Baudinet *et al. Journal of Eating Disorders* (2025) 13:260
https://doi.org/10.1186/s40337-025-01440-6

Journal of Eating Disorders

RESEARCH Open Access

# The mediating role of social connectedness between inflexibility, the suppression of emotional expression, and symptoms of eating disorders and depression in adolescents with restrictive eating disorders referred for radically open dialectical behaviour therapy (RO DBT)

Julian Baudinet[1,2*], Lucinda J. Gledhill[1], Molly Fennig Steinhoff[3], Kirsten Gilbert[3] and Mima Simic[1]

## Abstract

**Background** Overcontrol is a transdiagnostic phenotype which has been associated with restrictive eating disorders and depression. It is characterised by traits such as cognitive and behavioural inflexibility, risk aversion, suppression of emotional expression, reduced reward sensitivity and higher temperamental anxiety. Two aspects of the overcontrol phenotype (inflexibility and the suppression of emotional expression) have been particularly linked with poorer mental health. Additionally, social connectedness has been shown to protect against mental health symptom severity. The current study aimed to test whether the relationship between these factors and mental health symptom severity, namely, eating disorder and depression, is mediated by social connectedness.

**Methods** Routine data were collected for adolescents with restrictive eating disorders presenting to either outpatient or intensive day programme treatment in a specialist eating disorder service. Four cross-sectional mediation analyses were planned. The first two models aimed to test the mediating role of social connectedness on the relationship between inflexibility (model 1) and the suppression of emotional expression (model 2) on eating disorder symptom severity. The second two models aimed to test the mediating role of social connectedness on the relationship between inflexibility (model 3) and the suppression of emotional expression (model 4) on depression symptom severity. Baseline weight and comorbid mental health symptom severity were controlled for in each model.

**Results** The sample consisted of 109 adolescents (mean age = 15.21 years, 96.3% female). Current findings indicate that social connectedness did not statistically mediate the relationships between inflexibility and eating disorder

*Correspondence:
Julian Baudinet
Julian.Baudinet@kcl.ac.uk

Full list of author information is available at the end of the article

symptom severity (model 1; Path ab β = .02, 95% bootstrap CI 0.0002–0.05). The planned analysis examining the relationship between the suppression of emotional expression and eating disorder symptoms (model 2) was not tested as the variables did not significantly correlate. Findings also indicated that social connectedness statistically mediated the relationships between both inflexibility (model 3; Path ab β = .82, 95% bootstrap CI 0.33–1.40) and the suppression of emotional expression (model 4; Path ab β = .38, 95% bootstrap CI 0.13–0 .69) on depressive symptoms.

**Conclusions** Findings suggest targeting social connectedness, as is the case in Radically Open Dialectical Behaviour Therapy (RO DBT), may be a useful way to improve treatment outcomes for young people with restrictive eating disorders and co-morbid depressive symptoms. This fits with qualitative data that shows that taking a holistic approach during treatment, as opposed to being overly symptom focused, is needed and valued by young people and their family members.

**Plain english summary**

Inflexibility and suppressing emotional expression have both been linked with poorer mental health. The current study aimed to test whether the relationship between these factors is indirectly impacted by the quality of young people's social connections (known as social connectedness). Data from 109 adolescents with restrictive eating disorders were examined. Four cross-sectional mediation analyses were planned. The first two analyses aimed to test the impact of social connectedness on the relationship between inflexibility (model 1) and the suppression of emotional expression (model 2) on eating disorder symptoms. The second two aimed to test the impact of social connectedness on the relationship between inflexibility (model 3) and the suppression of emotional expression (model 4) on depression symptom severity. Findings show that social connectedness did not impact the relationship between inflexibility and eating disorder symptom severity (model 1). Assumptions of model 2 were not met, thus this planned analysis was not completed. Findings did show that social connectedness impacts the relationships between both inflexibility (model 3) and the suppression of emotional expression (model 4) on depressive symptoms. Together, findings suggest that targeting social connectedness may be a useful way to improve depressive symptoms for young people with restrictive eating disorders.

**Keywords** Adolescent, Depression, Eating disorders, Radically open dialectical behaviour therapy, Dialectical behaviour therapy, Overcontrol

## Background

Overcontrol is a transdiagnostic phenotype characterised by traits such as cognitive and behavioural inflexibility, risk aversion, suppression of emotional expression, reduced reward sensitivity and higher temperamental anxiety [23, 40]. It is associated with excessive inhibitory control and is theorised to result from the interaction of neurobiological, environmental, and learning factors [40]. Overcontrol is also implicated in the development and maintenance of a range of mental health difficulties, such as treatment refractory depression [40, 41], restrictive eating disorders [8, 32, 35], obsessive–compulsive personality disorder [40], and paediatric anxiety disorders [23].

Evidence suggests that two core features of overcontrol—inflexibility and the suppression of emotional expression—may be particularly linked with poorer mental health. Inflexibility has been associated with increased symptoms of depression and other mental health difficulties [50, 53, 58], as well as greater experiences of stigma [36]. Similarly, the increased use of suppression of emotional expression as an emotion regulation strategy has been shown to be associated with reduced positive affect [20], higher social anxiety [17] and poorer mental health [33].

Overcontrol has also been suggested to contribute to perceived social isolation and poorer relationship quality [22, 31, 32, 40, 41], pointing to a potential relational pathway linking overcontolled personality traits and mental health symptoms. Studies have shown that the quality of interpersonal relationships is tied to well-being and mental health outcomes [11]. Strong social ties have been identified as a protective factor against depression, including during the COVID-19 pandemic [15, 39, 54, 55]. A recent meta-analysis also found that loneliness, a proxy for low social connectedness, is also predictive of symptoms of anxiety, self-harm and particularly depression [42].

Taken together, social connectedness, inflexibility and the suppression of emotional expression appear to be important factors to consider in understanding mental well-being. From the available data, it seems clear that all three factors impact mental health, however, little empirical attention has been given to how these factors may interact for young people with restrictive eating disorders presenting to treatment. Furthermore, the direction of influence between these inter-connected variables remains somewhat unclear. In one study of 349 adults in the USA, psychological flexibility and the suppression of emotional expression significantly moderated the

relationship between social isolation and mental wellbeing [50]. Therefore, social connectedness may not only be influenced by inflexibility and suppression but could also impact its effect on mental health. This may be particularly key during the adolescent developmental window given emerging data demonstrating a bidirectional relationship between social context and brain maturation [37].

Within Radically Open Dialectical Behaviour Therapy (RO DBT; [40]), a novel intervention targeting emotional overcontrol, social connectedness is conceptualized as a key mechanism of change. Specifically, it is proposed that increasing social connectedness mediates the impact of overcontrolled traits such as inflexibility and emotional suppression, on outcomes, rather than social connectedness being a downstream consequence of these traits [31].

Given this theoretical framework and the existing empirical gaps, the current study aimed to examine whether social connectedness mediates the relationships between inflexibility, the suppression of emotional expression, and symptoms of depression and eating disorders in a clinical sample of treatment-seeking adolescents with restrictive eating disorders.

## Method

### Participants

A convenience sample of adolescents (11–18 years) presenting for Radically Open Dialectical Behaviour Therapy (RO DBT) treatment between 2015 and 2024 at the Maudsley Centre for Child and Adolescent Eating Disorders (MCCAED) were eligible for this study. An adolescent-adapted transdiagnostic RO DBT treatment programme that specifically targets overcontrol operates at MCCAED. See previous publications for an outline of service structures [49, 51], as well as the content, structure, experience and outcomes of the RO DBT programme [7–10].

This study included young people with an eating disorder referred for RO DBT-informed treatment. All had either a) received eating disorder focused family therapy [9, 18] but continued to experience high levels of eating disorder behaviours and cognitions that interfered with daily functioning despite partial or full weight restoration, and/or b) they presented to the RO-DBT-informed Intensive day Treatment Programme (ITP) due to partial or poor response to outpatient treatment. See previous literature for further details on the ITP programme and outcomes [8, 48] and experience [13, 24, 25].

### Ethical approval and consent to participate

This project was approved by the South London and Maudsley (SLAM) Child and Adolescent Mental Health (CAMHS) Service Evaluation and Audit Committee (Reference: 769). As this study constitutes service evaluation or audit, NHS Research Ethics Committee approval was not required. SLaM CAMHS service evaluation and audit approval allows for analysis and publication of anonymised data extracted from case files without written consent from participants or carers. Outcome measures were administered as part of routine clinical care. All methods were performed in accordance with the stipulated guidelines and regulations.

### Data collection and outcome measures

Self-report outcome measures were collected by clinical staff as part of routine clinical assessment at entry into the RO DBT programme. When possible, measures validated for adolescents were utilised, as described below. Otherwise, adult measures were used.

#### *Inflexibility*

The 4-item Inflexibility subscale of the Five Factor Obsessive Compulsive Inventory – Short Form (FFOCI; [28, 46]) was used to assess inflexibility. The FFOCI has not been validated for children and adolescents, although has been used with adolescents previously [7–9]. The FFOCI has good discriminant validity and internal consistency with undergraduate university samples [28].

#### *Suppression of emotional expression*

The suppression subscale of the Emotion Regulation Questionnaire (ERQ; [29]), a 6-item subscale of the full 10-item measure, was used to examine the suppression of emotional expression. This subscale specifically assesses how much someone inhibits the behavioural expression of their emotions to regulate themselves. The ERQ has demonstrated good reliability and validity [29], good internal consistency [45], and has been used with adolescents [7–9, 26].

#### *Social connectedness*

The Social Connectedness Scale (SCS-R; [38]) is a 20-item self-report scale used to assess connectedness that an individual feels in their social environment. Low scores are indicative of low levels of perceived social connectedness. This measure shows good internal consistency and validity with an adult sample [38], however has not been validated with adolescents.

#### *Symptoms of depression*

The Moods and Feelings Questionnaire (MFQ; [2]) was used to screen for symptoms of depression. It consists of 33 items and is designed for use with children and young adults. Scores of 27 and higher indicate the presence of depression [16, 56]. It has been shown to have good validity, reliability and internal consistency with adolescents [52].

#### *Eating disorder symptoms*

Over the course of treatment for this real-world clinical sample, two different measures to assess eating disorder symptom severity were used. The Eating Disorder Inventory – 3rd Version (EDI-3; [21]) was used between February 2015—January 2019 and the Eating Disorder Examination Questionnaire for Adolescents (EDE-Q–A [12]) between August 2018——August 2023. For young people who completed both the EDI and EDE-Q–A ($n = 15$) in the period between August 2018—January 2019, EDI-3 data were used.

The EDI-3 consists of 91 items organised into 12 primary scales. Five composite scales and a global score can be derived from the 12 subscales, including an eating disorder risk composite. The EDI-3 is widely used and has published adolescent norms [21]. The EDE-Q–A is also a validated instrument of eating disorder symptoms with available adolescent norms [12]. Given the use of two different measures during the recruitment period, a z-score was calculated and used in all analyses for the total sample.

Eating disorder diagnosis was confirmed during the initial assessment based on information gathered during the clinical interview and self-report data provided on the Development and Well-being Assessment (DAWBA; [27]). The DAWBA is a structured diagnostic assessment tool that generates predicted DSM-V (American Psychiatric [1]) and ICD-10 (World Health [57]) psychiatric diagnoses. It was completed prior to attending the initial assessment.

### Planned statistical analysis

A series of bivariate correlations were initially conducted between all variables of interest. Thereafter, four simple cross-sectional mediation analyses using ordinary least squares path analysis were conducted to investigate the relationship between the factors of interest.

Simple (Hayes model 4) mediation models in the PROCESS macro [30] were used for these analyses, which were run in SPSS version 29 [34]. A total of four models were planned: two for eating disorder symptoms and two for depressive symptoms. Percentile bootstrap confidence intervals (95%; seed = 031216) based on 5000 bootstrap samples are reported for the indirect effect (path ab) in each model.

The first mediation model (model 1) was tested with eating disorder symptomatology (ED z-score) as the dependent variable, inflexibility (FFOCI-inflexibility subscale score) as the independent variable, and social connectedness (SCS-R total score) as the mediator. The second planned mediation model (model 2) included eating disorder symptomatology (ED z-score) as the dependent variable, the suppression of emotional expression (ERQ-suppression) as the independent variable, and social connectedness (SCS-R total score) as the mediator.

Two mediator models were then tested with depressive symptoms (MFQ total score) as the dependent variable. The first (model 3) included inflexibility (FFOCI-inflexibility subscale score) as the independent variable and the second (model 4) included suppression of emotional suppression (ERQ-suppression) as the independent variable. Social connectedness (SCS-R total score) was entered as the mediator in both models.

#### *Covariates & sensitivity analysis*

Given the correlation between eating disorder symptoms, depressive symptoms, and weight, each model included two covariates; (1) weight (percentage of median Body Mass Index [%mBMI]) and (2) the mental health symptomatology that was not the dependent variable in each model (i.e. eating disorder symptomatology [ED z-score] in models 1 and 2 and depressive symptoms [MFQ total score] in model 3 and 4). Sensitivity analysis was conducted on all models by switching the mediator and independent variables to confirm the direction of the relationship between the variables in each model. See supplementary material.

#### *Power analysis*

Power calculations were conducted using the Monte Carlo Power Analysis tool developed for testing indirect effects [47]. To achieve a power of 0.80 or more, a sample size of $N \geq 52$ (95%CI: 0.86—0.90) is required.

## Results

### Group characteristics

The sample consisted of 109 adolescents (mean age = 15.21 years, *sd* = 1.48, range = 11–18). Most were female (105/109, 96.3%) and White (White British = 99/109, 90.8%; Asian British = 2/109, 1.8%; Black British = 2/109, 1.8%; Mixed Race = 6/109, 5.55). The majority were diagnosed with anorexia nervosa restrictive subtype (AN-R; 74/109, 67.9%) with the remaining diagnosed with anorexia nervosa binge-purge subtype (AN-BP; 21/109, 19.3%), atypical anorexia nervosa (A-AN; 9/109, 8.3%) and Other Specified Feeding or Eating Disorder (OSFED)/Eating Disorder Not Otherwise Specified (EDNOS; 5/109, 4.6%). Approximately two thirds ($n = 72/109$, 66.1%) scored above the clinical cut-off on the MFQ (total score of 27 or greater) indicating the likelihood of depression.

Thirty-nine adolescents (35.8%) came from the outpatient service and 70 (64.2%) from the Intensive day Treatment Programme (ITP). See previous publications for service descriptions and outcomes [8, 48, 49, 51]. Mean weight was 87.39%mBMI (*sd* = 12.58, range = 66.46 – 172.00). Forty-nine adolescents (45.0%) were considered

underweight (< 85%mBMI). See Table 1 for means and bivariate correlations between variables entered into the mediation analyses. Given ED z-score did not significantly correlate with the suppression of emotional expression the assumptions of a mediation analysis were not met and model 2 was not run. Additionally, as age was significantly correlated with social connectedness (see Table 1), the analyses were conducted with age as an additional covariate (see supplementary material).

### The mediating role of social connectedness on the relationship between inflexibility and eating disorder symptoms (model 1)

From the first mediation analysis, controlling for baseline %mBMI and depressive symptoms (MFQ total score), conducted using ordinary least squares path analysis, social connectedness did not indirectly influence the impact of inflexibility on the severity of eating disorder symptoms. Participants who rated themselves as more inflexible reported lower social connectedness (path a, p<.05), and those with lower social connectedness reported greater severity of eating disorder symptoms (path b, p<.05). However, the bootstrap confidence interval for the indirect effect (path ab) included zero. As such, there was no evidence of a significant mediating effect. The total effect c was also not significant (β = 0.02 [95% CI -0.05 – 0.08], $p = 0.94$, $N = 85$). See Fig. 1 and Table S1. Sensitivity analysis showed the indirect effect (path ab) was not significant when the independent variable and mediator variable were switched in the model (see Table S4). The pattern of findings remained the same once age was entered into the model as a covariate (see Table S7).

### The mediating role of social connectedness on the relationship between inflexibility and depressive symptoms (model 3)

From the third mediation analysis, controlling for baseline %mBMI and ED z-score, conducted using ordinary least squares path analysis, social connectedness indirectly influenced the impact of inflexibility on the severity of depressive symptoms. Participants who rated themselves as more inflexible reported lower social connectedness (path a), and those with lower social connectedness reported greater severity of depressive symptoms (path b). The bootstrap confidence interval for the indirect effect (path ab) was entirely above zero. The total effect c was significant (β = 1.58 [95% CI 0.64 –2.52], $p = 0.001$, $N = 85$). See Fig. 2 and Table S2. Again, sensitivity analysis showed the indirect effect (path ab) was not significant when the independent variable and mediator variable were switched in the model (see Table S5). The pattern of findings remained the same even after age was entered into the model as a covariate (see Table S8).

### The mediating role of social connectedness on the relationship between the suppression of emotional expression and depressive symptoms (model 4)

A similar pattern of findings was observed in the fourth mediation analysis. Controlling for baseline %mBMI and ED z-score, social connectedness indirectly influenced the impact of the suppression of emotional expression as a means of regulating emotions on the severity of depressive symptoms. Participants who supressed their emotional expression more, reported lower social connectedness (path a), and those with lower social connectedness reported greater severity of depressive symptoms (path b). The bootstrap confidence interval for

**Table 1** Means and bivariate correlations for all variables

| | N | Mean | SD | | MFQ | SCS-r | FFOCI-inflex | ERQ-supp | %mBMI | ED z-score |
|---|---|---|---|---|---|---|---|---|---|---|
| MFQ | 94 | 39.39 | 15.51 | ***r*** | – | – | – | – | – | – |
| - *Missing* | *15* | | | **N** | – | – | – | – | – | – |
| SCS-r | 109 | 63.28 | 19.72 | ***r*** | – 0.471*** | – | – | – | – | – |
| - *Missing* | *0* | | | **N** | 94 | – | – | – | – | – |
| FFOCI-inflex | 107 | 12.74 | 3.51 | ***r*** | 0.276** | -0.586*** | – | – | – | – |
| - *Missing* | *2* | | | **N** | 94 | 107 | – | – | – | – |
| ERQ-supp | 95 | 17.95 | 6.14 | ***r*** | 0.241** | – 0.371*** | 0.282** | – | – | – |
| - *Missing* | *14* | | | **N** | 93 | 95 | 95 | – | – | – |
| %mBMI | 109 | 87.39 | 12.58 | ***r*** | 0.344*** | – 0.364*** | 0.196* | 0.206* | – | – |
| - *Missing* | *0* | | | **N** | 85 | 96 | 95 | 87 | – | – |
| ED z-score | 109 | 0.00 | 0.96 | ***r*** | 0.190* | – 0.230** | 0.261** | – 0.015 | 0.017 | – |
| - *Missing* | *0* | | | **N** | 94 | 109 | 107 | 95 | 96 | – |
| Age | 109 | 15.21 | 1.48 | ***r*** | 0.014 | – 0.166* | 0.086 | 0.030 | 0.210* | 0.210* |
| - *Missing* | *0* | | | **N** | 94 | 109 | 107 | 95 | 96 | 96 |

ED, eating disorder; ERQ-supp, Suppression of Emotional Expression subscale of the Emotion Regulation Questionnaire; FFOCI-inflex, inflexibility subscale of the Five Factor Obsessive Compulsive Inventory Short Form; MFQ, Mood and Feelings Questionnaire total score; r, Pearson correlation coefficient; SCS-r, revised Social Connectedness Scale, sd = standard deviation; %mBMI, percentage of median Body Mass Index.

*p < 0.05, **p < 0.01, ***p < 0.001

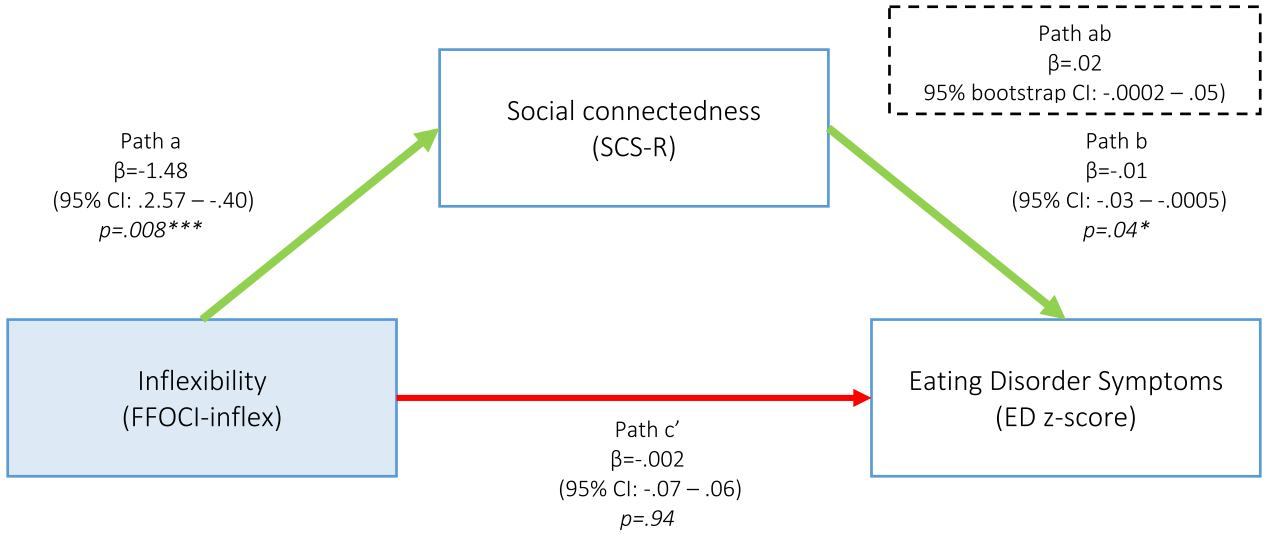


**Fig. 1** Cross-sectional mediation of the relationship between inflexibility on eating disorder symptom severity and the influence of social connectedness on this relationship

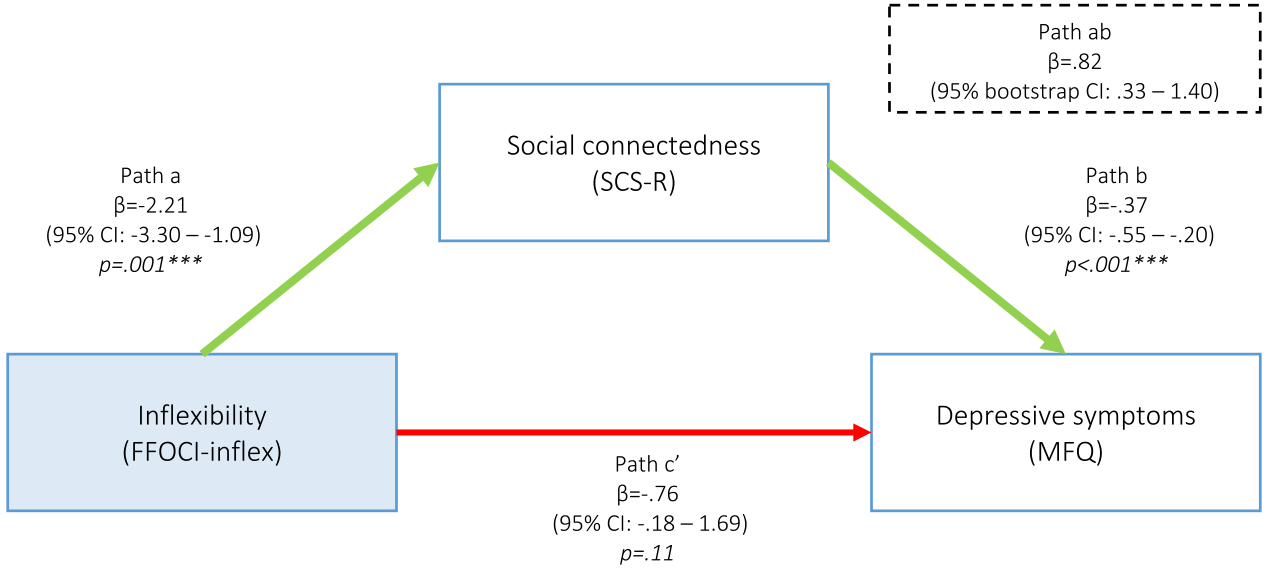


**Fig. 2** Cross-sectional mediation of the relationship between inflexibility on depressive symptom severity and the influence of social connectedness on this relationship

the indirect effect (path ab) was entirely above zero. The total effect c was not significant (β = 0.50 [95% CI -0.01 – 1.00], $p = 0.052$, $N = 85$). See Fig. 3 and Table S3. Sensitivity analysis showed the indirect effect (path ab) was not significant when the independent variable and mediator variable were switched in the model (see Table S6). As with model 3, the pattern of findings remained the same even after age was entered into the model as a covariate (see Table S9).

## Discussion

This study aimed to explore the possible mediating role of social connectedness on the relationship between inflexibility, the use of emotional suppression as an emotion regulation strategy, and symptoms of eating disorders and depression in a treatment-seeking sample of adolescents with anorexia nervosa and related restrictive eating disorders. The current findings indicate that social connectedness does influence the relationships between both inflexibility and the suppression of emotional expression on depressive symptoms—two factors that have been demonstrated to be associated with depression and poorer mental health [33, 50, 53, 58]. In both

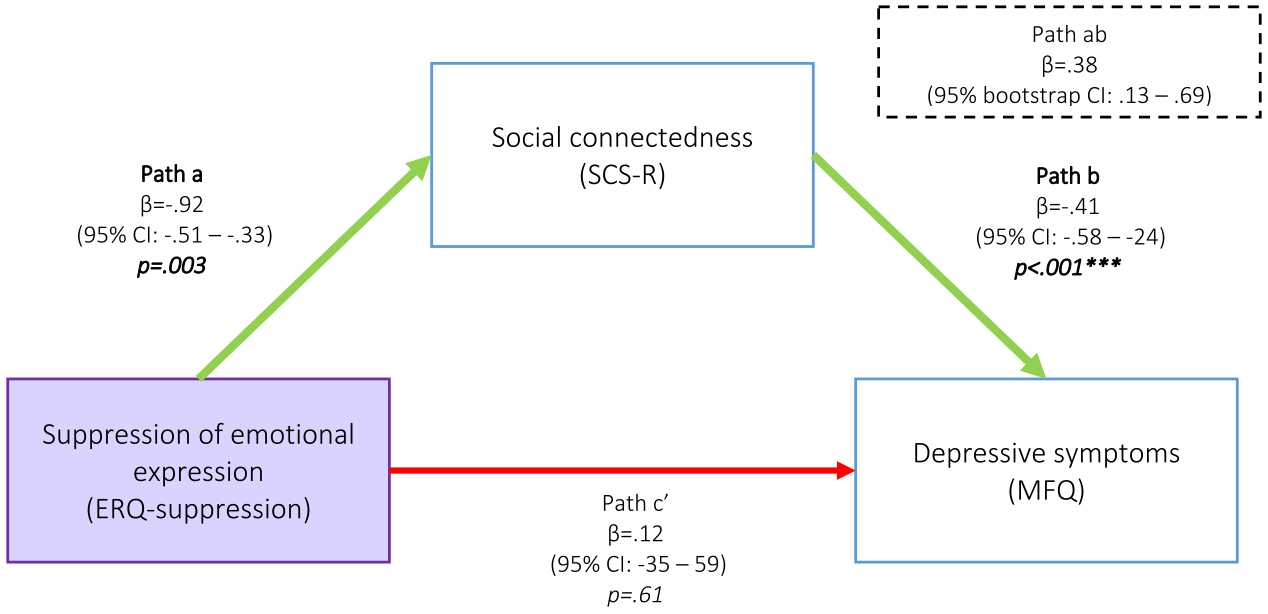


**Fig. 3** Cross-sectional mediation of the relationship between the suppression of emotional expression on depressive symptom severity and the influence of social connectedness on this relationship

mediation models, greater social connectedness reduced the impact of both inflexibility and the suppression of emotional expression on depressive symptoms. Findings indicated that social connectedness did not mediate the relationship between inflexibility and eating disorder symptoms. The planned analysis to assess the mediating role of social connectedness on the relationship between the suppression of emotional expression and eating disorder symptoms was not able to be conducted due to assumptions not being met. As such, no conclusions can be made about this from the current study. The overall conclusions of the study are strengthened by the non-significant sensitivity analysis findings. This indicates that social connectedness mediates the relationship between the variables tested and mental health symptom severity, but the other factors (inflexibility and suppression of emotional expression) do not mediate the relationship between social connectedness and mental health symptom severity.

Taken together the findings highlight the importance and potential benefit of targeting social connectedness in treatments for adolescents presenting with restrictive eating disorders and low mood, particularly for those reporting higher levels of inflexibility and who suppress their emotional expression more. For this group, findings from this study suggest improving social connectedness may help to buffer against the severity of low mood. Nevertheless, findings suggest that social connectedness does not seem to protect against the impact of inflexibility on restrictive eating disorder symptoms themselves. While not directly impacting eating disorder symptoms, the findings are encouraging as many young people present with co-morbid low mood, and social connectedness is a modifiable factor that can be targeted in treatment. It also fits with qualitative data that taking a holistic approach to the young person and family during treatment, as opposed to being overly symptom focussed, is valued in first-line adolescent eating disorder treatment [5, 6, 14, 43] and is part of what is perceived to be helpful in progressing treatment in more intensive treatment options [3–6, 13, 25].

In current first line recommended treatments for adolescent restrictive eating disorders, social connectedness is not identified as a specific treatment target [44]. While supporting social functioning is likely incorporated into day-to-day clinical practice, rarely is specific guidance provided on how to do this. This is one of the core mechanisms of change within RO DBT [31, 40]. Although an evidence base is only beginning to emerge for adolescents [7–10, 19], the current data support the empirical investigation of interventions that target social connectedness. It calls for treatments to take a broad view of psychosocial well-being and a holistic view on treatment targets in addition to food and eating related behaviours and psychopathology. The current findings also indicate that age and developmental stage may also be important to consider.

### Limitations and future directions

While informative, the current findings are limited by the cross-sectional nature of the data. One study in adult depression found that improvements in inflexibility and interpersonal functioning across treatment are associated with improved outcomes at the end of treatment [22],

suggesting that not only are these important to consider at baseline, but they are modifiable during treatment. Future research examining the temporal shift in social connectedness and how this impacts symptom severity is warranted. Similarly, there was no screen for neurodiversity in the current study, which is likely to impact several of the factors assessed. It would be useful to understand whether these factors interact differently for people with Autism and other neurodevelopmental conditions. Nevertheless, the data suggest targeting social connectedness directly in treatment may be useful in improving mental health symptoms. Lastly, the current study included two groups of young people – those attending outpatient and day programme treatment. Due to a lack of power, subgroup analyses were not possible. Future research on how these group may differ in presentation is warranted.

## Conclusion

The current findings indicate that self-reported increases in social connectedness mediate the relationship between inflexibility and the suppression of emotional expression as an emotion regulation strategy on depressive symptoms. There was no evidence that it mediates the relationship between inflexibility on eating disorder symptom severity, even though some of these variables were correlated. The findings highlight the importance of social connectedness and suggest targeting this directly in adolescent eating disorder treatment may be beneficial for those presenting with co-morbid depressive symptoms.

### Abbreviations

| | |
|---|---|
| %mBMI | Percentage of median body mass index |
| CAMHS | Child and Adolescent Mental Health Service |
| DAWBA | Development and Well-being Assessment |
| DBT | Dialectical Behaviour Therapy |
| DSM-V | Diagnostic and Statistical Manual, 5th edition |
| ERQ | Emotion regulation questionnaire |
| FFOCI | The Five Factor Obsessive Compulsive Inventory–Short Form |
| FT-ED | Eating dissorder focussed family therapy |
| ICD-10 | International Classification of Diseases, 10th edition |
| MCCAED | Maudsley Centre for Child and Adolescent Eating Disorders |
| MFQ | Mood and Feelings Questionnaire |
| RO DBT | Radically Open Dialectical Behaviour Therapy |
| SCS-R | Social Connectedness Scale-Revised |

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40337-025-01440-6.

Supplementary material 1.

### Acknowledgements

The authors would like to thank the adolescents in this study.

### Author contributions

JB was involved in all aspects of this project. JB, LG and MS contributed by collecting and analysing data as well as manuscript preparation. MS, MF and KG assisted with data interpretation and manuscript preparation. All reviewed and accepted the final manuscript.

### Funding

There was no external funding for this study. MFS and KG both receive salary support from the National Institute of Mental Health (MFS: 1F31MH137979-01A1.; KG: 5R01MH126984-04).

### Availability of data and materials

Data generated for this evaluation are available upon reasonable request.

## Declarations

### Ethics approval and consent to participate

This study was approved by the SLaM CAMHS Service Evaluation and Audit Committee. As this study constitutes service evaluation or audit, NHS Research Ethics Committee approval was not required. SLaM CAMHS service evaluation and audit approval allows for analysis and publication of anonymised data extracted from case files without written consent from participants or carers. All methods were performed in accordance with the required guidelines and regulations.

### Consent for publication

SLaM CAMHS service evaluation and audit approval allows for publication of anonymised data extracted from case files without written consent from participants or carers.

### Competing interests

The authors declare no competing interests.

### Author details

[1]Maudsley Centre for Child and Adolescent Eating Disorders (MCCAED), Maudsley Hospital, De Crespigny Park, Denmark Hill, London SE5 8AZ, UK
[2]Centre for Research in Eating and Weight Disorders (CREW), Institute of Psychiatry, Psychology & Neuroscience, King's College London, De Crespigny Park, Denmark Hill, London SE5 8AZ, UK
[3]Department of Psychiatry, Washington University School of Medicine, St. Louis, MO, USA

Received: 28 April 2025 / Accepted: 14 October 2025
Published online: 12 November 2025

### References

1. AP Association. Diagnostic and statistical manual of mental disorders: DSM-5 5. Washington, D.C.: American Psychiatric Association; 2013.
2. Angold A, Costello EJ, Messer SC, Pickles A, Winder F, Silver D. The development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. Int J Methods Psychiatr Res. 1995;5:237–49.
3. Baudinet J, Eisler I. Multi-family therapy for eating disorders across the lifespan. Curr Psychiatry Rep. 2024;26:323–9. https://doi.org/10.1007/s11920-024-01504-5.
4. Baudinet J, Eisler I, Konstantellou A, Hunt T, Kassamali F, McLaughlin N, et al. Perceived change mechanisms in multi-family therapy for anorexia nervosa: a qualitative follow-up study of adolescent and parent experiences. Eur Eat Disord Rev. 2023;31(6):822–36. https://doi.org/10.1002/erv.3006.
5. Baudinet J, Eisler I, Konstantellou A, Simic M, Schmidt U. How young people perceive change to occur in family therapy for anorexia nervosa: a qualitative study. J Eat Disord. 2024;12(1):11. https://doi.org/10.1186/s40337-024-00971-8.
6. Baudinet J, Eisler I, Roddy M, Turner J, Simic M, Schmidt U. Clinician perspectives on how change occurs in multi-family therapy for adolescent anorexia nervosa: a qualitative study. J Eat Disord. 2024;12(1):103. https://doi.org/10.1186/s40337-024-01064-2.
7. Julian Baudinet Mima Simic Ivan Eisler 2021 'From Treatment Models to Manuals: Maudsley Single- and Multi-Family Therapy for Adolescent Eating Disorders' in Systemic Approaches to Manuals, European Family Therapy Association Series M Mariotti G Saba Eds and P Stratton Springer. Cham
8. Baudinet J, Simic M, Griffiths H, Donnelly C, Stewart C, Goddard E. Targeting maladaptive overcontrol with radically open dialectical behaviour therapy

in a day programme for adolescents with restrictive eating disorders: an uncontrolled case series. J Eat Disord. 2020;8(1):68. https://doi.org/10.1186/s40337-020-00338-9.
9. Baudinet J, Stewart C, Bennett E, Konstantellou A, Parham R, Smith K, et al. Radically open dialectical behaviour therapy adapted for adolescents: a case series. BMC Psychiatry. 2021;21(1):462. https://doi.org/10.1186/s12888-021-03460-3.
10. Baudinet J, Watson C, Brothwood PL, Parham R, Smith L, Snowden N, et al. Adolescent experience of radically open dialectical behaviour therapy: a qualitative study. BMC Psychiatry. 2022;22(1):466. https://doi.org/10.1186/s12888-022-04114-8.
11. Block VJ, Haller E, Villanueva J, Meyer A, Benoy C, Walter M, et al. Meaningful relationships in community and clinical samples: their importance for mental health. Front Psychol. 2022;13:832520. https://doi.org/10.3389/fpsyg.2022.832520.
12. Carter JC, Stewart DA, Fairburn CG. 'Eating Disorder Examination Questionnaire: Norms for Young Adolescent Girls.' Behav Res Ther. 2001;39(5):625–32. https://doi.org/10.1016/S0005-7967(00)00033-4.
13. Colla A, Baudinet J, Cavenagh P, Senra H, Goddard E. Change processes during intensive day programme treatment for adolescent anorexia nervosa: a dyadic interview analysis of adolescent and parent views. Front Psychol. 2023. https://doi.org/10.3389/fpsyg.2023.1226605.
14. Cripps S, Serpell L, Pugh M. Processes of change in family therapies for anorexia nervosa: a systematic review and meta-synthesis of qualitative data. J Eat Disord. 2024;12(1):104. https://doi.org/10.1186/s40337-024-01037-5.
15. Dailey SF, Parker MM, Campbell A. Social connectedness, mindfulness, and coping as protective factors during the COVID-19 pandemic. J Couns Dev. 2023;101(1):114–26. https://doi.org/10.1002/jcad.12450.
16. Daviss WB, Birmaher B, Melhem NA, Axelson DA, Michaels SM, Brent DA. Criterion validity of the mood and feelings questionnaire for depressive episodes in clinic and non-clinic subjects: criterion validity of mood and feelings questionnaire. J Child Psychol Psychiatry. 2006;47(9):927–34. https://doi.org/10.1111/j.1469-7610.2006.01646.x.
17. Dryman MT, Heimberg RG. Emotion regulation in social anxiety and depression: a systematic review of expressive suppression and cognitive reappraisal. Clin Psychol Rev. 2018;65:17–42. https://doi.org/10.1016/j.cpr.2018.07.004.
18. Eisler, Ivan, Mima Simic, Esther Blessitt, Liz Dodge, and MCCAED Team. 2016. 'Maudsley Service Manual for Child and Adolescent Eating Disorders.'
19. Fennig M, Agali U, Looby M, Gilbert K. 'Telehealth-delivered radically open dialectical behavior therapy for adolescents (RO DBT-A): a pilot mixed-methods study.' Am J Psychother. 2024. https://doi.org/10.1176/appi.psychotherapy.20230025.
20. Fernandes MA, Tone EB. 'A Systematic review and meta-analysis of the association between expressive suppression and positive affect.' Clin Psychol Rev. 2021;88:102068. https://doi.org/10.1016/j.cpr.2021.102068.
21. Garner DM. Eating disorder inventory-3. Professional manual. Lutz, FL: Psychological Assessment Resources Inc; 2004.
22. Gilbert K, Codd RT, Hoyniak C, Tillman R, Baudinet J, Pires PP, et al. 'Processes of change in a randomized clinical trial of radically open dialectical behavior therapy (RO DBT) for adults with treatment-refractory depression.' J Consult Clin Psychol. 2023;91(2):71–81. https://doi.org/10.1037/ccp0000795.
23. Gilbert K, Perino MT, Myers MJ, Sylvester CM. Overcontrol and neural response to errors in pediatric anxiety disorders. J Anxiety Disord. 2020;72:102224. https://doi.org/10.1016/j.janxdis.2020.102224.
24. Gledhill, Lucinda J., Chiara Calissano, Jasmin Turner, Charlotte Watson, Mima Simic, and Julian Baudinet. 2024. 'What Is Day Programme Treatment for Anorexia Nervosa Really like? Part 2: A Reflexive Thematic Analysis of Feedback from Parents'.
25. Gledhill LJ, MacInnes D, Chan SC, Drewery C, Watson C, Baudinet J. What is day hospital treatment for anorexia nervosa really like? A reflexive thematic analysis of feedback from young people. J Eat Disord. 2023;11(1):223. https://doi.org/10.1186/s40337-023-00949-y.
26. Gómez-Ortiz O, Romera EM, Ortega-Ruiz R, Cabello R, Fernández-Berrocal P. Analysis of emotion regulation in spanish adolescents: validation of the emotion regulation questionnaire. Front Psychol. 2016. https://doi.org/10.3389/fpsyg.2015.01959.
27. Goodman R, Ford T, Richards H, Gatward R, Meltzer H. The development and well-being assessment: description and initial validation of an integrated assessment of child and adolescent psychopathology. J Child Psychol Psychiatry. 2000;41(5):645–55. https://doi.org/10.1111/j.1469-7610.2000.tb02345.x.
28. Griffin SA, Suzuki T, Lynam DR, Crego C, Widiger TA, Miller JD, et al. Development and examination of the five-factor obsessive-compulsive inventory-short form. Assessment. 2016;25(1):56–68.
29. Gross JJ, John OP. Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. J Pers Soc Psychol. 2003;85(2):348–62. https://doi.org/10.1037/0022-3514.85.2.348.
30. Hayes AF. Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach, Third Edition. 3rd ed. New York: Guilford Press; 2022.
31. Hempel RJ, Trent Codd R, Baudinet J, Simic M. Radically Open Dialectical Behavior Therapy. In: Bach B, editor. ICD-11 Personality disorders: assessment and Treatment. Oxford: University Press; 2025.
32. Hempel R, Vanderbleek E, Lynch TR. Radically open DBT: targeting emotional loneliness in anorexia nervosa. Eat Disord. 2018;26(1):92–104. https://doi.org/10.1080/10640266.2018.1418268.
33. Hu T, Zhang D, Wang J, Mistry R, Ran G, Wang X. Relation between emotion regulation and mental health: a meta-analysis review. Psychol Rep. 2014;114(2):341–62. https://doi.org/10.2466/03.20.PR0.114k22w4.
34. IBM. 2019. 'Statistical Package for Social Sciences (SPSS)'.
35. Kaye WH, Wierenga CE, Bailer UF, Simmons AN, Bischoff-Grethe A. Nothing tastes as good as skinny feels: the neurobiology of anorexia nervosa. Trends Neurosci. 2013;36(2):110–20. https://doi.org/10.1016/j.tins.2013.01.003.
36. Krafft J, Ferrell J, Levin ME, Twohig MP. Psychological inflexibility and stigma: a meta-analytic review. J Context Behav Sci. 2018;7:15–28. https://doi.org/10.1016/j.jcbs.2017.11.002.
37. Lamblin M, Murawski C, Whittle S, Fornito A. Social connectedness, mental health and the adolescent brain. Neurosci Biobehav Rev. 2017;80:57–68. https://doi.org/10.1016/j.neubiorev.2017.05.010.
38. Lee RM, Draper M, Lee S. 'Social connectedness, dysfunctional interpersonal behaviors, and psychological distress: testing a mediator model.' J Couns Psychol. 2001;48(3):310–8. https://doi.org/10.1037/0022-0167.48.3.310.
39. Li G, Li Y, Lam AIF, Tang W, Seedat S, Barbui C, et al. 'Understanding the protective effect of social support on depression symptomatology from a longitudinal network perspective.' BMJ Ment Health. 2023;26(1):e300802. https://doi.org/10.1136/bmjment-2023-300802.
40. Lynch TR. Radically open dialectical behavior therapy: theory and practice for treating disorders of overcontrol. Oakland: Context Press/New Harbinger Publications; 2018.
41. Lynch TR, Hempel RJ, Whalley B, Byford S, Chamba R, Clarke P, et al. Refractory depression – mechanisms and efficacy of radically open dialectical behaviour therapy (RefraMED): findings of a randomised trial on benefits and harms. Br J Psychiatry. 2020;216(4):204–12. https://doi.org/10.1192/bjp.2019.53.
42. Mann F, Wang J, Pearce E, Ma R, Schlief M, Lloyd-Evans B, et al. Loneliness and the onset of new mental health problems in the general population. Soc Psychiatry Psychiatr Epidemiol. 2022;57(11):2161–78. https://doi.org/10.1007/s00127-022-02261-7.
43. Medway M, Rhodes P. Young people's experience of family therapy for anorexia nervosa: a qualitative meta-synthesis. Adv Eat Disord. 2016;4(2):189–207. https://doi.org/10.1080/21662630.2016.1164609.
44. National Institute for Health and Care Excellence (NICE). 2017. *Eating Disorders (NICE Guideline Ng69)*. Retrieved from: https://www.nice.org.uk/guidance/ng69.
45. Preece DA, Becerra R, Robinson K, Gross JJ. The emotion regulation questionnaire: psychometric properties in general community samples. J Pers Assess. 2020;102(3):348–56. https://doi.org/10.1080/00223891.2018.1564319.
46. Samuel DB, Riddell ADB, Lynam DR, Miller JD, Widiger TA. A five-factor measure of obsessive-compulsive personality traits. J Pers Assess. 2012;94(5):456–65. https://doi.org/10.1080/00223891.2012.677885.
47. Schoemann AM, Boulton AJ, Short SD. Determining power and sample size for simple and complex mediation models. Soc Psychol Personal Sci. 2017;8(4):379–86. https://doi.org/10.1177/1948550617715068.
48. Simic M, Stewart CS, Eisler I, Baudinet J, Hunt K, O'Brien J, et al. Intensive treatment program (ITP): a case series service evaluation of the effectiveness of day patient treatment for adolescents with a restrictive eating disorder. Int J Eat Disord. 2018;51(11):1261–9. https://doi.org/10.1002/eat.22959.
49. Simic M, Stewart CS, Konstantellou A, Eisler I, Baudinet J. From efficacy to effectiveness: child and adolescent eating disorder treatments in the real world (part 1) – treatment course and outcomes. J Eat Disord. 2022;10(1):27. https://doi.org/10.1186/s40337-022-00553-6.
50. Smith BM, Twohy AJ, Smith GS. Psychological inflexibility and intolerance of uncertainty moderate the relationship between social isolation and mental

health outcomes during COVID-19. J Context Behav Sci. 2020;18:162–74. https://doi.org/10.1016/j.jcbs.2020.09.005.
51. Stewart CS, Baudinet J, Munuve A, Bell A, Konstantellou A, Eisler I, et al. From efficacy to effectiveness: child and adolescent eating disorder treatments in the real world (Part 2): 7-year follow-up. J Eat Disord. 2022;10(1):14. https://doi.org/10.1186/s40337-022-00535-8.
52. Thabrew H, Stasiak K, Bavin L-M, Frampton C, Merry S. 'Validation of the mood and feelings questionnaire (MFQ) and short mood and feelings questionnaire (SMFQ) in New Zealand help-seeking adolescents.' Int J Methods Psychiatr Res. 2018. https://doi.org/10.1002/mpr.1610.
53. Torres-Fernández G, Rodríguez-Valverde M, Reyes-Martín S, Hernández-Lopez M. The role of psychological inflexibility and experiential approach on mental health in children and adolescents: an exploratory study. Behav Sci. 2022;12(7):201. https://doi.org/10.3390/bs12070201.
54. Vella C, Berry C, Easterbrook MJ, Michelson D, Bogen-Johnston L, Fowler D. 'The mediating role of social connectedness and hope in the relationship between group membership continuity and mental health problems in vulnerable young people.' BJPsych Open. 2023;9(4):e130. https://doi.org/10.1192/bjo.2023.500.
55. Wickramaratne PJ, Yangchen T, Lepow L, Patra BG, Glicksburg B, Talati A, et al. Social connectedness as a determinant of mental health: a scoping review. PLoS ONE. 2022;17(10):e0275004. https://doi.org/10.1371/journal.pone.0275004.
56. Wood A, Kroll L, Moore A, Harrington R. 'Properties of the mood and feelings questionnaire in adolescent psychiatric outpatients: a research note.' Child Psychol Psychiat All Discipl. 1995;36(2):327–34. https://doi.org/10.1111/j.1469-7610.1995.tb01828.x.
57. Organization WH. International statistical classification of diseases and related health problems (ICD-10) 10th revision 2. Geneva: World Health Organization; 2004.
58. Yao X, Xu X, Chan KL, Chen S, Assink M, Gao S. Associations between psychological inflexibility and mental health problems during the COVID-19 pandemic: a three-level meta-analytic review. J Affect Disord. 2023;320:148–60. https://doi.org/10.1016/j.jad.2022.09.116.

## Publisher's Note