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More than Body Appearance! Improving body image in young women through a functionality-focused intervention combined with psychoeducation: A randomized controlled trial

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Abstract

Objectives: Body dissatisfaction is a public health concern, prevalent among women. This study aims to investigate the efficacy of a 2-week online functionality-focused intervention combined with psychoeducation on improving body image among young women at both high and low risk of Body Image Disorders (BIDs).

Design: A randomized controlled trial was conducted among young women at high risk and low risk of developing BIDs.

Methods: In total, 231 young women ($n = 64$ at high risk of BIDs) were randomized into: experimental ($n = 113$) and waitlist ($n = 118$) groups. The experimental group underwent the intervention at baseline (T0) for 15 days (T1), while the waitlist group started the intervention at T1 for 15 days (T2). Participants completed questionnaires about body and functionality appreciation, eating disorders (EDs) risk and extreme body dissatisfaction at baseline, 15 days from baseline and 30 days from baseline.

Results: Mixed linear models revealed enhancements in body and functionality appreciation post-intervention for women at both high risk and low risk of BIDs. Reductions in EDs risk and body dissatisfaction were observed in participants at high risk.

Conclusions: The intervention proves to be useful in promoting a positive body image (i.e. body and functionality appreciation) in women at both high and low risk of BIDs,

while the results concerning the risk of developing EDs and extreme body dissatisfaction are more nuanced.

KEYWORDS

body dissatisfaction, eating disorder symptoms, positive body image, randomized controlled trial

Practitioner points

- Body dissatisfaction is a public health concern prevalent among young women and is strongly associated with the development of psychological disorders, including Eating Disorders (EDs) and Body Dysmorphic Disorder (BDD).
- Psychological interventions should promote a positive body image rather than solely reducing body dissatisfaction to effectively lower the prevalence of body dissatisfaction and BIDs in young women.
- The combination of a functionality-focused intervention with psychoeducation emerged as a useful approach to improve body image in young women at both high and low risk of developing Body Image Disorders (BIDs).

INTRODUCTION

Body dissatisfaction, recognized as a significant public health concern (Bornioli et al., 2021; Bucchianeri & Neumark-Sztainer, 2014; Swami et al., 2010), strongly predicts the development of psychological disorders (Bornioli et al., 2021; Rohde et al., 2015), including Body Image Disorders (BIDs) such as Eating Disorders (EDs) and Body Dysmorphic Disorder (BDD) (Berg et al., 2009; Rohde et al., 2015). The prevalence of body dissatisfaction and BIDs have rapidly increased over the last decade (Galmiche et al., 2019), particularly during the COVID-19 pandemic (Cooper et al., 2022), with a higher occurrence among young women (Galmiche et al., 2019; Silén & Keski-Rahkonen, 2022; Wang et al., 2019). Consequently, psychological interventions to address body dissatisfaction and prevent BIDs are needed (Bornioli et al., 2019). Effective interventions should include both a disease reduction perspective (i.e. reducing body dissatisfaction) and a health promotion perspective (i.e. promoting positive body image; Levine & Smolak, 2016; Piran, 2015; Sundgot-Borgen et al., 2018). Emphasizing the promotion of positive body image, rather than solely reducing body dissatisfaction, is crucial for lowering the prevalence of body dissatisfaction and BIDs, especially in at-risk groups like young women (Webb et al., 2015). Positive body image—an overall love and respect for one's body—is a multifaceted construct distinct from negative body image and body dissatisfaction (Tylka & Wood-Barcalow, 2015a), and occurs when individuals accept, appreciate and respect their body despite its perceived flaws. Positive body image is associated with various aspects of well-being, such as self-esteem, optimism and life satisfaction (Halliwell, 2015; Tylka & Wood-Barcalow, 2015b) and serves as a protective factor against psychological disorders, including BIDs (Tylka & Wood-Barcalow, 2015b). Conversely, body dissatisfaction involves a negative relationship with one's body, characterized by negative evaluations and emotions towards it. Body dissatisfaction is linked to unhealthy behaviours, including disordered eating (i.e. extreme dieting and compensatory behaviours to control weight; Berg et al., 2009; Taylor et al., 2006), excessive physical exercise (Alcaraz-Ibáñez et al., 2021), frequent body checking and avoidance of body-related situations (Walker et al., 2018), and a strong tendency towards appearance-enhancing treatments (Walker et al., 2019).

The promotion of a positive body image is crucial for two reasons: (1) not all young women need to decrease body dissatisfaction, but all can potentially benefit from cultivating healthier attitudes towards their bodies (Piran, 2015); (2) if psychological interventions solely aim to reduce body dissatisfaction without enhancing positive body image, they may, at best, foster a neutral body image (e.g. 'I don't hate my body anymore. I merely tolerate it'; Tylka & Wood-Barcalow, 2015b, p. 118). Consequently, the promotion of a positive body image is crucial to increase the efficacy of psychological interventions targeting body image. Recent studies indicated that positive body image also acts as a protective factor against the onset of ED symptoms (Cerea et al., 2024; Linardon, 2021), highlighting the need for a better understanding of how to cultivate a positive body image in psychological interventions (Cook-Cottone, 2015). However, in the last decades, research has predominantly focused on reducing body dissatisfaction, with most available psychological interventions for body image adopting a disease reduction perspective while neglecting positive aspects of psychological functioning (Linardon et al., 2022). This approach has shown limited efficacy in improving body image (Sundgot-Borgen et al., 2018). Consequently, it is crucial to develop new psychological interventions or combine various effective psychological techniques that incorporate both disease reduction and health promotion perspectives to improve body image, and to test their efficacy across different contexts and populations. This would allow to respond to the recent call to incorporate positive body image in therapeutic practices and the prevention of BIDs (Cook-Cottone, 2015; Longhurst, 2022).

Functionality appreciation is a facet of positive body image and refers to appreciating, respecting and honouring the body for what it is capable of doing, including physical capacities, functions related to internal processes, body sensations and communication, creative endeavours and self-care (Alleva et al., 2017; Alleva, Martijn, et al., 2015). Recent research indicated that appreciating the functionality of the body is a useful approach to improve body image (see Alleva, Diedrichs, Halliwell, Martijn, et al., 2018). Focusing on and appreciating one's own body functionality helps to positively reframe the way individuals think about their body, shifting their attention from the body-as-an-object to the body-as-a-process (Franzoi, 1995). This shift reduces the individual's focus on perceived physical imperfections and the sole evaluation of the body based only on its appearance (Alleva, Diedrichs, Halliwell, Martijn, et al., 2018; Avalos & Tylka, 2006), leading to reduced body dissatisfaction and positive enhancements in body image, as emerged in previous studies (Alleva et al., 2014, 2023; Alleva, Martijn, et al., 2015). In line with these findings, a recent systematic review (Guest et al., 2019) highlighted that the online writing-based functionality intervention *Expand Your Horizon* (Alleva, Diedrichs, Halliwell, Martijn et al., 2018; Alleva, Diedrichs, Halliwell, Peters, et al., 2018; Alleva, Martijn, et al., 2015) is currently the most effective psychological intervention for fostering a positive body image. In this intervention, participants are asked to focus on body functionality by describing different functions of their body and to reflect on why these functions are personally meaningful to them (Alleva, Diedrichs, Halliwell, Martijn, et al., 2018; Alleva, Diedrichs, Halliwell, Peters, et al., 2018; Alleva, Martijn, et al., 2015). When compared to an active control group undergoing a creativity training program, participants randomized to the *Expand Your Horizon* intervention showed significant improvements in appearance satisfaction, body appreciation and functionality appreciation. In other studies, the same intervention reduced self-objectification (i.e. the process by which individuals, particularly women, internalize an outsider's perspective on their own bodies, treating themselves as objects to be viewed and evaluated based on their physical appearance; Fredrickson & Roberts, 1997) in women with rheumatoid arthritis (Alleva, Diedrichs, Halliwell, Peters, et al., 2018) and in young women experiencing negative body image (Alleva, Diedrichs, Halliwell, Martijn, et al., 2018). In conclusion, a focus on the appreciation of body functionality can, alone or as an integrated part of a broader psychological intervention, improve body image (Tylka & Wood-Barcalow, 2015b).

In addition to the emphasis on functionality appreciation, research has supported the effectiveness of psychoeducation as a strategy to reduce body dissatisfaction and promote a positive body image, specifically enhancing body satisfaction, body appreciation and body esteem (Guest et al., 2022). Psychoeducation provides individuals with information about the nature and development of body image (Strachan & Cash, 2002), and may help them to develop a healthier relationship with their bodies,

offering specific information on key features of a healthy lifestyle (e.g. eating in response to internal cues, practising physical activity in accordance with body's needs; Alleva, Sheeran, et al., 2015). Psychoeducation is easily delivered online and it is often combined with other structured online interventions (e.g. writing tasks) to maximize its positive impact on body image (Guest et al., 2019). To our knowledge, there is limited research directly combining psychoeducation with functionality-based interventions in the specific context of improving body image. However, this combination may represent a promising avenue for maximizing the benefits of both approaches, since psychoeducation may help individuals gain a deeper understanding of body image-related concepts, while functionality-based interventions may encourage a shift in focus towards body gratitude and appreciation for what the body can do, fostering a more holistic and positive view of the body. A combined approach integrating psychoeducation with functionality appreciation may offer a comprehensive strategy for improving body image outcomes in diverse contexts and populations.

The present study

The aim of this study was therefore to investigate the efficacy of a 2-week online psychological intervention that we called *More than Body Appearance* (MBA), combining the *Expand Your Horizon* intervention (i.e. a functionality-focused intervention; Alleva, Martijn, et al., 2015) with psychoeducation to create a more comprehensive intervention model. Consequently, we investigated the combination of the *Expand Your Horizon* intervention (Alleva, Martijn, et al., 2015) with psychoeducation with the aim of advancing our understanding of the effectiveness of combining psychoeducation with writing tasks focused on functionality appreciation (Alleva, Sheeran, et al., 2015). Our specific interest lies in examining the efficacy of this combined intervention in increasing body and functionality appreciation and in reducing extreme body dissatisfaction as well as the risk of developing EDs (i.e. EDs risk) in young women (see Method section for details). We investigated the suitability of the intervention for young women at both high and low risk of BIDs, as women at low risk might benefit from a psychological intervention aimed at maximizing protective factors for body image (i.e. health promotion perspective). To reach our aims, we conducted a randomized controlled trial (RCT) with a crossover design. The crossover design is a well-established methodology used in RCTs focused on body image (Aspen et al., 2015; Burgess et al., 2006; Vocks et al., 2009) and has also been successfully implemented in the Italian context (Cerea et al., 2022; Cerea, Ghisi, et al., 2021). One advantage of the crossover design is that all participants ultimately receive the intervention, which can enhance retention and reduce dropout rates, leading to improved study compliance. This approach also ensures that everyone has access to the active treatment after the waiting period, which is particularly important in studies where the intervention is expected to provide benefits, as is the case in our study. Indeed, based on previous research (Alleva, Martijn, et al., 2015), our hypothesis was that participants randomized to the intervention would exhibit increased body and functionality appreciation, as well as reduced extreme body dissatisfaction and EDs risk compared to participants randomized to the waitlist. Additionally, we expected that participants' gains following the intervention would be maintained at the 15 days follow-up. A second advantage of the crossover design is that it allows the intervention to be tested a second time with the waitlist control participants. Therefore, for the waitlist group, we anticipated improvements in body and functionality appreciation, along with reductions in body dissatisfaction and EDs risk following the crossover, from T1 (the beginning of the intervention for the waitlist group) to T2 (the end of the intervention for the waitlist group). We also expected differences based on risk status (i.e. at high risk vs. low risk), hypothesizing that while participants in both groups would benefit from the intervention, showing enhancements in body and functionality appreciation, reductions in extreme body dissatisfaction and EDs risk would be less pronounced in women at low risk of BIDs.

TABLE 1 Comparisons between experimental and waitlist groups in socio-demographic variables and outcome measures at baseline (T0).

	Experimental group ($n = 113$)		Waitlist group ($n = 118$)				
	n	%	n	%			
High risk of BIDs	33	29	31	26			
	M	SD	M	SD	t	p	d
Age	21.80	1.51	21.82	1.27	−.14	.89	.02
Education	15.28	1.54	15.30	1.43	−.07	.94	.01
BMI t0	20.76	2.60	20.93	2.67	−.48	.63	.06
FAS t0	4.16	.69	4.19	.64	−.31	.70	.05
BAS-2 t0	3.54	.84	3.52	.77	.14	.89	.02
EDRC t0	23.06	16.48	22.05	17.06	.46	.65	.06
QDC t0	107.56	36.91	105.87	36.08	.35	.73	.05

Abbreviations: BAS-2, Body Appreciation Scale – 2; BIDs, body image disorders; BMI, body mass index; EDRC, Eating Disorder Risk Composite; FAS, Functionality Appreciation Scale; QDC, Questionario sul Dismorfismo Corporeo.

METHOD

Participants

A total of 231 Italian young women aged 20–28 years (M_{age} = 21.81; SD = 1.39, $M_{education}$ = 15.29; SD = 1.49) took part in the study. Sixty-four of them were at high risk of developing a BID (M_{age} = 21.61; SD = 1.36, $M_{education}$ = 14.98; SD = 1.61), and 167 of them (M_{age} = 21.89; SD = 1.40, $M_{education}$ = 15.41; SD = 1.42) were not (i.e. low risk) (see Procedure section). Participants were randomized into two groups, regardless of risk status: experimental group (n = 113) and waitlist group (n = 118). The two randomized groups did not differ in terms of demographic variables, body mass index (BMI) and at baseline (T0) self-report questionnaire scores (i.e. functionality appreciation, body appreciation, EDs risk and extreme body dissatisfaction; Table 1).

Study design

The study was a RCT with a crossover design (Figure). Participants randomized to the experimental group started the intervention immediately (T0) for 15 consecutive days (until T1). Then, they were assessed 15 days after the conclusion of the intervention (at T2; follow-up assessment). Participants randomized to the waitlist started the intervention at T1 (15 days after the experimental group) and underwent the intervention for the following 15 days (until T2). Both groups completed the self-report questionnaires at T0, T1 and T2.

Measures

The *Structured Clinical Interview for DSM-5 Clinical Version* (SCID-5-CV; First et al., 2015, 2017) and the *demographic information schedule* were administered at baseline only (T0). All other assessments occurred at three time points: baseline (T0), at the end of 15 days (T1) and again after 15 days (T2).

The SCID-5-CV (First et al., 2015, 2017) is a structured interview for the assessment of psychological disorders according to the DSM-5. The interview demonstrated excellent reliability and specificity,

and good clinical validity (Osório et al., 2019). For the purposes of the study, we administered only the modules for BDD and EDs.

The *socio-demographic information schedule* aimed to assess the socio-demographic information of participants (age, sex, relationship status, education, occupation, weight and height) and self-reported psychological disorders.

The *Questionario sul Dismorfismo Corporeo* (QDC; Cerea et al., 2017) is a self-report questionnaire assessing extreme body dissatisfaction and symptoms of BDD. The QDC consists of 40-item rated on a 7-point Likert scale (from 1 = *strongly disagree* to 7 = *strongly agree*) investigating behaviours associated with extreme body dissatisfaction and BDD, such as repetitive behaviours (e.g. mirror checking), mental acts (e.g. comparing the 'defective' body areas with the same body areas of other people), and body image-related avoidance behaviour. The QDC demonstrated excellent internal consistency ($a = .95$), high test–retest stability over a period of 1 month ($r = .91$) and high specificity (84%) and sensitivity (90%; Cerea et al., 2017). The cut-off point to discriminate participants at high risk of extreme body dissatisfaction/BDD symptoms is 130 (Cerea et al., 2017). In the current study, internal consistency values of the QDC were good for both the experimental group (Cronbach's $a = .94$, McDonald's $\omega = .95$) and the waitlist group (Cronbach's $a = .95$, McDonald's $\omega = .96$).

The *Eating Disorder Risk Composite* (EDRC) is one of the composite scores of the *Eating Disorder Inventory-3* (EDI-3; Garner, 2004; Giannini et al., 2008), a measure aimed at assessing the presence of psychological features and behaviours relevant to EDs. The EDI-3 is made up of 91 items rated on a 6-point Likert scale (ranging from 1 = *never* to 6 = *always*). The EDRC score is composed of the three main subscales of the EDI-3, measuring Drive for Thinness (DT; 7 items), Bulimia (B; 7 items), and Body Dissatisfaction (BD; 9 items). The Italian version of EDI-3 showed good internal consistency in a clinical sample ($a = .70–.94$) and a non-clinical sample ($a = .70–.92$; with the exception of the Asceticism subscale: $a = .55$; Giannini et al., 2008). In accordance with previous studies (Cerea et al., 2022; Cerea, Ghisi, et al., 2021), we adopted a score >47 on the EDRC as a cut-off for detecting women at high risk of EDs (corresponding to the 75 percentile in non-clinical individuals). In the present study, internal consistency values of the EDRC score were good for both the experimental group (Cronbach's $a = .92$, McDonald's $\omega = .94$) and the waitlist group (Cronbach's $a = .92$, McDonald's $\omega = .95$).

The *Functionality Appreciation Scale* (FAS; Alleva et al., 2017; Cerea, Todd, et al., 2021) is a 7-item questionnaire assessing functionality appreciation on a 5-point Likert scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*). Higher score indicates greater functionality appreciation. The Italian version of the FAS proved to be highly reliable, with good internal consistency (McDonald's $\omega = .89$) and an adequate test–retest reliability ($r = .83$ in women and .73 in men; Cerea, Todd, et al., 2021). In the current study, the internal consistency values of the FAS were good both for the experimental (Cronbach's $a = .89$, McDonald's $\omega = .92$) and the waitlist group (Cronbach's $a = .89$, McDonald's $\omega = .92$).

The *Body Appreciation Scale-2* (BAS-2; Casale et al., 2021; Tylka & Wood-Barcalow, 2015a) is a measure assessing acceptance of one's body, respect and care for one's body and protection of one's body from unrealistic beauty standards. The BAS-2 is made up of 10 items that are rated on a 5-point Likert scale (ranging from 1 = *never* to 5 = *always*). Higher scores reflect higher levels of body appreciation. The Italian version of the BAS-2 showed good internal consistency values (McDonald's $\omega = .93$ in women and McDonald's $\omega = .89$ in men; Casale et al., 2021). In the present study, internal consistency values for the BAS-2 scores were good both for the experimental group (Cronbach's $a = .95$, McDonald's $\omega = .97$) and for the waitlist group (Cronbach's $a = .94$, McDonald's $\omega = .95$).

Procedure

Italian young women were recruited through flyers placed in university buildings. They were invited to take part in a study 'investigating the efficacy of online interventions to improve body image'. Interested women gave their informed consent for study participation and completed online self-report questionnaires assessing extreme body dissatisfaction, EDs risk and body and functionality appreciation (Phase 1; see Measures

section). Women who scored above the cut-off at the QDC (Cerea et al., 2017; see Measures section) and/or at the EDRC (EDI-3; Giannini et al., 2008; see Measures section) underwent a structured diagnostic clinical interview administered by means of the Zoom platform (Phase 2; SCID-5-CV; First et al., 2015, 2017) to investigate the presence of a BID. The SCID-5-CV was administered by the principal investigator (first author).[1] Figure S2 displays the flow diagram of participants through the trial.

In total, 274 young women gave their informed consent for participation and completed online self-report questionnaires aimed to assess the inclusion criteria of the study. Based on scores obtained from self-report questionnaires, participants were divided into at high risk of developing BIDs and at low risk. Women were considered at risk of BIDs if they satisfied one of the following criteria: (a) presence of extreme body dissatisfaction/BDD symptoms with scores >130 on the QDC (Cerea et al., 2017; see Measure section for details); (b) presence of EDs risk with scores >47 on the EDRC (EDI-3; Giannini et al., 2008; see Measure section for details). Participants who did not overcome the cut-off scores on the QDC (Cerea et al., 2017) and on the EDRC score (EDI-3; Giannini et al., 2008) were considered at low risk of BIDs ($n = 167$).

Participants at high risk of BIDs ($n = 107$) were contacted by email to take part to the SCID-5-CV to assess the exclusion criteria of the research. The exclusion criteria of the research were the following: (a) presence of a full-blown BID; (b) current treatment for a BID. We excluded women with a diagnosis of BIDs from the study because the intervention was intended to improve body image in a non-clinical population (i.e. young women at high and low risk of developing BIDs); indeed, women with a BID diagnosis require more intensive and specialized psychological interventions. Based on the exclusion criteria, 43 women were excluded from the study. Specifically, 36 of them received a diagnosis of a BID and 7 of them were attending a psychological intervention for a BID. Participants not eligible for the study were debriefed about reasons of the exclusion and they were given information about the opportunity to engage in a psychological intervention free of charge at specialized university services.

In total, 231 women entered the study. They were randomly assigned to either the experimental group or to the waitlist group (Phase 3). Block randomization with a fixed block size of two was used to ensure similar sample sizes across conditions. The MBA intervention started in two different moments depending on the group (see Study design section). Participants allocated to the experimental group received detailed information about the MBA intervention at T0 and were asked to complete the MBA intervention in 15 days (i.e. length of the MBA intervention). Participants who were randomized to the waitlist group had the opportunity to start the MBA intervention at T1 (15 days after the experimental group) and were given the same information as the experimental group.

Participants did not receive any compensation for their participation, except for psychology students who received course credits. The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethical Committee of the School of Psychology, University of Padova. The study was registered as a Clinical Trial (ClinicalTrials.gov Identifier: NCT04677400).

Intervention

The intervention was delivered online over a 15-day period and comprised two types of activity, divided between the first and second weeks of the intervention. We selected a 15-day duration based on previous studies demonstrating improvements in body image among young women with subclinical body dissatisfaction after exposure to brief online psychological interventions (Cerea et al., 2022; Cerea, Ghisi, et al., 2021). Before starting the intervention, participants received detailed information about the intervention by email, including its timeline (i.e. assignments to complete during the 1st and the 2nd week of the intervention).

During the first week, participants were asked to read three blocks of psychoeducational material (i.e. slides) including information about: (1) body image (e.g. what is and what is not body image; body image components; factors that influence body image i.e. sociocultural, psychological; positive

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[1]The principal investigator has extensive expertise in body image. She received extensive diagnostic training and attended body image disorder workshops prior to beginning this project.

and negative body image); (2) positive body image and healthy lifestyles (e.g. eating in accordance with physical cues); and (3) body functionality (e.g. what is and what is not body functionality; body functions; why it is important to focus on and to appreciate what our body is capable of doing). To investigate participants' engagement with the psychoeducational material, they completed a brief quiz (3 multiple-choice questions for each quiz) that was made available to participants after the consultation of each block of slides.

In the second week, participants completed the Italian translation of the *Expand Your Horizon* intervention, which included three structured writing assignments developed by Alleva, Martijn, et al. (2015),[2] made available on the Qualtrics platform. These assignments aimed to shift participants' attention from the appearance of their bodies (i.e. weight and body shape) to everything that the body can do (i.e. body functionality), and why it is important to them (i.e. functionality appreciation). Each assignment focused on two areas of body functionality: (1) body's senses and physical capacities; (2) health and creative skills; (3) self-care/daily routine and communication with others. For each writing assignment, participants were asked to reflect, describe and specify why these aspects of body functionality were personally important and meaningful to them. Following Alleva, Martijn, et al. (2015) guidelines, participants were encouraged to: (1) write for at least 15 min; (2) not to stop writing once started; (3) re-read what they have written once finished writing. The fulfilment of these guidelines was ascertained through the Qualtrics platform, allowing us to verify: (1) the time spent by participants on each writing assignments; and (2) the adherence to our instructions related to the content of each assignment.

Both the psychoeducational material and writing assignments followed a specific timeline during the 15-day intervention[3] (i.e. participants had access to contents on certain days of the first and second weeks of the intervention). Participants had the chance to read each block of the psychoeducational material on three specific and different days (e.g. Monday, Wednesday and Friday) of the first week of the intervention, with each block sent via a study-specific email. The email sent to participants included the deadline for reading the block of slides and completing the quiz, and automatic reminders were sent to participants before the deadline of the assignment (e.g. 6 h before the deadline). Writing assignments were to be completed on three specific days of the second week of the intervention (e.g. Monday, Wednesday and Friday), with automatic reminders sent before each assignment deadline.

Statistical analyses

Analyses were conducted with the R statistical software (R Core Team, 2024) with the 'lme4' package (Bates et al., 2015). To report means, standard deviations and frequencies, descriptive analyses were employed. To assess differences between groups on demographic variables and baseline symptoms at T0, *t*-test analyses were conducted showing that they were homogeneous (Table 1). Spearman correlations were used to evaluate the bivariate associations between variables (Table S1). Longitudinal mixed linear models with a Restricted Maximum Likelihood (REML) estimator were employed to evaluate the effect of the intervention over time on each outcome (i.e. FAS, BAS-2, EDRC and QDC). Random intercepts for each participant were used. The predictors were: time, MBA intervention (experimental group vs. waitlist group), being at high risk of BIDs (= 1) or at low risk (= 0) and their interactions (time × MBA intervention, time × at high risk of BIDs, MBA intervention × at high risk of BIDs, time × MBA intervention × at high risk of BIDs). For model parsimony, interactions of higher order (i.e. time × MBA intervention × at high risk of BIDs) were removed if not statistically significant and/or not

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[2]We asked permission from Dr. Alleva to translate and employ the writing assignments of the Expand your Horizon intervention. The translation followed the five-stage test adaptation procedure by Beaton et al. (2000), which has been recommended in body image research (Swami & Barron, 2019).

[3]Participants received extensive information about the timeline of the intervention before starting it.

relevant for the research aims (i.e. MBA intervention × at high risk of BIDs). The contrasts for time effect were user-defined in order to check if: (a) the values at time 1 were different than time 0 (expected to be significant); and (b) if the values at time 2 were different than time 0. The intraclass correlation coefficient (ICC) was the effect size used to determine whether or not, in each model, it was useful to retain the random components (intercepts of subjects). Conditional r squared (R^2) was reported as the effect size measure related to variance explained for each overall model—including both the fixed and random effects. The p-values for the fixed effects are obtained with the Satterwhaite method for degrees of freedom.

Analysis of simple effects allowed to deepen if the effect of a predictor on the outcome was significant, or not, within each level of other predictors, according to the hypothesis and results of the model. The plots show the estimated levels of the dependent variable over time for the two groups in the MBA intervention (experimental in green vs. waitlist in orange). Separate plots are provided for each outcome, distinguishing between women at high risk (right side) and low risk (left side) of BIDs. All participants completed the whole training in 15 consecutive days and the required self-report questionnaires at T0, T1 and T2; there were no missing responses in the dataset, as participants were prompted to respond to all items.

RESULTS

FAS

The results of the model for the FAS scores ($R^2 = .72$) are presented in Table 2. Figure 1 shows the estimated values of the FAS over time.

In regard to the omnibus effects, the interaction of time × MBA intervention × BIDs risk was statistically significant ($\chi^2 = 8.98$, $p = .011$), indicating that there is an effect of the MBA intervention over time and this effect is different for the group at high and low risk of BIDs. Specifically, the fixed-effects analysis shows that the above-mentioned interaction is statistically significant when comparing time 1 versus time 0 (time 1 × experimental × BIDs high risk: $b = .41$, SE $= .142$, $p = .004$), meaning that at time 1 the MBA intervention was successful in heightening the FAS scores in the experimental group compared to the waitlist one, in particular in the group at high risk of BIDs compared to the one at low risk.

Also, the interaction of time × BIDs risk was statistically significant ($\chi^2 = 17.11$, $p < .001$) (see Figure 2). Specifically, when comparing time 2 to time 0, the group at high risk of BIDs showed a greater increase in FAS values than the group at low risk of BIDs (time 2 × BIDs high risk: $b = .21$, SE $= .101$, $p = .041$), regardless of whether they received the MBA intervention at time 0 or time 1.

The interaction of time × MBA intervention was statistically significant ($\chi^2 = 62.50$, $p < .001$) (see Figure 3), because when comparing time 1 vs. time 0 the experimental group has higher FAS scores than the waitlist group ($b = .29$, SE $= .075$, $p < .001$).

Noteworthy, the group at high risk of BIDs maintains significantly lower FAS scores than the group at low risk ($b = -.57$, SE $= .116$, $p < .001$). Importantly, the FAS scores at time 2 are significantly higher than at time 0 ($b = .35$, SE $= .052$, $p < .001$). This indicates that by time 2, when all participants had received the MBA intervention, they exhibited significantly higher FAS scores compared to time 0.

The simple slope analysis further deepened the effect of the MBA intervention on FAS scores in both the high- and low-risk groups (see Table 3). Results indicated that at time 1 there was a statistically significant difference between the experimental and waitlist groups in both the high- and low-risk groups for BIDs.

TABLE 2 Results of the model for the Functionality Appreciation Scale (FAS).

	Beta	SE	p	Omnibus part	χ^2	df	p
Fixed part							
Time				Time	144.40	2	$p < .001$
1	.08	.052	.12				
2	.35	.052	$p < .001$				
MBAint				MBAint	2.42	1	.120
Experimental group	.02	.086	.8				
Waitlist group	—	—					
Risk				Risk	58.67	1	$p < .001$
BIDs high risk	−.57	.116	$p < .001$				
BIDs low risk	—	—					
Time × MBAint				Time:MBAint	62.50	2	$p < .001$
1 × Exp	.29	.075	$p < .001$				
2 × Exp	−.10	.075	.2				
Time × Risk				Time:Risk	17.11	2	$p < .001$
1 × BIDs high risk	−.18	.101	.072				
2 × BIDs high risk	.21	.101	.041				
MBAint × Risk				MBAint:Risk	.07	1	.791
Exp × BIDs high risk	−.14	.163	.389				
Time × MBAint × Risk				Time:MBAint:Risk	8.98	2	.011
1 × Exp × BIDs high risk	.41	.142	.004				
2 × Exp × BIDs high risk	.12	.142	.397				
Random part							
Id SD (intercept)	.44						
Residual SD observation	.34						
R^2 marginal	.24						
R^2 conditional	.72						
N subjects	231						
N observations	692						

Note: Baseline category for time 1 was time 0, baseline category for time 2 was time 0, baseline category for MBAint was waitlist; baseline category for high risk was low risk.

Abbreviations: BIDs, Body Image Disorders; MBAint, More than Body Appearance intervention; SE, standard error.

BAS-2

The results of the model for the BAS-2 scores ($R^2 = .87$) are presented in Table 4. Figure 4 shows the estimated values of the BAS-2 over time.

About the omnibus effects, both the interactions of time × MBA intervention ($\chi^2 = 35.38$, $p < .001$) and time × BIDs risk ($\chi^2 = 9.49$, $p = .009$) emerged as statistically significant, meaning that the scores of the BAS-2 significantly change over time, but they do it differently across the groups of the MBA intervention (experimental vs. waitlist) and the BIDs-risk groups (high risk vs. low risk). In particular, the fixed effect for the interaction of time × MBA intervention (see Figure 5) is significant when comparing time 1 versus time 0: the experimental group (in green) has a higher increase in the BAS-2 scores than the waitlist group (time1 × experimental: $b = .17$, SE = .066, $p = .011$).

The single fixed effects for the interaction of time × BIDs risk were not statistically significant (see Figure 6):
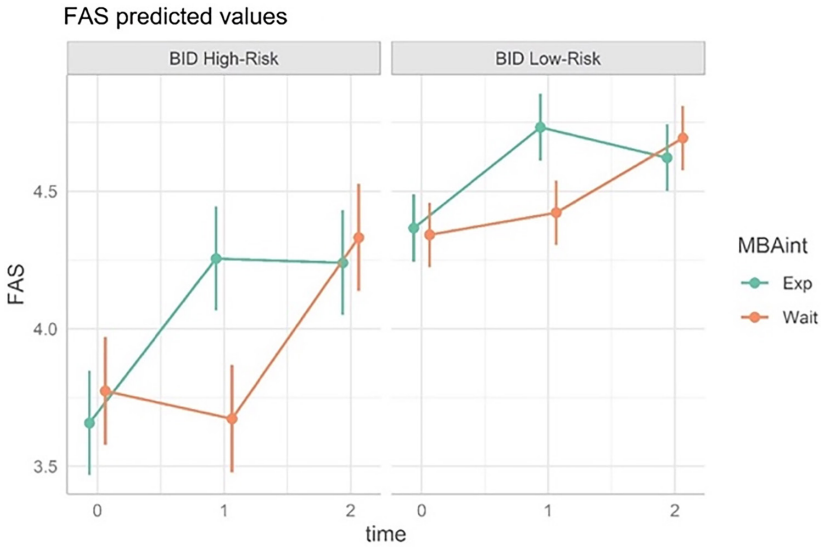
F I G U R E 1 Graph of the predicted values of the FAS over time. On the x axis there is time, on the y axis the FAS scores. The vertical lines represent the 95% confidence interval around the estimate represented by the dot.
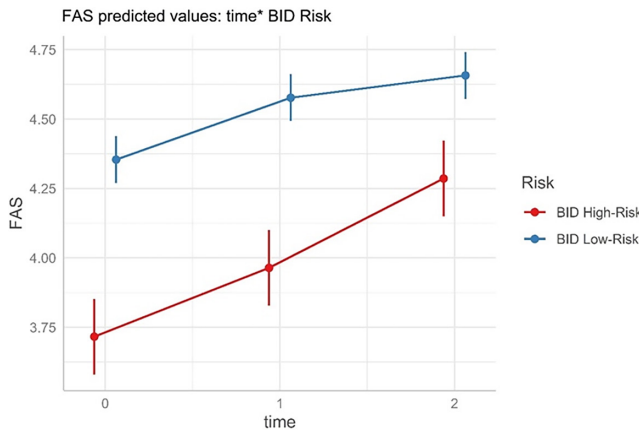

F I G U R E 2 FAS predicted values for time × BIDs risk.

- Comparing time 1 to time 0, the group at high risk of BIDs (in red) has a smaller increase in the BAS-2 values compared to the group at low risk of BIDs (time1 × high risk: $b = -.17$, SE $= .089$, $p = .061$);
- Comparing time 2 to time 0, the group at high risk of BIDs showed a slightly greater increase in the BAS-2 scores compared to the group at low risk of BIDs (time2 × high risk: $b = .10$, SE $= .089$, $p = .300$), although this difference was not statistically significant.

The simple slope analysis further deepened the effect of the MBA intervention on BAS-2 scores in both the high- and low-risk groups (see Table 5). Results indicated that at time 1, there was a statistically significant difference between the experimental and waitlist groups in both risk categories, suggesting that the MBA intervention was effective for both the groups at low risk and at high risk of BIDs.
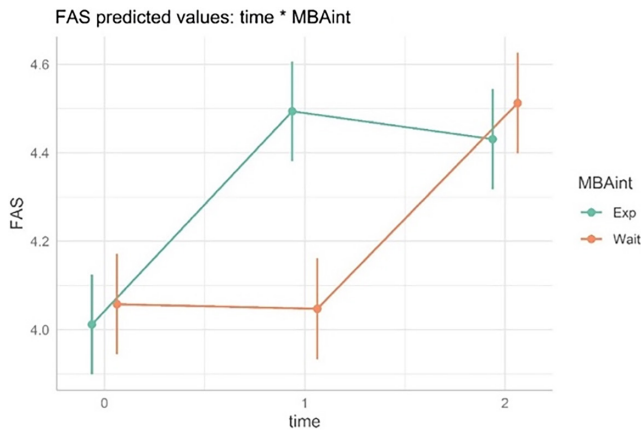
FAS predicted values: time * MBAint

FIGURE 3 FAS predicted values for time × MBA intervention.

TABLE 3 Simple slope analysis on the FAS scores: (a) comparing the MBA groups across time and the BID-risk groups; (b) comparing times across the MBA groups and BID-risk groups.

Contrast	Time	BID risk	Exp	Wait		Estimate	SE	p
Exp vs. wait	0	High	3.66	3.77		−.116	.139	.403
Exp vs. wait	0	Low	4.37	4.34		.025	.086	.776
Exp vs. wait	1	High	4.26	3.67		.583	.139	$p<.001$
Exp vs. wait	1	Low	4.73	4.42		.310	.086	$p<.001$
Exp vs. wait	2	High	4.24	4.33		−.092	.139	.511
Exp vs. wait	2	Low	4.62	4.69		−.072	.086	.406
Contrast	MBA group	BID risk	T0	T1	T2	Estimate	SE	p
time0-time1	Exp	High	3.66	4.26	4.24	−.597	.084	$p<.001$
time0-time2	Exp	High	3.66	4.26	4.24	−.582	.085	$p<.001$
time1-time2	Exp	High	3.66	4.26	4.24	.015	.085	.982
Contrast	MBA group	BID risk	T0	T1	T2	Estimate	SE	p
time0-time1	Wait	High	3.77	3.67	4.33	.101	.087	.471
time0-time2	Wait	High	3.77	3.67	4.33	−.558	.087	$p<.001$
time1-time2	Wait	High	3.77	3.67	4.33	−.659	.087	$p<.001$
Contrast	MBA group	BID risk	T0	T1	T2	Estimate	SE	p
time0-time1	Exp	Low	4.37	4.73	4.62	−.366	.054	$p<.001$
time0-time2	Exp	Low	4.37	4.73	4.62	−.255	.054	$p<.001$
time1-time2	Exp	Low	4.37	4.73	4.62	.111	.054	.101
Contrast	MBA group	BID risk	T0	T1	T2	Estimate	SE	p
time0-time1	Wait	Low	4.34	4.42	4.69	−.081	.052	.265
time0-time2	Wait	Low	4.34	4.42	4.69	−.351	.052	$p<.001$
time1-time2	Wait	Low	4.34	4.42	4.69	−.271	.052	$p<.001$

Abbreviations: BID, Body Image Disorder; Exp, Experimental; FAS, Functionality Appreciation Scale; MBA, More than Body Appearance; SE, standard error; Wait, waitlist.

EDRC

The results of the EDRC (i.e. composite score of the EDI-3) model ($R^2 = .85$) are presented in Table 6. Figure 7 shows the predicted levels of the EDRC over time and across the groups of the MBA

TABLE 4 Results of the model for the Body Appreciation Scale-2 (BAS-2).

	Beta	SE	p		χ^2	df	p
Fixed part				Omnibus			
Time				Time	86.34	2	$p < .001$
1	.06	.045	.200				
2	.27	.045	$p < .001$				
MBAint				MBAint	1.25	1	.264
Experimental group	.08	.106	.500				
Waitlist group	—	—					
Risk				BIDs risk	114.33	1	$p < .001$
BIDs High risk	−.98	.144	$p < .001$				
BIDs Low risk	—	—					
Time × MBAint				Time × MBAint	35.38	2	$p < .001$
1 × Exp	.17	.066	.011				
2 × Exp	−.11	.066	.100				
Time × risk				Time × BIDs Risk	9.49	2	.009
1 × BIDs High risk	−.17	.089	.061				
2 × BIDs High risk	.10	.089	.300				
MBAint × risk				MBAint × BIDs Risk	.01	1	.941
Exp × BIDs High risk	−.12	.202	.600				
Time × MBAint × Risk				Time × MBAint × BIDs Risk	3.70	2	.157
1 × Exp × BIDs High risk	.24	.125	.060				
2 × Exp × BIDs High risk	.08	.125	.500				
Random part							
id SD (intercept)	.62						
Residual SD observation	.30						
R^2 marginal	.32						
R^2 conditional	.87						
N subjects	231						
N observations	692						

Note: Baseline category for time 1 was time 0, baseline category for time 2 was time 0, baseline category for MBAint was waitlist; baseline category for high risk was low risk.

Abbreviations: BIDs, Body Image Disorders; MBAint, More than Body Appearance intervention; SE, standard error.

intervention and BIDs risk groups. The graph shows distinct patterns between the high risk and low risk BID groups, highlighting notable differences in their trajectories.

Figure 8 shows the EDRC levels across the MBA intervention groups. The Time × MBA intervention has a statistically significant effect at the omnibus level ($\chi^2 = 6.17$, $p = .046$), suggesting that the experimental and waitlist groups follow different trajectories over time. However, this effect was not significant at the pre-planned fixed-effect levels, likely because the main effect does not account for the critical interaction with BIDs risk (i.e. high risk or low risk; see Figure 7). Indeed, the groups at high risk and low risk of BIDs exhibit substantially different levels of EDRC and follow distinct patterns over time, which is more clearly illustrated through the simple slope analysis presented below.

Figure 9 shows the EDRC levels across the BIDs risk groups over time. Risk of BIDs has a statistically significant effect on the EDRC scores ($\chi^2 = 140.02$, $p < .001$), with the group at high risk of BIDs showing statistically significant higher scores ($b = 23$, SE $= 2.89$, $p < .001$) than the group at low risk (see
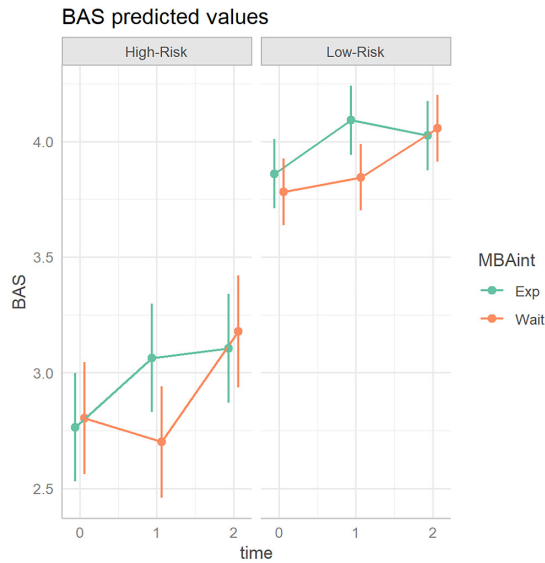
FIGURE 4 Graph of the predicted values of the BAS-2 over time. On the *x* axis there is time, on the *y* axis the BAS-2 scores. The vertical lines represent the 95% confidence interval around the estimate represented by the dot.
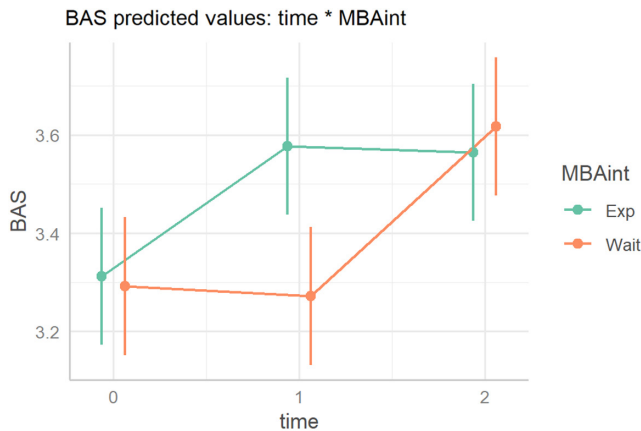

FIGURE 5 BAS-2 predicted values for time × MBA intervention.

Figure 7). The fixed effects of time by risk were not statistically significant when comparing the high risk group to the low risk group, either from time 0 to time 1 ($b = 2.6$, SE $= 1.96$, $p = .200$) or from time 0 to time 2 ($b = -2.1$, SE $= 1.96$, $p = .300$).

The simple slope analysis (Table 7) was focused only on the group at high risk of BIDs (see the left sside of Figure 7). In particular, in the group at high risk of BIDs: the experimental group reported a statistically significant decrease in EDRC score from pre-intervention (time 0) to follow-up (time 2) ($b = -4.51$, SE $= 1.65$, $p = .018$); the waitlist group reported a statistically significant decrease in EDRC scores from pre-intervention (time 1) to post-intervention (time 2) ($b = -7.00$, SE $= 1.69$, $p < .001$).

QDC

The results of the model for the QDC scores ($R^2 = .89$) are presented in Table 8. Figure 10 shows the overall effect of the MBA intervention across the BIDs-risk groups over time. The graph shows
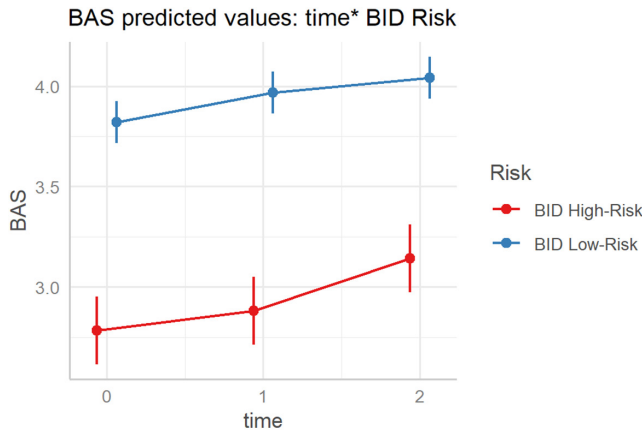
FIGURE 6   BAS-2 predicted values for time × BIDs risk.

TABLE 5   Simple slope analysis on the BAS-2 scores: (a) comparing the MBA groups across time and the BID-risk groups; (b) comparing times across the MBA groups and BID-risk groups.

Contrast	Time	BID risk	Exp	Wait		Estimate	SE	p
Exp vs. wait	0	High	2.76	2.80		−.040	.172	.818
Exp vs. wait	0	Low	3.86	3.78		.078	.106	.461
Exp vs. wait	1	High	3.06	2.70		.364	.172	.035
Exp vs. wait	1	Low	4.09	3.84		.246	.106	.021
Exp vs. wait	2	High	3.10	3.18		−.073	.172	.671
Exp vs. wait	2	Low	4.02	4.06		−.031	.106	.768
Contrast	**MBA group**	**BID risk**	**T0**	**T1**	**T2**	**Estimate**	**SE**	**P**
time0-time1	Exp	High	2.76	3.06	3.10	−.300	.073	$p < .001$
time0-time2	Exp	High	2.76	3.06	3.10	−.341	.075	$p < .001$
time1-time2	Exp	High	2.76	3.06	3.10	−.041	.075	.849
Contrast	**MBA group**	**BID risk**	**T0**	**T1**	**T2**	**Estimate**	**SE**	**P**
time0-time1	Wait	High	2.80	2.70	3.18	.103	.076	.365
time0-time2	Wait	High	2.80	2.70	3.18	−.374	.076	$p < .001$
time1-time2	Wait	High	2.80	2.70	3.18	−.477	.076	$p < .001$
Contrast	**MBA group**	**BID risk**	**T0**	**T1**	**T2**	**Estimate**	**SE**	**p**
time0-time1	Exp	Low	3.86	4.09	4.03	−.231	.047	$p < .001$
time0-time2	Exp	Low	3.86	4.09	4.03	−.165	.047	.002
time1-time2	Exp	Low	3.86	4.09	4.03	.066	.047	.343
Contrast	**MBA group**	**BID risk**	**T0**	**T1**	**T2**	**Estimate**	**SE**	**p**
time0-time1	Wait	Low	3.78	3.84	4.06	−.063	.045	.346
time0-time2	Wait	Low	3.78	3.84	4.06	−.275	.045	$p < .001$
time1-time2	Wait	Low	3.78	3.84	4.06	−.212	.045	$p < .001$

Abbreviations: BID, Body Image Disorder; Exp, Experimental; MBA, More than Body Appearance; SE, standard error; Wait, waitlist.

distinct patterns between the high risk and low risk BID groups, highlighting notable differences in their trajectories.

Time × BIDs risk has a statistically significant effect on the QDC scores ($\chi^2 = 25.905$, $p < .001$). The group at high risk of BIDs shows a greater decrease in QDC scores from time 0 to time 2 compared to

TABLE 6 Results of the model for the Eating Disorder Risk Composite (EDRC).

Characteristic	Beta	SE	p		χ^2	df	p
Fixed part				**Omnibus**			
Time				Time	20.15	2	$p < .001$
1 vs. 0	.69	1.01	.500				
2 vs. 0	−1.6	1.01	.110				
MBAint				MBAint	.21	1	.648
Experimental group	.72	2.14	.700				
Risk				Risk	140.02	1	$p < .001$
BIDs High risk	23	2.89	$p < .001$				
Time × MBAint				Time × MBAint	6.17	2	.046
1 × Experimental	−2.1	1.46	.200				
2 × Experimental	−.35	1.46	.800				
Time × Risk				Time × Risk	6.58	2	.037
1 × BIDs High risk	2.6	1.96	.200				
2 × BIDs High risk	−2.1	1.96	.300				
MBAint × Risk				MBAint × Risk	.42	1	.515
Experimental × BIDs High risk	−1.3	4.06	.700				
Time × MBAint × Risk				Time × MBAint × Risk	1.24	2	.539
1 × Experimental × BIDs High risk	−2.8	2.76	.300				
2 × Experimental × BIDs High risk	−.42	2.77	.900				
Random part							
id SD (intercept)	12.09						
Residual SD observation	6.64						
R^2 marginal	.345						
R^2 conditional	.848						
N subjects	231						
N observations	692						

Note: Baseline category for time 1 was time 0, baseline category for time 2 was time 0, baseline category for MBAint was waitlist; baseline category for high risk was low risk.

Abbreviations: BIDs, Body Image Disorders; MBAint, More than Body Appearance intervention; SE, standard error.

the group at low risk of BIDs, regardless of whether they received the MBA intervention at time 0 or time 1. Figure 11 shows the predicted values of the QDC across the BIDs risk groups over time.

The Time × MBA intervention has a statistically significant effect on the QDC scores ($\chi^2 = 13.190$, $p < .001$) at the omnibus level: the MBA intervention lowered the QDC scores from time 0 to time 1, but this effect was not statistically significant at the pre-planned fixed-effect levels ($b = −4.6$, SE $= 2.57$, $p = .073$). This may be because the main effect does not account for the critical interaction with BID risk (i.e. high risk or low risk; see Figure 10). Figure 12 shows the estimated QDC values across the MBA intervention groups over time.

Also in this model, the BIDs risk is a statistically significant and important predictor of QDC scores ($\chi^2 = 302.836$, $p < .001$), with the group at high risk of BIDs showing significantly higher QDC scores when compared to the low risk group ($b = 61$, SE $= 5.09$, $p < .001$). Also, time had a statistically significant effect on QDC scores ($\chi^2 = 126.567$, $p < .001$) because the QDC scores at time 2 were significantly lower than at time 0 ($b = −8.8$, SE $= 1.78$, $p < .001$).
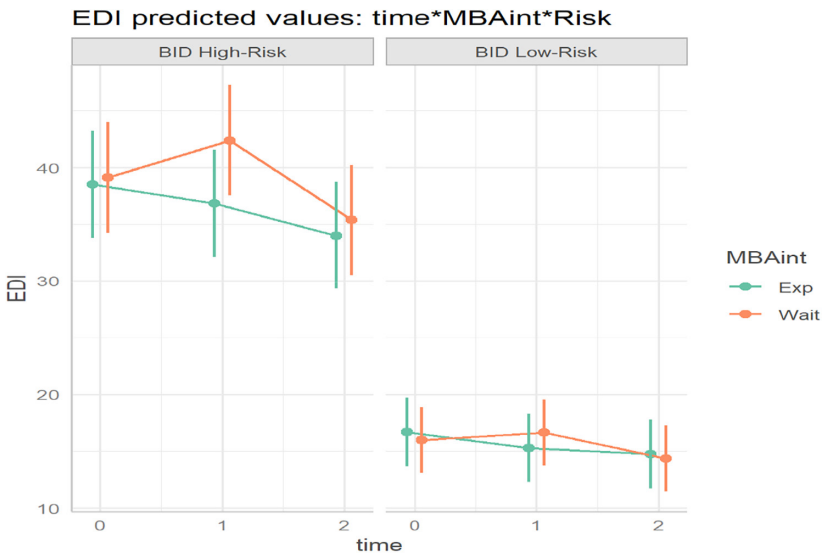
FIGURE 7 Graph of the predicted values of EDRC over time. On the *x* axis there is time, on the *y* axis the EDRC values. The vertical lines represent the 95% confidence interval around the estimate represented by the dot.
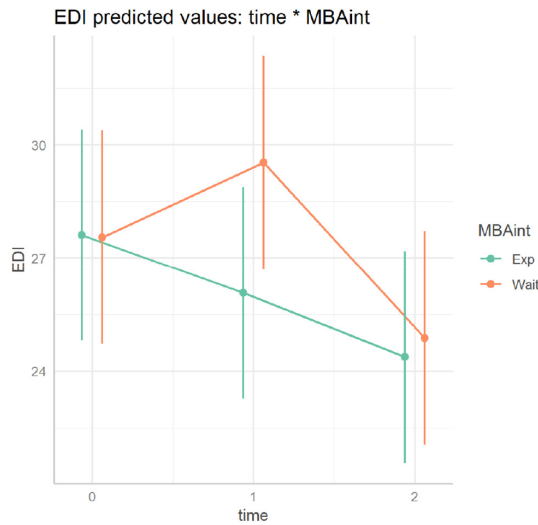

FIGURE 8 Predicted effect of MBA intervention groups on EDRC scores over time.

The simple slope analysis was conducted only on the group at high risk of BIDs (left side of Figure 10). As Table 9 shows, in the group at high risk of BIDs: the experimental group reported a statistically significant decrease in the QDC score both from pre-intervention (time 0) to post-intervention (time 1) ($b = -.17$, SE $= 2.89$, $p < .001$) and from pre-intervention (time 0) to follow-up (time 2) ($b = -21.03$, SE $= 2.92$, $p < .001$); similarly, the waitlist group reported a statistically significant decreases in QDC scores both from pre-intervention (time 1) to post-intervention (time 2) ($b = -17.26$, SE $= 2.89$, $p < .001$) and from baseline (time 0) to post-intervention (time 2) ($b = -21.48$, SE $= 2.89$, $p < .001$).
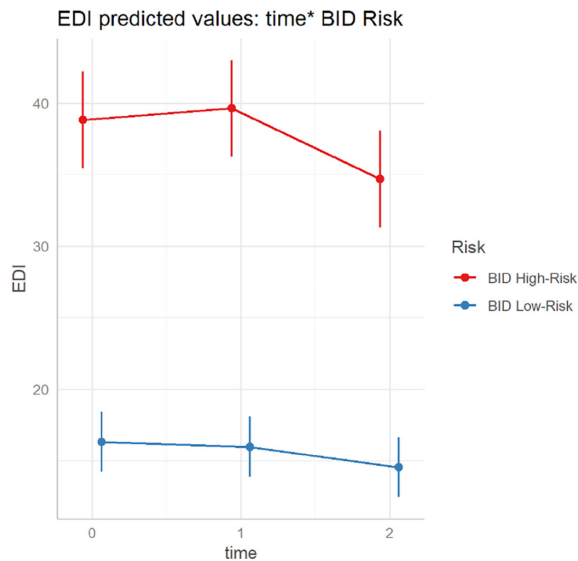
FIGURE 9 Predicted levels of EDRC across the BID-risk groups.

TABLE 7 Simple slope analysis on the EDRC in the BIDs high risk group across the MBA groups over time.

EDI	MBA group	t0	t1	t2	Time	Estimate	SE	p
High risk	Exp	38.52	36.85	34.00	t1-t0	−1.67	1.64	.565
High risk	Exp	38.52	36.85	34.00	t2-t0	−4.51	1.65	.018
High risk	Exp	38.52	36.85	34.00	t2-t1	−2.85	1.65	.198
High risk	Wait	39.13	42.39	35.39	t1-t0	+3.26	1.69	.132
High risk	Wait	39.13	42.39	35.39	t2-t0	−3.74	1.69	.069
High risk	Wait	39.13	42.39	35.39	t2-t1	−7.00	1.69	$p < .001$

Abbreviations: Exp, Experimental; MBA, More than Body Appearance; SE, standard error; Wait, waitlist.

Acceptability and feasibility of the intervention

After the completion of the intervention, participants were asked to rate the degree of their satisfaction with (1) psychoeducational material; (2) functionality-based writing assignments (i.e. Italian translation of the Expand you Horizon intervention); and (3) the overall intervention on a 5-point Likert scale (ranging from 1 = *not at all satisfied* to 5 = *very satisfied*). The average degree of satisfaction with psychoeducational materials was 4.27 (SD = .81), while the average degree of satisfaction with writing assignments was 4.02 (SD = 1.03); finally, the average degree of satisfaction with the overall intervention was 4.01 (SD = .78). No differences in terms of satisfaction ratings emerged with respect to participants' wave of intervention (i.e. T0 to T1 vs. T1 to T2) (all ps > .05).

DISCUSSION

In this RCT with a crossover design, we investigated the effectiveness of a psychological intervention that combines the Expand Your Horizon intervention (Alleva, Martijn, et al., 2015) with psychoeducation to improve body image in young women at high and low risk of developing BIDs, drawing on research supporting the effectiveness of both approaches (Alleva, Sheeran, et al., 2015; Guest et al., 2019).

**TABLE 8** Results of the model for the Questionario sul Dismorfismo Corporeo (QDC).

Characteristic	Beta	SE	p		χ^2	df	p
Fixed part				**Omnibus**			
Time				Time	126.567	2	$p < .001$
1	−1.2	1.78	.500				
2	−8.8	1.78	$p < .001$				
MBAint				MBAint	.715	1	.398
Experimental	−1.5	3.77	.700				
Risk				Risk	302.836	1	$p < .001$
BIDs High risk	61	5.09	$p < .001$				
BIDs Low risk	—	—					
Time × MBAint				Time × MBAint	13.190	2	$p < .001$
1 × Experimental	−4.6	2.57	.073				
2 × Experimental	−.18	2.57	.900				
Time × Risk				Time × Risk	25.905	2	$p < .001$
1 × BIDs High risk	−3.1	3.47	.400				
2 × BIDs High risk	−13	3.47	$p < .001$				
MBAint × Risk				MBAint × Risk	.109	1	.742
Experimental × BIDs High risk	4.7	7.16	.500				
Time × MBAint × Risk				Time × MBAint × Risk	4.014	2	.134
1 × Experimental × BIDs High risk	−8.1	4.88	.100				
2 × Experimental × BIDs High risk	.64	4.90	.900				
Random part							
id SD (intercept)	21.31						
Residual SD observation	11.73						
R^2 marginal	.54						
R^2 conditional	.89						
N subjects	231						
N observations	692						

Note: Baseline category for time 1 was time 0, baseline category for time 2 was time 0, baseline category for MBAint was waitlist; baseline category for high risk was low risk.

Abbreviations: BIDs, Body Image Disorders; MBAint, More than Body Appearance intervention; SE, standard error.

The combination of the Expand Your Horizon intervention (Alleva, Martijn, et al., 2015) with psychoeducation proves to be useful in promoting a positive body image (i.e. body and functionality appreciation), while the results regarding the risk of developing EDs and extreme body dissatisfaction were more nuanced.

Starting with positive body image, and in line with our hypotheses, the results of the current study support our intervention, which combines writing tasks focused on functionality appreciation with psychoeducation, as a valuable psychological approach for enhancing positive body image in young women, both at high and low risk of developing BIDs. Specifically, participants who were randomized to the experimental group showed significant increases in both body and functionality appreciation from pre-intervention to post-intervention, regardless of their risk status, compared to those in the waitlist group. These findings indicate that the intervention was successful in improving positive body image (i.e. body and functionality appreciation) relative to the waitlist condition. Importantly, these improvements were
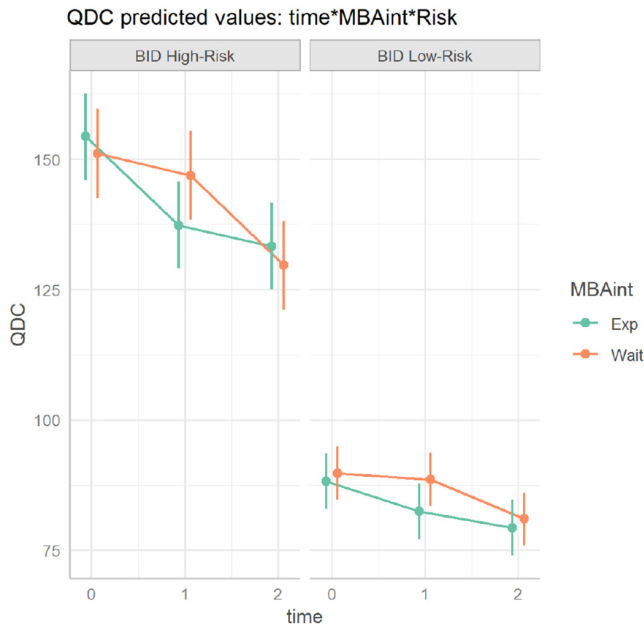
FIGURE 10 Graph of the predicted QDC scores over time and across groups. On the x axis there is time, on the y axis the QDC values. The vertical lines represent the 95% confidence interval around the estimate represented by the dot.
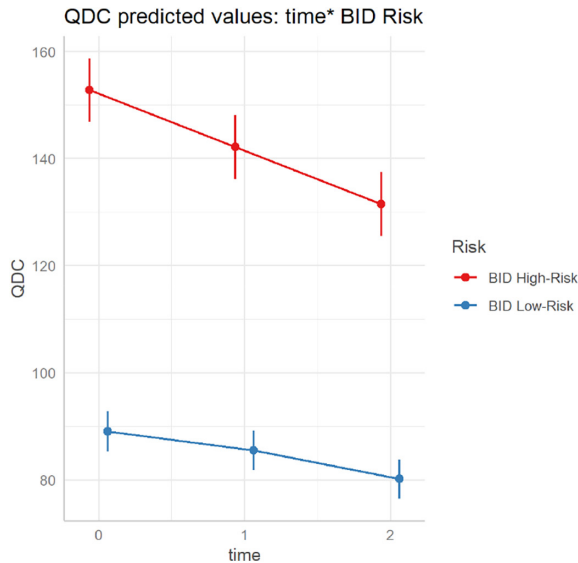
FIGURE 11 Predicted values of QDC over time across the BIDs-risk groups.

maintained up to the 15-day follow-up, demonstrating the lasting positive effects of the intervention on body and functionality appreciation in the experimental group. The results were later replicated in the waitlist group: once they started the intervention (after crossover), participants similarly experienced improvements in both body and functionality appreciation. These findings align with previous RCTs on functionality-based approaches to improve body image (Alleva, Diedrichs, Halliwell, Martijn, et al., 2018; Alleva, Martijn, et al., 2015), further supporting the idea that focusing on functionality
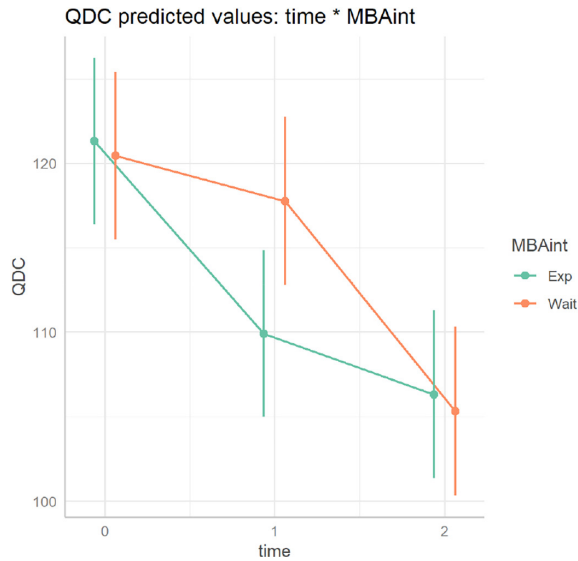
FIGURE 12   Predicted QDC values over time across MBA intervention groups.

TABLE 9   Simple slope analysis on the QDC in the group at high risk of BIDs across the MBA groups over time.

QDC	MBA group	t0	t1	t2	Time	Estimates	SE	p
High risk	Exp	154.33	137.33	133.31	t1-t0	−17.00	2.89	$p<.001$
High risk	Exp	154.33	137.33	133.31	t2-t0	−21.03	2.92	$p<.001$
High risk	Exp	154.33	137.33	133.31	t2-t1	−4.03	2.92	.353
High risk	Wait	151.13	146.90	129.65	t1-t0	−4.23	2.98	.333
High risk	Wait	151.13	146.90	129.65	t2-t0	−21.48	2.89	$p<.001$
High risk	Wait	151.13	146.90	129.65	t2-t1	−17.26	2.89	$p<.001$

Abbreviations: Exp, Experimental; MBA, More than Body Appearance; SE, standard error; Wait, waitlist.

appreciation is a promising strategy for improving women's body image. Appreciating bodily functions may help individuals develop a more holistic view of the body, allowing them to positively reframe their thoughts, shifting from viewing the body-as-an-object to appreciating it as a dynamic process (Franzoi, 1995). This holistic perspective is essential for cultivating gratitude towards one's body and promoting positive embodiment, both of which are known to enhance body appreciation (Homan & Tylka, 2018; Piran, 2016).

While improvements in body and functionality appreciation were observed in both groups (i.e. participants at high risk and low risk of BIDs), the intervention proved more effective for young women at high risk of developing BIDs compared to those at low risk. In other words, the impact of the intervention on these key protective factors (i.e. body and functionality appreciation) was more pronounced in young women at high risk of BIDs. This outcome may be attributed to the active engagement of high-risk participants in a psychological intervention that combined psychoeducation with a functionality-focused approach. The psychoeducation component provided participants with crucial information about body image, helping them to broaden their understanding of the body beyond appearance. The functionality-based approach encouraged participants to reflect on their body's functions—fostering appreciation for what their bodies can do, rather than focusing solely on how they look. This combination likely played a key role in helping participants develop a more

holistic and positive view of their bodies. Furthermore, compared to low-risk participants, those at high risk may tend to focus more on physical appearance, potentially adopting a self-objectifying perspective (Fredrickson & Roberts, 1997). As a result, they may have particularly benefited from learning about body functionality and redirecting their focus toward the various functions their bodies perform across different domains (Alleva, Diedrichs, Halliwell, Martijn, et al., 2018; Alleva, Martijn, et al., 2015). However, it is worth noting that these findings might also be explained by the lower baseline levels of body and functionality appreciation observed in high-risk participants relative to their low-risk counterparts, making it more likely for high-risk participants to exhibit greater improvements during the intervention. Since women in the high-risk group started the intervention with lower levels of these protective factors, they may have had more room for improvement, leading to more pronounced changes in response to the intervention.

While the results on positive body image support the intervention as a useful approach to enhancing positive body image, the findings related to the risk of developing EDs and extreme body dissatisfaction are more nuanced. This is likely due to the differing baseline levels and trajectories of high- and low-risk participants on these clinically focused measures. Regarding the risk of developing EDs, the results suggest that the intervention may be effective in reducing this risk among young women at high risk of BIDs, although some variability in the EDRC scores remains. Among high-risk participants assigned to the experimental group, reductions in EDs risk were observed from pre-intervention to follow-up, but not immediately from pre-intervention to post-intervention. This delayed improvement might indicate that the processes underlying ED risk, particularly in young women at higher risk for BIDs, require more time to be effectively modified. It is possible that the initial stages of the intervention helped participants raise awareness and begin the process of change, but more prolonged engagement with the intervention may be necessary for substantial shifts to occur. Therefore, the follow-up period likely captures the more enduring impact of the intervention on these outcomes. Interestingly, similar results were observed in the waitlist group, where participants showed reductions in ED risk from pre- to post-intervention. This might suggest that the waitlist period allowed participants to reflect on and notice their eating behaviours, potentially enhancing the effect of the intervention once it began. Overall, this preliminary evidence supports the utility of combining psychoeducation with functionality-based writing tasks in mitigating ED risk, aligning with previous studies (Linardon, 2021, 2022) and a recent systematic review and meta-analysis (Linardon et al., 2023), which highlight the role of functionality appreciation in preventing dysfunctional eating patterns. However, it is important to note that high-risk participants maintained higher levels of ED risk compared to those at low risk of BIDs. Participants at low risk, who were randomized to the intervention, already exhibited lower ED risk at baseline and did not show significant changes on this variable, continuing to maintain lower EDRC scores than high-risk participants. Alternatively, it is possible that the intervention may not sufficiently address this dimension to help high-risk individuals move out of the EDs risk zone. Given that ED risk is a clinical variable, it may require more than 15 days to show significant changes, particularly in those at risk of developing EDs, as already discussed above.

Finally, the intervention appeared to be beneficial in reducing extreme body dissatisfaction among participants at high risk of BIDs who were assigned to the intervention condition, compared to those in the waitlist group. Improvements in body dissatisfaction were observed in women at high risk from pre- to post-intervention and from pre-intervention to follow-up. Similar results were found after the crossover (i.e. beginning of the intervention for the waitlist group) for participants randomized to the waitlist condition, who showed reductions in extreme body dissatisfaction from pre-intervention to post-intervention and from baseline to post-intervention. Overall, these findings are consistent with previous RCTs (Alleva, Diedrichs, Halliwell, Martijn, et al., 2018; Alleva, Martijn, et al., 2015; Cerea et al., 2022; Cerea, Ghisi, et al., 2021), indicating that appreciating one's body functionality is associated with a healthier body image and can lead to improvements in body image. Also in this case, it is worth noting that high-risk participants maintained higher levels of body dissatisfaction compared to those at low risk of BIDs. Once again, the absence of reduction in extreme body dissatisfaction among participants at low risk of BIDs might be explained by their

more positive baseline attitudes towards their body and their lower initial scores relative to high-risk participants. Alternatively, the intervention may not adequately target extreme body dissatisfaction to help high-risk individuals move out of the risk zone.

In general, the findings of the current study suggest that combining writing tasks focused on functionality appreciation with psychoeducation on body image may be a useful approach for enhancing body and functionality appreciation, two key facets of positive body image, across different risk profiles (i.e. women at high and low risk of BIDs). Therefore, the combination of the writing tasks of the Expand your Horizon intervention with psychoeducation about body image may be a suitable approach for maximizing protective factors related to body image, particularly body and functionality appreciation, not only in women at high risk of BIDs but also among those at low risk of BIDs. This is important, as not all women need to reduce body dissatisfaction, but all can benefit from cultivating healthier attitudes towards their bodies (Piran, 2015). Additionally, this approach shows potential for reducing certain negative body image aspects, such as extreme body dissatisfaction and the risk of developing EDs in young women at high risk of BIDs. This potential aligns with recent calls to incorporate positive body image into psychological interventions aimed at reducing the risk of BIDs (Cook-Cottone, 2015; Longhurst, 2022). This evidence is encouraging considering the brief duration (i.e. 15 days) and the easy dissemination (i.e. online) of the intervention.

The intervention demonstrates high participant satisfaction as well as high attendance rate. These findings may be attributed to several factors: the crossover design of the intervention, which ensures that all participants eventually receive the active treatment, thereby enhancing retention and reducing dropout rates and leading to improved study compliance; the online format of the intervention, which may have made participation more convenient; and the course credit offered to some participants, which may have encouraged their compliance with the study. Regarding the generalizability of these findings to other settings, while we believe that the high compliance observed in our study may serve as a positive indicator, we recognize that the specific context of our sample—young women participating in an online psychological intervention—could influence compliance. Further research in diverse populations and settings is necessary to better understand how the features of the intervention impact compliance rates.

Notwithstanding the promising results of the current study, it is not free from limitations. First, the age range of participants in our study was relatively restricted (between 20 and 28 years), although this age range is one of the most critical for BIDs development such as BDD (Cerea et al., 2018). Therefore, whether such results are equally applicable to women below 20 years and above 28 is currently unclear. Future studies should investigate the efficacy of this intervention in adolescents, given the high risk of body dissatisfaction and BIDs in this population (Micali et al., 2014). Second, the design of the current study makes it difficult to determine whether the observed effects were solely due to the existing Expand Your Horizon intervention or if the psychoeducation aspect of the MBA intervention provided any additional benefits to participants. Future studies should include a control group that only completes the Expand Your Horizon intervention to better isolate and evaluate the specific contribution of the psychoeducation component to body image outcomes, thereby providing more clarity on whether the psychoeducation aspect offers extra benefits beyond the functionality-focused intervention. Third, our study employed a waitlist control group rather than an active control group. The absence of an active control group limits our ability to conclusively attribute the observed improvements in body image to the intervention itself. While the use of a waitlist group is common in the literature, it does not account for potential demand characteristics or social desirability bias that may have influenced participants' responses. Future studies would benefit from comparing the intervention with alternative psychological interventions aimed at improving body image. It is also important to note that participants were aware that the study aimed to improve body image, which may have led to socially desirable responses rather than genuine behavioural change. Future studies should consider employing a disguised purpose to minimize bias and better isolate the effects of the intervention. Additionally, the follow-up period was short (15 days) and limited to the experimental group, which restricted our ability to capture the long-term impact of the intervention. Future research should include longer-term follow-up assessments to evaluate the sustainability of the benefits observed in both groups. In light of these limitations,

the results of the current study should be interpreted with caution. Further investigations employing more robust designs for the intervention across diverse contexts and populations (e.g. adolescents and individuals with BIDs) are needed to replicate our findings and fully understand its effectiveness and generalizability.

CONCLUSIONS

In conclusion, the results of the current study suggest that young women at high risk and low risk of BIDs may benefit from a brief online psychological intervention that combines psychoeducation with writing assignments focused on functionality appreciation. Overall, our results support the implementation of this approach as valuable to improve body image in young women, particularly those at high risk of BIDs. By maximizing protective factors for body image and addressing negative body image aspects, this approach demonstrates the potential for improving body image across young women at high risk and low risk of BIDs.

AUTHOR CONTRIBUTIONS
Silvia Cerea: Conceptualization; methodology; data curation; investigation; writing – original draft; writing – review and editing; project administration. **Anna Panzeri:** Formal analysis; writing – original draft. **Beatrice Burdisso:** Data curation; investigation; writing – original draft. **Gioia Bottesi:** Writing – review and editing; supervision. **Paolo Mancin:** Data curation; investigation. **Martina Rapisarda:** Data curation; writing – original draft. **Marta Ghisi:** Writing – review and editing; supervision.

CONFLICT OF INTEREST STATEMENT
The authors have no conflict to declare.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

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

How to cite this article: Cerea, S., Panzeri, A., Burdisso, B., Bottesi, G., Mancin, P., Rapisarda, M., & Ghisi, M. (2024). More than Body Appearance! Improving body image in young women through a functionality-focused intervention combined with psychoeducation: A randomized controlled trial. *British Journal of Clinical Psychology*, *00*, 1–27. https://doi.org/10.1111/bjc.12514