

How do warmth, safeness and connectedness-related memories and experiences explain disordered eating?

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Abstract Literature suggested that the recall of early positive experiences have a major impact on the promotion of feelings of connectedness and social safeness, and seems to protect individuals against psychopathology. Recent research has also demonstrated that the absence of these positive rearing memories play a key role on disordered eating-related behaviours. The impact of early affiliative memories on disordered eating do not seem to be direct, and the mechanisms underlying this relationship are scarcely investigated. The present study aimed to clarify how memories of warmth and safeness explain the adoption of disordered eating attitudes, and tested the mediator role of social safeness, external shame and appearance-focused social comparison on aforementioned relationship, in a sample of 277 young women. The tested model explained 36% of eating psychopathology's variance and presented an excellent fit. Path analysis results indicated that the impact of rearing memories on eating psychopathology was fully mediated through the mechanisms of social safeness, external shame and appearance-focused social comparison. Specifically, these findings suggested that the extent to which positive rearing memories are associated with lower levels of disordered eating attitudes is influenced by the current feelings of social safeness and connectedness, which in turn are totally carried by decreased feelings of external shame and by lower endorsement on unfavourable comparison based on physical appearance with proximal targets (peers). These results seem to offer important insights for research and clinical

work on body image and eating-related difficulties, suggesting the relevance of promoting warm and safe interactions with others.

Level of evidence Level V, descriptive study.

Keywords Early affiliative memories · Social safeness · External shame · Appearance-focused social comparison · Eating psychopathology

Introduction

It is well established that the quality of care received in childhood has a crucial impact on gene expression, brain maturation, and on the development of a whole range of cognitive and emotional regulation competencies (e.g., [1–4]). Recent literature, based on neuroscience research, proposed three interacting affect regulation systems: threat-protection, resource-seeking and contentment-soothing system [5–9]. In accordance to this perspective, even though these systems are in constant interaction, they are linked to specific neurohormones and play distinctive evolved functions. Specifically, the threat system allows individuals to detect and respond to possible dangers or threats, triggering automatic emotional responses and protective behaviours (such as submission, fight or freeze). Operating through specific brain structures (e.g., the amygdala), this protection system is linked to serotonin genetic and synaptic regulation, and can be activated by threat signals (e.g., social cues or emotional memories) (e.g., [7, 8, 10]). The resource-seeking system operate through dopaminergic brain pathways and stimulates positive feelings of activation, pleasure and excitement [5, 6]. According to Gilbert [6–8] this system evolved to guarantee and motivate individuals to seek out and acquire resources that are necessary for survival (e.g., food, sexual

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opportunities, and alliances). However, when individual efforts failed or blocked, this system could activate negative and threat-related emotions (e.g., shame) [6]. The contentment-soothing system constitute a positive emotion regulation system, which activation gives rise to feelings of content, peace and a positive sense of calm [5]. This system is linked to endorphins/opiates and oxytocin and developed in parallel with the evolution of the attachment system, stimulated by signals of care and affection [7, 8]. In this line, early warmth, safeness and soothing experiences can activate this system and promote feelings of affiliation, trust, safeness and connectedness [11]. Moreover, rearing positive experiences can be recorded as conditioned emotional memories, which seems to play a key role on the development of positive relational schema for the self and others, enabling feelings of connectedness and social safeness [2, 12–14].

Growing evidences showed that experiences of social safeness (that is a sense of belonging, being accepted, valued and loved) promote adaptive emotional states and resources to deal with the adversity, which seems to protect individuals against psychopathology (e.g., [1, 6, 8]). To be accepted, chosen, and valued by others is an essential need for human survival (e.g., [15]). In accordance to evolutionary perspective, this fundamental need is linked to the process of social comparison [16]. This process can be conceptualized as a defensive mechanism that allows individuals to estimate self-rank within their social group and to adapt his/her behaviours in accordance to what is socially valued [12, 16, 17]. To increase the probability of being accepted by others and to compete for a secure social rank position, individuals need to be aware about the qualities appreciated by the social group (e.g., forms of beauty) [18, 19]. Thus, through social comparison with peers, individuals can perceive which domains are valued and by which one's should invest in, to raise his/her own status [12].

Clinical and empirical data show that unfavourable social comparisons play a key role on the development and maintenance of different psychopathological conditions, namely eating psychopathology [20, 21]. Particularly, it has been demonstrated that negative social comparisons based on physical appearance are strongly associated to body image dissatisfaction and can lead to higher tendency to seek thinness and engage in disordered eating [22]. For women, body image is a central self-evaluative dimension, therefore, unfavourable social comparisons based on physical appearance are often associated with feelings of inferiority and inadequacy, which are part of the shame phenomenon [17]. The experience of shame emerges as a response to social threat, that occur when individuals believe that other's perceive him or her negatively (as inferior, defective, inadequate or unattractive) because of one's own characteristics (e.g., [12]). This painful emotion has an important defensive function, warning individuals that certain features, behaviours, or

attributes are not able to create positive image in others, putting the self at risk of rejection or exclusion [12, 23]. Nevertheless, intense feelings of shame are strongly associated with social difficulties and several psychopathological conditions, namely eating disorders (e.g., [22, 24, 25]). In fact, it has been suggested that maladaptive eating behaviours (such as dieting) may act as strategies to cope with a sense of defect and inferiority [22].

Eating psychopathology is a complex process that involved different risk factors and mechanisms (such as, external shame and social comparison), and recent research suggested that early affiliative memories play a key role on disordered eating-related attitudes and behaviours. However, the mechanisms underlying this relationship are scarcely investigated. Thus, the present study intended to clarify the impact of recalling early affiliative memories in the engagement in disordered eating-related attitudes and behaviours, and whether social safeness, external shame and appearance-focused social comparison act on this association. It was hypothesized that the recall of early positive memories may be associated with lower levels of eating psychopathology, through higher levels of social safeness and lower levels of external shame and unfavourable social comparison based on physical appearance with peers.

Materials and methods

Participants

The sample of this study comprised 277 women from general population, with ages ranging from 18 to 35 ($M = 23.94$; $SD 4.11$). Concerning marital status, 85.2% of the participants were single, 14.1% were married or living together and 0.7% were divorced or separated. The majority of the participants (75.5%) attended college, while 22% reported only having completed high school. Participant's body mass index (BMI) ranged from 15.21 to 38.06, with a mean of 22.36 ($SD 3.46$), corresponding to normal weight values (WHO [26]). Furthermore, the sample's BMI distribution revealed to be equivalent to the female Portuguese population's BMI distribution [27].

Measures

Body mass index (BMI)

BMI was calculated from the Quetelet index based on self-reported participant's height and weight (Kg/m^2).

Early Memories of Warmth and Safeness Scale (EMWSS)

The EMWSS [14; Matos, Pinto-Gouveia, and Duarte, 2015] is a self-report questionnaire, designed to specifically assess early emotional memories of safeness, warmth, soothing and positive affection. It consists of 21 items, such as “I could easily be soothed by people close to me when I was unhappy”. Respondents rated on a five-point Likert scale, ranging from 0 (“No, never”) to 4 (“Yes, most of the time”), the frequency of their positive feelings, emotions and experiences in childhood. This measure revealed good psychometric properties, with a high level of internal consistency ($\alpha=0.97$), both for the original and the Portuguese versions. In the current study, this questionnaire presented a Cronbach’s alpha of 0.98.

Social Safeness and Pleasure Scale (SSPS)

SSPS [28; Pinto-Gouveia, Matos and Dinis, 2008] is a self-report instrument, with 11 items that assesses current feelings of safeness, belonging, acceptance and a sense of connectedness in their social world (e.g., “I feel connected to others” or “I feel easily soothed by those around me”). Participants are asked to rate their agreement with the items on a five-point Likert-type scale, with higher scores indicating higher social safeness. This scale showed a good internal consistency in the original version ($\alpha=0.91$) and, also, in the present study ($\alpha=0.95$).

Other As Shamer Scale (OAS)

The OAS [29; Matos, Pinto-Gouveia, and Duarte, 2011] is a self-report scale that explore external shame, that is, the perception that others evaluate the self negatively (as inferior, unattractive or inadequate). The scale is composed of 18 items, such as “I think that other people look down on me”, rated in a five-point Likert-type scale ranging from 0 (“Never”) to 4 (“Almost always”). Higher results in this scale indicate higher levels of external shame. OAS presented good psychometric characteristics, with a high internal consistency, both in the original study ($\alpha=0.92$) and in the Portuguese version ($\alpha=0.91$). Concerning to the present study, the Cronbach’s alpha was 0.95.

Social Comparison through Physical Appearance Scale (SCPAS)

SCPAS [17] was developed to assess social comparisons based on the subjective perception of individual’s group fit, attractiveness and social ranking according to the way one compares oneself with others, using physical appearance as a reference. Participants are instructed to compare themselves physically to proximal targets (part A: Peers)

and distal targets (part B: Models) regarding 11 bipolar constructs (e.g., inferior/superior, left out/ accepted or devalued/ valued). Answers are given on a ten-point Likert scale, with higher scores characterizing more favourable social comparisons based on physical appearance. The SCPAS presented high internal reliability in its original study ($\alpha=0.94$ in Part A: Peers, and $\alpha=0.96$ in Part B: Models). In this study, only Part A: Peers was used, which revealed a Cronbach alpha of 0.95.

Eating Disorder Examination Questionnaire (EDE-Q)

The EDE-Q [30, 31] is a 36-item self-report questionnaire adapted from the Eating Disorder Examination Interview, to assess eating disorder attitudes and behaviours. It consists of four subscales, namely restraint, eating concern, shape concern and weight concern. The items are rated for frequency and severity of the disordered eating-related attitudes and behaviours, within a 28-day time frame. This scale presented good psychometric properties ($\alpha=0.94$, for both the original and the Portuguese studies); regarding the current study, the Cronbach’s alpha was 0.95.

Procedures

The present study is part of a wider ongoing research regarding the effect of distinct emotional regulation processes on body and eating-related difficulties. The ethical requirements were respected: the ethics committees of all institutions involved in the study provided their approval, participants were fully informed about the study aims, the voluntary nature of their participation and the confidentiality of the collected data.

Participants were recruited through online messages via Facebook or e-mail where the nature of the present study were described. Individuals who are interested to participate were directed to a website where they were given an informed consent before completing the self-report questionnaire, which took approximately 15–20 min. Self-report measures were initially completed by 453 participants of both genders (407 women and 46 man), with ages ranging from 18 to 67 years old. However, taking into account the purpose of the current study only 277 women, with ages ranging from 18 to 35 years old were selected. The data-cleaning procedure excluded: (a) male participants and (b) participants who were younger than 18 or older than 35 years.

Data analyses

Data analyses were performed using the software IBM SPSS Statistics 22.0 (SPSS IBM; Chicago, IL, USA), and Path analysis were conducted using the software AMOS [32].

The descriptive statistics were explored (e.g., means and standard deviations) to analyze the characteristics of the sample. Pearson's product-moment correlations were performed to explore the association between: early affiliative memories of warmth and safeness with family figure (EMWSS), social safeness (SSPS), external shame (OAS), social comparison through physical appearance with peers (SCPAS_peers) and disordered eating attitudes and behaviours (total score and subscales of the EDE-Q). To estimate the relations between the different variables under analysis in the theoretical model, a path analysis was conducted. This statistical methodology enables the simultaneous examination of structural relationships and allow the examination of direct and indirect effects among multiple variables [33]. Specifically, in this study, we tested whether the association between early memories of warmth and safeness (exogenous variables) and disordered eating attitudes and behaviours (endogenous variable) would be mediated through the mechanisms of social safeness, external shame and appearance-focused social comparison (endogenous mediator variables), while controlling for BMI. The Maximum Likelihood method was used for the estimation of the regression coefficients and fit statistics. Moreover, set of goodness-of-fit indices were calculated to assess the plausibility of the overall model, such as, Chi-square (χ^2), Comparative Fit Index (CFI), Tucker Lewis Index (TLI) and the root-mean square error of approximation (RMSEA) with 95% confidence interval. Furthermore, the Bootstrap resampling procedure, with 5000 samples, and 95% bias-corrected confidence intervals (CI) around the standardized estimates of total, direct and indirect effects was conducted to test the significance of the mediational paths. Effects with p values under 0.05 were considered statistically significant.

Results

Preliminary analyses

Univariate and multivariate normality was examined by the values of skewness (Sk) and kurtosis (Ku). The skewness ranged from 0.98 to 1.58, while the values of kurtosis ranged from 0.18 to 1.91. These values indicated that there was no severe violation of the normal distribution [33].

Descriptive and correlation analyses

The mean, standard deviations and Pearson's product moment correlation coefficients of the studied variables, for the total sample ($N=277$), are reported in Table 1.

Results demonstrated that BMI presented negative associations, albeit weak, with early memories of warmth and safeness (EMWSS), social safeness (SPSS) and favourable appearance-based social comparison with peers (SCPAS_peers). In turn, BMI revealed positive associations with external shame (OAS) and eating psychopathology's severity (EDE-Q.total), with weak and moderate magnitudes, respectively.

Concerning the recall of early affiliative memories, positive correlations were found with social safeness and appearance-focused social comparison, with high and weak magnitudes, respectively. In contrast, early memories of warmth and safeness revealed negative associations with external shame and EDE-Q.total.

Social safeness presented negative associations with external shame and EDE-Q total (with high and weak magnitudes, respectively) and a positive significant association with appearance-based social comparison with peers. Furthermore, external shame revealed to be negatively and

Table 1 Descriptive and Pearson's correlations between study variables ($N=277$)

Measures	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. BMI	22.36	3.46	1								
2. EMWSS	66.30	16.06	-0.13*	1							
3. SSPS	44.11	8.34	-0.11	0.64***	1						
4. OAS	20.45	12.21	0.21***	-0.45***	-0.60***	1					
5. SCPAS_peers	66.79	20.96	-0.21***	0.29***	0.40***	-0.47***	1				
6. EDE_Q.total	1.47	1.31	0.45***	-0.23***	-0.22***	0.46***	-0.39***	1			
7. EDE_Q.rest	1.08	1.32	0.34***	-0.12*	-0.08	0.24***	-0.20**	0.78***	1		
8. EDE_Q.eating	0.82	1.13	0.37***	-0.26***	-0.26***	0.45***	-0.34***	0.86***	0.63***	1	
9. EDE_Q.weight	1.74	1.56	0.46***	-0.18**	-0.18**	0.43***	-0.36***	0.94***	0.64***	0.75***	1
10. EDE_Q.shape	1.94	1.65	0.42***	-0.25***	-0.25***	0.49***	-0.42***	0.96***	0.63***	0.76***	0.92***

EMWSS Early Memories of Warmth and Safeness Scale, SSPS Social Safeness and Pleasure Scale, OAS Other As Shamer, SCPAS_peers Social Comparison Through Physical Appearance Scale—Peers, EDE_Q.total Eating Disorder Examination Questionnaire_global score and subscales (rest=restraint; eating=eating concern; weight=weight concern; shape=shape concern)

* $p < 0.050$; ** $p < 0.010$; *** $p < 0.001$

moderately correlated with appearance-based social comparison with peers and positively associated with EDE-Q total. As expected, a negative association was found between favourable appearance-focused social comparisons with peers and EDE-Q total.

Finally, results also revealed that the total scale of the EDE-Q was highly and positively correlated with its subscales: restraint, eating concern, weight concern, and shape concern.

Path analysis

The purpose of this path analysis was to test the impact of the recall of early memories of warmth and safeness (EMWSS) on disorder eating (EDE-Q.total) through the mechanisms of social safeness (SSPS), external shame (OAS) and appearance-focused social comparison with peers (SCPAS_peers), while controlling for BMI.

The path model was first tested through a fully saturated model (i.e., with zero degrees of freedom) consisting of 27 parameters. Analysis indicated the progressive removal of the following nonsignificant path: the direct effect of the recall of early affiliative memories on appearance-focused social comparison with peers ($b_{EMWSS} = 0.041$; $SE_b = 0.092$; $Z = 0.440$; $p = 0.660$), on EDE-Q.total ($b_{EMWSS} = -0.005$; $SE_b = 0.005$; $Z = -1.010$; $p = 0.312$); and on external shame ($b_{EMWSS} = -0.073$; $SE_b = 0.045$; $Z = -1.620$; $p = 0.105$); and, also, the direct effect of social safeness on EDE-Q.total ($b_{SSPS} = 0.018$; $SE_b = 0.009$; $Z = 1.905$; $p = 0.057$). These paths were eliminated and the model was recalculated.

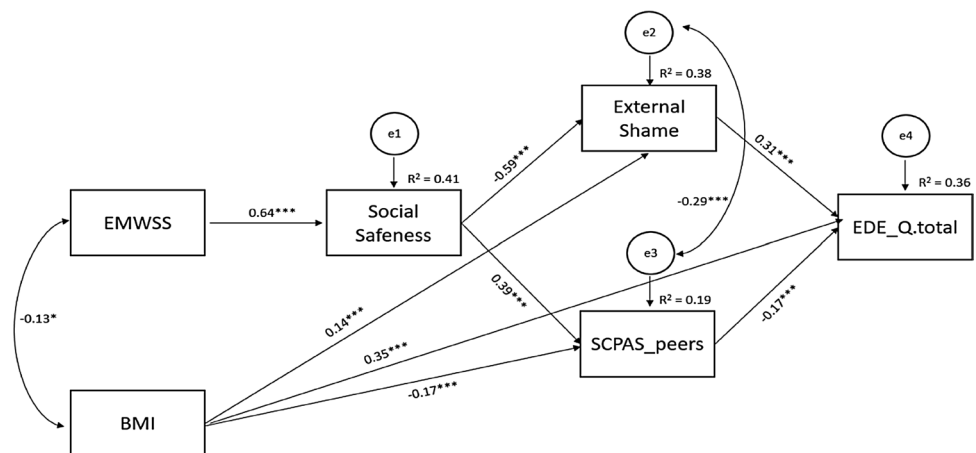
The model was recalculated and results indicated that all paths were statically significant, explained 41, 38, 19 and 36% of social safeness, external shame, appearance-focused social comparison with peers, and EDE-Q.total variance, respectively (Fig. 1). Additionally, this model showed an excellent model fit ($\chi^2_{(5)} = 7.822$; $p = 0.166$,

$CMIN/DF = 1.564$; $CFI = 0.994$; $TLI = 0.982$; $RMSEA = 0.045$, $IC = 0.000-0.103$; $p = 0.480$) [33]. Specifically, early memories of warmth and safeness had a direct effect of 0.64 ($b_{EMWSS} = 0.332$; $SE_b = 0.024$; $Z = 13.836$; $p < 0.001$) on social safeness. In turn, social safeness presented direct effects on external shame ($\beta = -0.59$; $b_{SSPS} = -0.856$; $SE_b = 0.070$; $Z = -12.275$; $p < 0.001$) and on appearance-focused social comparison with peers ($\beta = 0.39$; $b_{SSPS} = 0.966$ $SE_b = 0.137$; $Z = 7.053$; $p < 0.001$). Furthermore, external shame showed a direct effect of 0.31 ($b_{OAS} = 0.033$; $SE_b = 0.006$; $Z = 5.704$; $p < 0.001$) on EDE-Q.total. Finally, appearance-focused social comparison with peers presented, also, a direct effect of -0.17 on EDE-Q.total ($b_{SCPAS_peers} = -0.011$; $SE_b = 0.003$; $Z = -3.102$; $p < 0.010$).

The analysis of indirect effect showed that early memories of warmth and safeness presented indirect effect on EDE-Q.total, of -0.16 (95% CI -0.21 to -0.12) through social safeness, external shame and social comparison with peers. In turn, the recall of early memories of warmth and safeness had indirect effects of -0.38 (95% CI -0.47 to -0.28) on external shame and of 0.25 (95% CI 0.17 to 0.34) on social comparison with peers, which were totally mediated through social safeness. Furthermore, social safeness presented an indirect effect of -0.25 (95% CI -0.31 to -0.19) on EDE-Q.total, which was carried by the mechanisms of external shame and physical appearance-related social comparison with peers.

Overall, the model accounted for 36% of EDE-Q.total’s variances, revealing that the recall of early memories of warmth and safeness had an indirect influence on eating psychopathology, through social safeness, which in turn was linked to social comparison based on physical appearance with peers and external shame, when controlling BMI.

Fig. 1 Final path model. EMWSS early memories of warmth and safeness, SCPAS_peers social comparison through physical appearance with peers, EDE_Q.total eating psychopathology. Standardized path coefficients among variables are presented. All path coefficients are significant at the 0.05 level; * $p < 0.050$; ** $p < 0.010$; *** $p < 0.001$



Discussion

An emerging body of empirical research suggested that the recall of positive experiences can activate the soothing system and promote feelings of social safeness, which enhance the adoption of adaptive emotional states and protected individuals against stressful events (e.g., [2, 14]). In contrast, literature demonstrated that when individuals felt unsafe or insecure in their rearing social context, they may develop relational schemas of other's as untrusty or unavailable, which operate as a threat memories that are associated with defensive responses (such as shame) and psychopathological symptoms [12, 13].

Although recent research has shed light on the key role of early memories in disordered eating-related attitudes and behaviours (e.g., [34]), the mechanisms underlying this relationship are scarcely investigated. Therefore, this study was built on previous research [34] to further clarify mechanisms that underlie the association between memories of warmth and connectedness and disordered eating. More specifically, the current study aims to complement previous research [34] that found that external shame and self-judgment mediate the relationship between early memories and disordered eating. The model tested in the current study pretended to add to this data by exploring the mediator role of social safeness, external shame and appearance-focused social comparison on aforementioned relationship, in a sample of 277 young women.

Results demonstrated that the recall of early positive memories are associated to higher levels of social safeness, and with lower levels of external shame, unfavourable appearance-focused social comparisons with peers and disordered eating. These results are in line with previous research that suggested that positive rearing memories are positively associated with the development and engagement in emotional and social adaptive responses (e.g., [14]). Findings also demonstrated that the capability of accessing warm and supportive other-to-self childhood memories are inversely associated with emotional defensive responses (such as external shame) [35] and with eating psychopathological symptoms [36]. Moreover, results corroborate that external shame and unfavourable appearance-focused social comparisons are important correlates of disordered eating attitudes and behaviours [36, 37].

The present study aimed, therefore, at further exploring whether current feelings of social safeness, external shame and appearance-based social comparisons with peers mediate the impact of early positive memories on disordered eating severity. The tested model showed an excellent fit to the empirical data, explaining 36% of eating psychopathology's variance. Additionally, path results clarified the significant mediator effects of aforementioned mechanisms. Indeed, results indicated that the absence of affiliative

positive memories did not predict directly the engagement on disordered eating, but explain lower current feelings of social safeness. Moreover, results suggested that lower levels of feelings of belonging, acceptance and safeness are associated to higher levels of shame and more unfavourable appearance social comparisons with peers. In turn, shame and unfavourable social comparisons through physical appearance directly impact disordered eating. Indeed, results showed that the link between the recall of rearing positive memories on disordered eating attitudes and behaviours is fully carried by the mechanisms of social safeness, external shame and appearance-focused social comparisons with friends and colleagues.

However, these results should be interpreted considering some methodological limitations. First, the cross-sectional nature of this investigation does not allow the inference of causal relationships between the variables. Another possible limitation is the use of a sample only comprised of women. Although disordered eating behaviours are more prevalent in women, this sample restrains the generalization of the results to others population (e.g., males). Thus, future research should replicate this research using a longitudinal design and more representative and heterogeneous samples, to confirm these study's findings. Further, although the aim of the current study was to clarify the mechanisms that underlie the association between early memories and body image and eating-related difficulties in a community sample, future studies should test the adequacy of the conducted model in samples with pathological BMI levels and diagnosed eating disorders. In addition, eating psychopathology is a multi-determined process, therefore, future studies should incorporate other constructs or emotional processes (e.g., submission, social sensitivities), which were not explored in this model, but that could increase its predictive capacity. The possible limitation is the use of self-report measures that may be susceptible to biases and consequently compromise the generalization of the data.

Nonetheless, this study offers important insights for research on body image and eating-related difficulties. In fact, this is the first study that examines the associations between early memories, current feelings of safe and cared for, shame, appearance-focused social comparison and disordered eating. Specifically, the current study examined an integrative model that tested the relationship between early warmth and safeness memories and eating psychopathology, and explores the mediator role of social-related mechanisms on this association. The findings highlight that the extent to which positive rearing memories are associated with lower levels of disordered eating attitudes is influenced by the current feelings of belonging and social safeness, which in turn are totally carried by decreased feelings of external shame and by lower endorsement on unfavourable comparison based on physical appearance with proximal targets (peers).

These findings may have important implications for prevention and therapeutic interventions, suggesting that body image and eating-related difficulty intervention programs should target shame and promote the development of warm, supportive and safe interactions with others.

Compliance with ethical standards

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

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

Conflict of interest The authors of this manuscript declare no conflict of interest.

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