnicity; ED or MD symptoms; and concerns related to weight, shape, and muscularity, self-rated on a scale of 1 to 10. Consistent with previous research, scores $\geqslant$ 6 on any of these questions met the criteria for body dissatisfaction.[16,18]

Eligible participants were randomly assigned to either the DB (n=89) or AOC (n=91) conditions, via the website www.randomizer.org, in a 1:1 allocation ratio. Those assigned to the DB condition completed questionnaires at baseline (pre-intervention), post-intervention, and at 1- and 6-months, and 1-year follow-up; those assigned to the AOC condition completed assessments at comparable intervals. As our team has previously published the results of this trial through 6 months of follow-up,[7] the present study provides an extension of this prior work through 1 year of follow-up.

The DB condition participated in two sessions, lasting 2 hours each with a weekly break between them, of the Brazilian version of the BP/MTM.[18] In the first session, the participants i) defined the ''cultural ideal'' male body type, ii) discussed the origin and perpetuation of the ''cultural ideal,'' and how it has changed over time, iii) brainstormed the costs of pursuing the ''cultural ideal,'' iv) participated in verbal challenges countering the mesomorphic ideal message, and v) completed homework assignments. In the second session, they i) reviewed homework, ii) completed role plays to counter/discourage pursuit of the mesomorphic ideal, iii) discussed ways to resist pressure to pursue this ''cultural ideal,'' iv) brainstormed ways to resist future pressures to conform to the ideal, v) discussed ways to challenge/avoid negative ''body talk'' statements, and vi) selected an exit exercise to continue challenging the cultural-ideal. For details about sample, procedures, and intervention, please see Almeida et al.[18]

Measures

Body-ideal internalization

The Thin/Low Body Fat and Muscular/Athletic Internalization subscales of the Brazilian version of the Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4)[20] were used to measure body-ideal internalization. The instrument is rated on a 5-point Likert scale (1 = definitely disagree to 5 = definitely agree). A total score can be derived by the sum of the Thin/Low Body Fat and Muscular/Athletic Internalization subscales. The total score ranges from 10 to 50, with higher scores indicating greater body-ideal internalization.[20] The SATAQ-4 has demonstrated good convergent and discriminant validity, internal consistency, and composite reliability among Brazilian men.[20] The SATAQ-4 demonstrated good

internal consistency in the present study across time-points (McDonald's $\omega \geqslant 0.83$).

Eating disorder symptoms

ED symptoms were assessed through the Brazilian version of the Eating Attitudes Test-26 (EAT-26).[17] The EAT-26 is rated on a 6-point Likert-type scale (1 = never to 6 = always). The total score is calculated by reassigning scores in the following manner: scores from 1 to 3 are converted to 0, 4 is converted to 1, 5 is converted to 2, and 6 is converted to 3. The sole exception pertains to item 25, for which responses are scored as follows: a response of 1 is assigned a score of 3, 2 is scored as 2, 3 is scored as 1, and responses from 4 to 6 are scored as 0.[17] The EAT-26 total score ranges from 0 to 78, with higher scores indicating greater ED symptomatology.[17] The Brazilian version of the EAT-26 has demonstrated adequate indicators of convergent and discriminant validity, internal consistency, and test-retest reliability with a unidimensional structure.[17] In the present study, internal consistency (ω) for the EAT-26 was $\geqslant 0.76$ across time points.

Muscle dysmorphia symptoms

MD symptoms were assessed through the Brazilian version of the Muscle Dysmorphic Disorder Inventory (MDDI).[1] The 13 items of the MDDI are rated on a 5-point Likert-type scale (1 = never to 5 = always). Total scores are derived from the sum of all items and can range from 13 to 65. Higher scores indicate greater MD symptoms.[1] The Brazilian version of the MDDI has demonstrated good convergent validity, internal consistency, and test-retest reliability for undergraduate young men.[1] In the current sample, internal consistency was good across time points ($\omega \geqslant 0.78$).

Body dissatisfaction

The 15-items of the Male Body Attitudes Scale-Revised (MBAS-R) Brazilian version were used to measure body dissatisfaction.[21] MBAS-R items are rated on a 5-point Likert-type scale (1 = never to 5 = always). Items 7 and 14 are reverse-scored. The total score is the sum of the 15 items and ranges from 15 to 75; higher scores reflect a higher level of body dissatisfaction.[21] The Brazilian version of the MBAS-R has demonstrated good construct and convergent validity, internal consistency, and test-retest reliability for undergraduate young men.[21] In the present study, the MBAS-R demonstrated good internal consistency across time points ($\omega \geqslant 0.82$).

Data analyses

The sample size calculation suggested 29 participants per condition (Supplementary Material S1). However, taking into account the dropout rate of previous DB preventive interventions in the Brazilian context,[22,23] we invited a higher number of men to participate in the present study. Intent-to-treat analyses were run using the mixed models module of SPSS Version 21.0 to examine the condition (DB vs. AOC) on each outcome variable over time. In all models, a random-intercepts and a variance-components correlation structure were used. The Akaike information criterion and Bayesian information criterion were used to guide selection of the best-fitting model. To account for missing data, full information likelihood criteria were used,[24] and all individuals who completed any assessments were included in analyses. Predictors in each model were time, condition, and condition $\times$ time interactions. Time points (baseline = 1, post-intervention = 7, 1-month = 35, 6-months = 203, and 1-year = 365) were included as continuous variables. Additionally, incorporating a quadratic effect of time resulted in a better-fitting model.

Mediation models were analyzed using the PROCESS macro in SPSS Version 21.0, and bias-corrected bootstrapped confidence intervals were employed to access indirect effects.[25] Five thousand bootstrap resamples were applied to test the indirect effects of condition via the posited mediating variable (i.e., change in body-ideal internalization from baseline to 1-month follow-up) on the dependent variables (i.e., change in ED/MD symptoms from baseline to 1-year follow-up).

Ethics statement

Ethical approval was obtained from the Universidade Federal de Juiz de Fora (ref. 2.698.352).

Results

The flow of participants through the study can be seen in Figure 1. Two hundred and sixty Brazilian men expressed interest in the study. Of those, 81 were excluded based on study criteria. Thus, a total of 180 men were eligible and randomized. Retention was greater than 60% in all phases of the study. No significant differences were observed regarding age, BMI, or race/ethnicity for participants allocated to the DB and the AOC conditions (all $p \geqslant 0.08$) (Table S1, available as supplementary material).

In the mixed model results, no significant effects of time or condition were identified for any of the outcomes (all $p > 0.05$) (Supplementary Material S2). As expected, a significant time $\times$ condition interaction was observed for body-ideal internalization (b = -0.02, t = -3.42, p = 0.001), ED symptoms (b = -0.02, t = -2.91, p = 0.004), MD symptoms (b = -0.02, t = -2.77, p = 0.006), and body dissatisfaction (b = -0.03, t = -3.30, p = 0.001). The DB condition showed significantly greater reductions in MD symptoms and body dissatisfaction, with small to medium effect sizes, compared to AOC over a 1-year follow-up (Table 1). However, the DB condition demonstrated non-significantly greater mean reductions in ED symptoms and body-ideal internalization compared to AOC over the 1-year follow-up period (Table 1).

Regarding mediation analyses, the total effect results indicate that the condition significantly predicted ED (β = 4.58, 95%CI [2.52-6.65], $p < 0.001$) and MD symptoms (β = 4.30, 95%CI [2.12-6.48], $p < 0.001$) without considering body-ideal internalization. Positive indirect

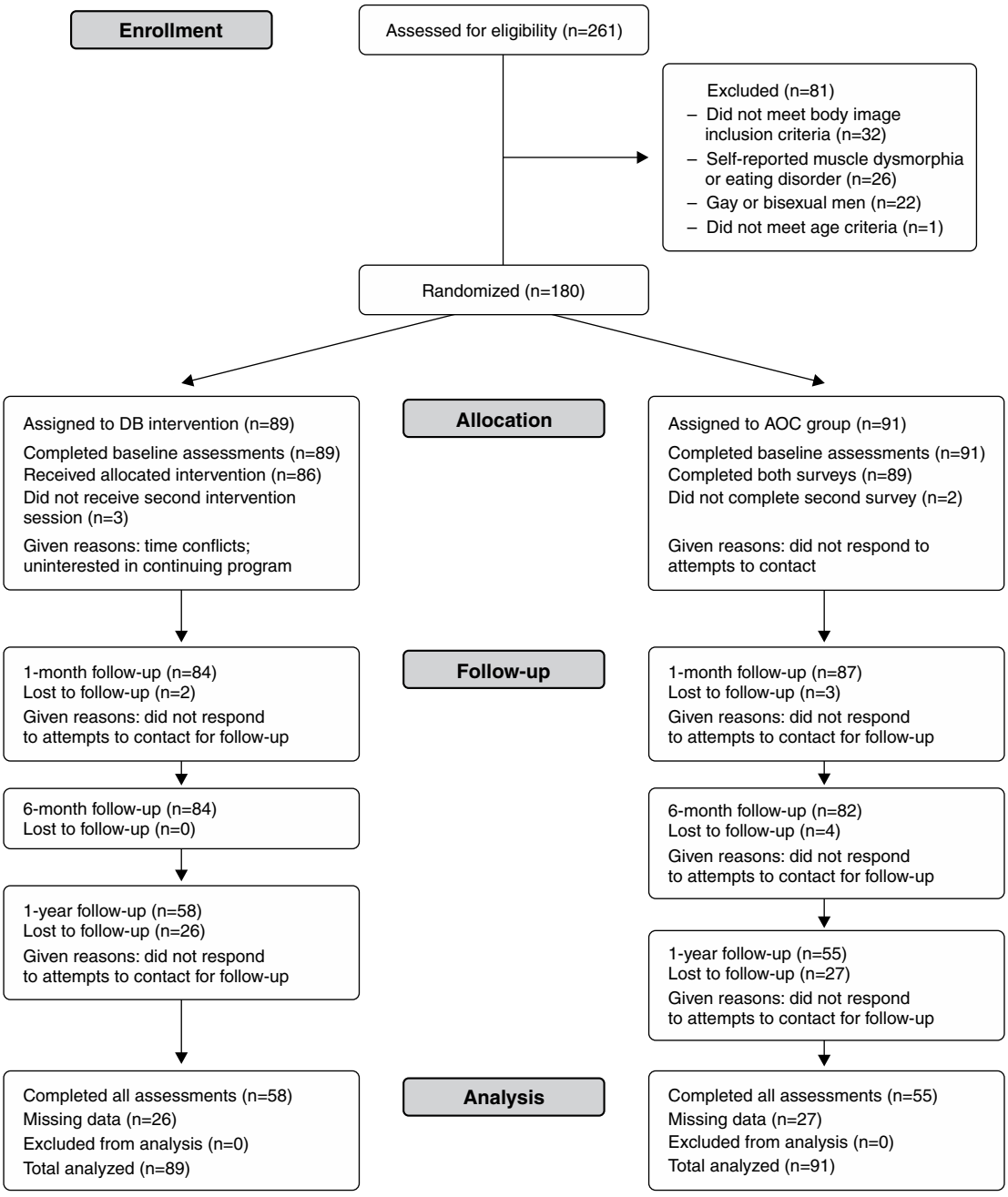

Figure 1 Consolidated Standards of Reporting Trials (CONSORT) chart detailing participant flow through the study. AOC = assessment-only control; DB = dissonance-based.

effects indicate that the relationship between the condition and ED (β = 2.90, 95%CI [1.37-4.43]) and between the condition and MD symptoms (β = 2.92, 95%CI [1.18-4.74]) were significantly mediated by body-ideal internalization. Finally, the non-significant direct effects indicate that changes in body-ideal internalization completely mediated the relationship between the condition and ED (β = 1.68, 95%CI [-0.75 to 4.12], p = 0.14) and between the condition and MD symptoms (β = 1.38, 95% CI [-1.23 to 3.99], p = 0.29).

Discussion

Considering that EDs and MD in men are marked by chronicity, relapse, impairment, and distress,[13] the present study evaluated the efficacy of a DB intervention to help reduce risk for EDs and predisposing factors for MD symptoms among body-dissatisfied Brazilian men. Our results extend previous research on DB interventions for men,[16,18] including a longer follow-up period (i.e., 1-year) and testing whether body-ideal internalization could

Table 1 Estimated marginal means for outcome variables at each time point by condition

	Baseline		Post-intervention		1-month follow-up		6-month follow-up		1-year follow-up		Between-condition Cohen's d (95%CI)			
Measures	DB	AOC	DB	AOC	DB	AOC	DB	AOC	DB	AOC	Post-intervention	1-month	6-month	1-year
SATAQ-4	25.85 (0.75)	27.75 (0.74)	25.67* (0.74)	27.75 (0.73)	24.90** (0.73)	27.72 (0.72)	22.84*** (0.82)	27.55 (0.82)	24.99 (0.89)	27.35 (0.90)	-0.28 (-0.58 to 0.01)	-0.33 (-0.62 to -0.04)	-0.74 (-1.03 to -0.43)	-0.37 (-0.67 to -0.08)
EAT-26	10.35 (0.69)	10.36 (0.68)	10.17 (0.68)	10.34 (0.67)	9.39 (0.67)	10.24 (0.66)	7.36** (0.77)	10.36 (0.77)	9.68 (0.85)	11.62 (0.87)	-0.02 (-0.32 to 0.27)	-0.10 (-0.40 to 0.19)	-0.49 (-0.79 to -0.19)	-0.32 (-0.62 to -0.03)
MDDI	26.28 (0.65)	27.41 (0.65)	26.13 (0.65)	27.40 (0.64)	25.48* (0.63)	27.35 (0.63)	23.70*** (0.73)	27.39 (0.73)	25.49* (0.81)	28.04 (0.82)	-0.18 (-0.48 to 0.11)	-0.24 (-0.53 to 0.05)	-0.50 (-0.79 to -0.20)	-0.34 (-0.64 to -0.05)
MBAS-R	36.84 (0.79)	38.11 (0.78)	36.61 (0.79)	38.08 (0.78)	35.64* (0.77)	37.94 (0.77)	32.99*** (0.88)	37.85 (0.88)	35.56** (0.96)	38.99 (0.98)	-0.18 (-0.47 to 0.12)	-0.25 (-0.54 to 0.04)	-0.75 (-1.05 to -0.44)	-0.54 (-0.83 to -0.24)

Data presented as estimated marginal mean (standard error [SE]), unless otherwise specified.
AOC = assessment-only control; DB = dissonance-based; EAT-26 = Eating Attitudes Test-26; MBAS-R = Male Body Attitudes Scale-Revised; MDDI = Muscle Dysmorphic Disorder Inventory; SATAQ-4 = Sociocultural Attitudes Towards Appearance Questionnaire-4 (Thin/Low Body Fat and Muscular/Athletic Internalization subscales).
The post-intervention, 1-month, and 6-month follow-up data have been published previously.[21] This information is included here for reference purposes only.
Between-group effects: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

mediate the effects of the intervention on ED and MD symptoms.

Partially supporting our initial hypothesis, significant effects were observed in the DB condition for MD symptoms and body dissatisfaction over a 1-year follow-up. Significant effects were not observed for body-ideal internalization and ED symptoms. There are some possible explanations for this. First, it is possible that the delay between the intervention and follow-up contributed to a reduced impact, as reported in other DB interventions.[15] However, this seems unlikely, as significant effects were found for other variables at the 1-year follow-up. Second, two sessions may not supply a strong enough dose to produce long-lasting effects on body-ideal internalization and ED symptoms.[18] Previous studies with women have shown lasting effects on thin-ideal internalization and new onset of EDs for up to 4 years of follow-up, using an in-person, four 60-min session format.[19] A greater number of sessions may allow participants more time between sessions for reflection and active practice.[26] It is possible that Brazilian men require more time to fully assimilate the program content. Future studies may benefit from investigating whether a four-session version of the BP/MTM improves the body-ideal internalization and ED symptoms over a 1-year follow-up period.

Preventive interventions can be classified into three categories: universal (i.e., including the entire population), selective (i.e., including specific at-risk groups), and indicated (i.e., including individuals with early signs and symptoms).[27] A systematic review and meta-analyses have shown that the most effective preventive interventions for EDs use DB techniques and are selective (e.g., sampling body-dissatisfied men).[26,28,29] However, given the paucity of preventive interventions for MD[18] and current controversies surrounding the nosological classification of MD,[3-5] prior research has not been able to suggest which aspects of interventions may be most successful in preventing MD symptoms. Thus, our results are in line with prior research on ED prevention programs and suggest that selective DB programs may also be useful in reducing MD symptoms in young men.

Further, our results reinforce prior research on possible shared risk factors among ED and MD symptomatology. Indeed, a prior study comparing the symptom profiles of men with MD and anorexia nervosa (AN) found similarities in symptoms related to body dissatisfaction, disordered eating, and exercise behavior.[5] Empirical models in men also suggest that body-ideal internalization can lead to body dissatisfaction, which in turn can result in symptoms of both EDs[30] and MD.[31] Notably, both muscularity and thinness internalization have been independently and positively related to MD and ED symptoms.[10] Given the similarities between these psychopathologies, authors have argued that interventions in men focusing on reducing ED symptoms should also evaluate MD symptoms.[32] Our study adds to a growing literature exploring the efficacy of simultaneously targeting both ED and MD symptoms in young men.[16,18]

Our results confirm that the BP/MTM holds promise in reducing MD symptoms in body-dissatisfied Brazilian

men. A previous study conducted by Brown et al.[16] in the United States yielded similar results, although they only included a 1-month follow-up period. Our findings replicate and advance upon these results by evaluating the magnitude of the effects over a 1-year follow-up. To the best of our knowledge, this was the first study to investigate the impact of a DB preventive intervention in reducing MD symptoms over a 1-year follow-up period. Our results suggest that a DB intervention designed to prevent ED can also help men with MD symptoms.

Consistent with our second hypothesis, changes in body-ideal internalization from baseline to 1-month follow-up completely mediated the relationship between condition and changes observed in both ED and MD symptoms. These results are aligned with a previous study conducted with American men,[16] as well as with models of risk for ED and MD symptoms (e.g., the expanded tripartite influence model[33] and the dual-pathway model[34]). Indeed, the BP/MTM targets body-ideal internalization by encouraging participants to challenge sociocultural pressures to conform to the lean muscular body ideal.[16] Our findings reinforce the importance of body-ideal internalization in models of risk for EDs and MD in men, and provide further empirical support for the theoretical mechanisms of DB interventions.[26]

The present study had several strengths, including the randomized controlled design, use of psychometrically sound measures, inclusion of a 1-year follow-up period, and evaluation of mediation. Despite these strengths, there are also some limitations. First, we were unable to determine whether program effects extend over a longer period of follow-up (e.g., 2+ years). Second, as all outcomes were self-reported, we were unable to determine whether the program reduces the onset of confirmed diagnoses; future studies should determine interview-based ED and MD diagnoses at baseline and long-term follow-up. Finally, there is a paucity of studies that seek to assess MD risk factors in the Brazilian context, which hinders further research on this topic. Future studies should evaluate risk factors for MD in the Brazilian context, which will help contribute to the nosologic understanding of MD (whether specifier of BDD, an ED, or a distinct psychiatric condition).

In summary, our findings provide further evidence that BP/MTM yields reliable reductions in body dissatisfaction and MD symptoms for young men in Brazil through 1-year follow-up via reductions in body-ideal internalization. They also highlight the importance of continued research on ways to reduce the public health impact of EDs and MD in young men.

Acknowledgements

This study was funded in part by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES; Finance Code 001) and Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG).

Disclosure

The authors report no conflicts of interest.

Author contributions

MA: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Validation, Writing – original draft.
TAB: Conceptualization, Formal analysis, Methodology, Supervision, Validation, Writing – review & editing.
PFC: Methodology, Validation, Writing – review & editing.
TROR: Methodology, Validation, Writing – review & editing.
PHBC: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Writing – review & editing.
All authors have read and approved of the final version to be published.

Handling Editor: Rodolfo Damiano

References

1 Gomes VMGM, Compte EJ, Almeida M, Campos PF, Queiroz ACC, Pereira LF, et al. Psychometric properties of the muscle dysmorphic disorder inventory among physically active Brazilian college men. Psychol Men Masculinity. 2020;21:622-31.
2 Associação Americana de Psiquiatria. Manual Diagnóstico e Estatístico de Transtornos Mentais, 5ª edição (DSM-5). Porto Alegre: Artmed; 2014.
3 Cooper M, Eddy KT, Thomas JJ, Franko DL, Carron-Arthur B, Keshishian AC, et al. A controlled trial of a dissonance-based eating disorders prevention program with Brazilian girls. Body Image. 2023; 11:100256.
4 Rodgers RF, Murray SB. Muscle dysmorphia and a growing preoccupation around size (of the evidence base): a cautionary tale in extrapolating from non-clinical data? J Psychiatr Res. 2022;154:207-8.
5 Murray SB, Rieger E, Hildebrandt T, Karlov L, Russell J, Boon E, et al. A comparison of eating, exercise, shape, and weight related symptomatology in males with muscle dysmorphia and anorexia nervosa. Body Image. 2012;9:193-200.
6 Devrim-Lanpir A, Zare R, Ali Redha A, Sandgren SS. Muscle dysmorphia and associated psychological features of males in the Middle East: a systematic review. Perform Enhanc Health. 2023;11:100256.
7 Esquivel-Hernández IM, Cervantes-Luna BS, Camacho-Ruíz EJ, González-Jaimes EI, Flores-Pérez V. Consumption of ergogenic substances, exercise dependence, muscle dysmorphia, symptoms and eating disorders in gym users: a systematic review of the literature. Rev Mex Trastor Aliment. 2022;12:186-201.
8 Mitchell L, Murray SB, Cobley S, Hackett D, Gifford J, Capling L, et al. Muscle dysmorphia symptomatology and associated psychological features in bodybuilders and non-bodybuilder resistance trainers: a systematic review and meta-analysis. Sports Med. 2017;47:233-59.
9 Pope CG, Pope HG, Menard W, Fay C, Olivardia R, Phillips KA. Clinical features of muscle dysmorphia among males with body dysmorphic disorder. Body Image. 2005;2:395-400.
10 Klimek P, Murray SB, Brown T, Gonzales M IV, Blashill AJ. Thinness and muscularity internalization: associations with disordered eating and muscle dysmorphia in men. Int J Eat Disord. 2018;51:352-7.
11 Convertino AD, Elbe CI, Mendoza RR, Calzo JP, Brown TA, Siegel JA, et al. Internalization of muscularity and thinness ideals: associations with body dissatisfaction, eating disorder symptoms, and muscle dysmorphic symptoms in at risk sexual minority men. Int J Eat Disord. 2022;55:1765-76.
12 Martenstyn JA, Maguire S, Griffiths S. A descriptive analysis of scoring patterns on clinically relevant questionnaires in 26 adults with diagnosed muscle dysmorphia. Eur Eat Disord Rev. 2023;31:737-51.
13 Brown TA, Keel PK. Eating disorders in boys and men. Annu Rev Clin Psychol. 2023;19:177-205.
14 Harrer M, Adam SH, Messner EM, Baumeister H, Cuijpers P, Bruffaerts R, et al. Prevention of eating disorders at universities: a systematic review and meta-analysis. Int J Eat Disord. 2020;53: 813-33.

15 Dunker KLL, de Carvalho PHB, Amaral ACS. Eating disorders prevention programs in Latin American countries: a systematic review. Int J Eat Disord. 2023;56:691-707.
16 Brown TA, Forney KJ, Pinner D, Keel PK. A randomized controlled trial of the body project: more than muscles for men with body dissatisfaction. Int J Eat Disord. 2017;50:873-83.
17 Fortes LDS, Amaral ACS, Almeida SDS, Conti MA, Ferreira MEC. Psychometric qualities of the Eating Attitudes Test (EAT-26) for Brazilian male adolescents. Psicol Teor Pesqui. 2016;32:1-7.
18 Almeida M, Brown TA, Campos PF, Amaral ACS, de Carvalho PHB. Dissonance-based eating disorder prevention delivered in-person after an online training: a randomized controlled trial for Brazilian men with body dissatisfaction. Int J Eat Disord. 2021;54:293-304.
19 Stice E, Rohde P, Shaw H, Gau JM. Clinician-led, peer-led, and internet-delivered dissonance-based eating disorder prevention programs: effectiveness of these delivery modalities through 4-year follow-up. J Consult Clin Psychol. 2020;88:481-94.
20 Barra JV, da Silva WR, Marôco J, Campos JADB. [Cross-cultural adaptation of the Sociocultural Attitudes Towards Appearance Scale-4 (SATAQ-4) applied to university students]. Cad Saude Publica. 2019;35:e00170218.
21 Almeida M, Gomes VMGM, de Carvalho PHB. Adaptação transcultural e análise de equivalências da Male Body Attitudes Scale – Revised (MBAS-R) e do Muscle Dysmorphic Disorder Inventory (MDDI) para jovens adultos brasileiros. Principia Caminhos da Iniciação Científica. 2020;19:11.
22 Hudson TA, Amaral ACS, Stice E, Gau J, Ferreira MEC. Dissonance-based eating disorder prevention among Brazilian young women: a randomized efficacy trial of the Body Project. Body Image. 2021;38:1-9.
23 Amaral ACS, Stice E, Ferreira MEC. A controlled trial of a dissonance-based eating disorders prevention program with Brazilian girls. Psicol Reflex e Crit. 2019;32:13.
24 Schafer JL, Graham JW. Missing data: our view of the state of the art. Psychol Methods. 2002;7:147-77.
25 Hayes AF, Rockwood NJ. Regression-based statistical mediation and moderation analysis in clinical research: observations, recommendations, and implementation. Behav Res Ther. 2017;98:39-57.
26 Stice E, Marti CN, Shaw H, Rohde P. Meta-analytic review of dissonance-based eating disorder prevention programs: intervention, participant, and facilitator features that predict larger effects. Clin Psychol Rev. 2019;70:91-107.
27 Mrazek PJ, Haggerty RJ. Reducing risks for mental disorders: frontiers for preventive intervention research. Washington: National Academy Press; 1994.
28 Le LKD, Barendregt JJ, Hay P, Mihalopoulos C. Prevention of eating disorders: a systematic review and meta-analysis. Clin Psychol Rev. 2017;53:46-58.
29 Koreshe E, Paxton S, Miskovic-Wheatley J, Bryant E, Le A, Maloney D, et al. Prevention and early intervention in eating disorders: findings from a rapid review. J Eat Disord. 2023;11:38.
30 de Carvalho PHB, Ferreira MEC. Disordered eating and body change behaviours: Support for the tripartite influence model among brazilian male university students. Cienc Saude Colet. 2020;25:4485-95.
31 Bégin C, Turcotte O, Rodrigue C. Psychosocial factors underlying symptoms of muscle dysmorphia in a non-clinical sample of men. Psychiatry Res. 2019;272:319-25.
32 Sandgren SS, Lavallee D. Intervention development for people with muscle dysmorphia symptoms: best practice and future recommendations. J Loss Trauma. 2023;28:315-26.
33 Tylka TL, Andorka MJ. Support for an expanded tripartite influence model with gay men. Body Image. 2012;9:57-67.
34 Stice E. A prospective test of the dual-pathway model of bulimic pathology: mediating effects of dieting and negative affect. J Abnorm Psychol. 2001;110:124-35.