# An evaluation of efficacy and acceptability of a novel manualised JuniorLEAP group programme for compulsive exercise, for children and adolescents with anorexia nervosa, within an inpatient setting

Luisa Mang(a), Amie Garghan(a), Jessica Grant(a), Prof Hubert Lacey (a, b), Rachel Matthews (a)

(a) Newbridge House, Birmingham, United Kingdom

(b) St George’s, University of London, London, United Kingdom

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Corresponding author: Hubert Lacey

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Abstract

Purpose: Compulsive exercise is a symptom and a maintenance factor of eating disorders, which increases the risk of relapse. It has been considered a target for treatment, particularly for anorexia nervosa (AN). This audit aims to review the efficacy and acceptability of a new seven-week JuniorLEAP group therapy programme, for children and adolescents with anorexia nervosa. JuniorLEAP was adapted by the authors and based on the Loughborough Eating Disorder Activity Programme (LEAP) for adults.

Methods: 32 children and adolescents with anorexia nervosa were allocated to the group in an in-patient setting using entry criteria. All children and adolescents completed seven weekly sessions of the JuniorLEAP programme, as well as pre- and post-treatment questionnaires, including the Eating Disorder Examination Questionnaire (EDE-Q) and the Compulsive Exercise Test (CET). The children and adolescents were also asked to provide qualitative responses about the acceptability of the group. A paired t-test was conducted to review the efficacy of the JuniorLEAP programme.

Results: Significant changes in eating disorder psychopathology was observed, as measured by the EDE-Q, with total mean scores reducing from 3.53 to 2.77 (p= 0.001). Compulsive exercise attitudes were also observed to reduce, as measured by the CET, with total mean scores reducing from 15.39 to 10.90 (p = <0.001). Furthermore, there was a significant reduction in all five subscales of the CET following completion of the group. Qualitative results also demonstrate the group to be acceptable to the patients.

Conclusion: This study finds that a new manualised JuniorLEAP group therapy, specifically adapted for adolescents and children with AN, when used as an adjuvant with other therapies in a residential setting, significantly reduces their compulsive exercise, as measured by CET. The patients reported that the treatment was acceptable. Further research testing the new treatment in a randomised controlled trial is now needed, particularly to disentangle the impact of other aspects of standard treatment in reducing compulsive exercise.

Key words: Compulsive Exercise, adolescents, Eating Disorders, anorexia nervosa, group therapy

Level of Evidence: II

Introduction

Compulsive exercise has been defined as highly rigid, resulting in negative effects on psychological and physical health [1]. It includes rigid exercise routines, and is characterised by compulsions to exercise despite injury, prioritising exercise over other activities and experiences of anxiety if the individual is unable to exercise [2]. Compulsive exercise has been identified as a core symptom of eating disorders, particularly anorexia nervosa (AN) [3, 4]. Individuals diagnosed with AN have been shown to present with more frequent exercise behaviour and more prevalent compulsive exercise attitudes than those diagnosed with bulimia nervosa (BN) [4]. Research also suggests that excessive and compulsive exercise is reported in around 20 – 80% of individuals diagnosed with an eating disorder [2]. Furthermore, Solenberger [5] reports that adults with AN and compulsive exercise difficulties require a longer admission than those who do not excessively exercise. Compulsive exercise symptoms have also been associated with more severe psychopathology, poorer treatment outcomes [4] and a higher risk of relapse [4, 6]. It has therefore been considered a key target in treatment.

Many consider the behaviour to be part of the development and maintenance of the disorder [7, 8, 9], with many individuals with eating disorders having a strong desire to engage in physical activity to comply with unrealistic, thin body ideals [2]. This strategy for weight loss has been identified as harmful, and is widely recognised as a compensatory behaviour within eating disorder diagnostic criteria [10]. Within the child and adolescent population, compulsive exercise represents the most frequent compensatory behaviour and it has been considered a ‘gateway’ behaviour for further compensatory behaviour such as vomiting and the use of laxatives [11]. This evidence further supports the need for treatment to target compulsive exercise within eating disorder populations.

To our knowledge there are no evidence-based therapeutic interventions to challenge compulsive exercise for children and adolescents with eating disorders. The Loughborough Eating Disorder Activity Programme (LEAP) is the only evidence-based programme that addresses this for adults [12]. In many eating disorder settings, physical activity is often restricted due to the evidence that it plays a role in maintaining the disorder, unfortunately, this deprives patients of the potential benefits of engaging in healthy physical activity [2]. The aim of the LEAP programme is to support individuals in developing knowledge and skills to regain control of their exercise behaviour and engage in exercise behaviour that is appropriate for their age and health status [13]. It has further been identified that, as well as weight and shape reasons, exercise can be used for emotion regulation [10]. Schlegl [14] found that individuals with eating disorders use exercise primarily for weight and shape control, to improve physical attractiveness and for mood regulation, compared to healthy controls, who identified health reasons as a primary motivation. This therefore suggests that compulsive exercise treatment should also incorporate psycho-education relating to emotion regulation. Furthermore, researchers have emphasised the importance of addressing patient’s attitudes, thoughts and motivations towards exercise rather than just the quantity [10]. LEAP utilises a Cognitive Behavioural model and the programme acknowledges the multiple maintaining factors for compulsive exercise, including emotion regulation. It incorporates behavioural experiments to reduce exercise behaviour, cognitive activities to challenge maladaptive attitudes and beliefs, education around ‘healthy’ exercise and encourages the development of alternative coping strategies and relapse prevention planning [13]. Furthermore, Danielsen [10] suggested that it is important to be aware of physical activity that may not ordinarily be considered as exercise, such as restlessness, excessive standing and walking or the rejection of any form of relaxation. The LEAP programme acknowledges all forms of physical activity when challenging compulsive exercise.

A randomised controlled trial studied the efficacy of LEAP in conjunction with Cognitive Behavioural Therapy (CBT), in comparison to CBT alone. Results demonstrated a significant reduction in the severity of compulsive exercise, in both treatment conditions. However, at 6-month follow-up, Body Mass Index (BMI) was significantly higher in the LEAP group. Furthermore, primary outcomes indicated reduced exercise cognitions with secondary outcomes of reduced exercise behaviour and psychopathology [13]. A recent editorial has highlighted the need for treatment to address compulsive exercise in adolescents with eating disorders [15]. The authors, all staff at a specialist adolescent eating disorder hospital called Newbridge House, therefore adapted the programme for a younger population.

Development of JuniorLEAP

Initially, the authors used the adult version in a series of audits; the adolescent patients were unhappy with the programme and there was significant drop-out. JuniorLEAP was developed as a brief intervention for children and adolescents with all eating disorder diagnoses, including AN and BN. Adaptations included simplifying the exercise maintenance formulation, as well as some of the content. Each session, except for Session Zero has specific power point slides, in order to visualise the learning. The development was an iterative process involving patients, and each version was tested in audit before a version was found that held the children’s attention and interest.

Like the LEAP programme the JuniorLEAP group also utilises a cognitive behaviour approach. The seven sessions focus on the factors and processes that maintain the unhelpful exercise behaviours (see Table 1). It uses psycho-education, monitoring records and cognitive restructuring techniques to address the children’s and adolescents’ difficulties. As with the original adult LEAP programme, JuniorLEAP is an active group, which means that the patients take responsibility for behavioural change. The therapists’ roles are to provide the information, guide the children and adolescents through the content, encourage and support to help them make the necessary changes.

This study aimed to explore the efficacy and acceptability of JuniorLEAP for children and adolescents with eating disorders, by comparing measures of psychopathology and compulsive exercise before (T0) and following completion of the group (T1). Acceptability was assessed through qualitative patient feedback on completion of the group.

Methods

**Participant Characteristics**

Data were derived from seven separate groups and a total of 32 children and adolescents (31 girls and one boy) currently accessing treatment for an eating disorder, at a specialist inpatient eating disorder service. All 32 children and adolescents had a primary diagnosis of AN. Four children and adolescents had a comorbid diagnosis; two diagnoses of Autism Spectrum Condition (ASC), one diagnosis of Obsessive-compulsive disorder and another of Anxiety. 25 children and adolescents were receiving CBT-E as individual therapy, while seven were receiving psychodynamic psychotherapy. Besides the individual psychological support offered within the inpatient setting, the children and adolescents also attended groups or 1:1 support with Occupational Therapists, Dieticians, Nurses, Psychologists and Psychiatrists. Some of these treatments were practical dealing with meals or food preparation, others were psychological addressing body image, self-esteem or family therapy. Other groups were psycho-educational. Medication is rarely used and always briefly, details have not been included in this research project. All treatments took place around the in-house school teaching programme which maintained the children’s education. Details of all these activities can be found on the Newbridge House website.

**Therapy**

**Table 1**. JuniorLEAP Group session outline

|  |  |
| --- | --- |
| Session 0 – JuniorLEAP Exercise profile | Completion of JuniorLEAP exercise profile; completion of questionnaire pack. Initial introduction and explanation. Questions. |
| Session 1 – Introduction to JuniorLEAP | Introduction to the JuniorLEAP group and its aims; definitions of key words; introduction to maintenance formulation for compulsive exercise; introduction to monitoring records and leisure questionnaires. |
| Session 2 – Eating Disorders and Exercise | Introduction to Activity Anorexia Theory and weight and shape concerns; reflection on initiating and maintaining factors for exercise. |
| Session 3 – Exercise Dependence | Introduction to positive and negative reinforcement; introduction to psychological dependence on exercise. |
| Session 4 - Compulsivity | Reflection on myths and facts about exercise; introduction to cognitive restructuring techniques; children and adolescents are challenged not to attend leisure activities, such as Yoga, which is on offer weekly. |
| Session 5 – Strict Rules | Introduction to the relationship between holding beliefs about exercise and strict rules, resulting in behavioural rigidity. Children and adolescents are encouraged to consider own rules and encouraged to set more flexible and healthy ones. |
| Session 6 – Healthy Exercise and Relapse Prevention | Reviewing the difference between healthy and unhealthy exercise behaviours; introduction of techniques to manage urges. |

This seven week group therapy programme is an adaption of the original LEAP group for a younger population. All adaptations were made by the authors and with service user involvement from some of the children and adolescents that attended the group. Children and adolescents with current or historical compulsive exercise urges were allocated to the group. Inpatients who were very active or have an active family were also considered for the group, even if their exercise behaviour was not considered unhealthy on admission. This was to reduce the risk of excessive exercise behaviour developing later in the recovery process particularly as other eating disorder behaviours are given up. The children and adolescents were allocated to the group when it was deemed clinically appropriate for them to engage in healthy exercise, which would equate to a minimum of 85% median BMI (mBMI). All individuals started and finished the group at the same time, in order to maintain the integrity of each group.

The first session was done in a 1:1 setting, in which the young person meets with an Assistant Psychologist or CBT Therapist, in order to develop their own exercise plan. This session identified reasons for the patient’s exercise and the function that exercise serves in the patient’s psychopathology. The subsequent six sessions were completed in groups of four to six children and adolescents and were all co-facilitated by two members of staff (two Assistant Psychologists or one Assistant Psychologist and one CBT Therapist). All subjects in this study completed the full seven week programme (Table 1.).

In order to maximise the benefit and maintain group momentum, the children and adolescents were encouraged to complete the monitoring records between sessions and to practise techniques that had been used in the preceding sessions. The monitoring records required the young people to make a note of times when they had experienced the urge to exercise, how strong the urge was and whether they were able to overcome it, or whether they gave into the urge.

**Quantitative Measures**

Participants completed self-report questionnaires assessing their eating disorder psychopathology and compulsive exercise.

*Eating Disorder Examination Questionnaire (EDE-Q; [16])*

The 28 items assess attitudes and behaviours relating to eating, weight and body image. The items can be categorised into four subscales, namely "Dietary Restraint”, “Eating Concern”, “Shape Concern” and “Weight concern”. Participants rate each item on a seven point scale (ranging from zero - six) rating whether the statements are applicable to their own attitudes, with higher scores indicating greater severity of psychopathology. An overall score can be obtained, by calculating an average of all subscales, for a global measurement. This scale is a reliable measure of eating psychopathology in a clinical sample of females with a diagnosis of an eating disorder.

*Compulsive Exercise Test (CET; [17])*

This measure is used to examine individuals’ maintaining factors of compulsive exercise, specifically for individuals with an eating disorder diagnosis. The 24 items make up five subscales, namely “Avoidance and Rule Driven Behaviour” (ARDB), “Weight Control Exercise” (WCE), “Mood Improvement” (MI), “Lack of Exercise Enjoyment (LEE) and “Exercise Rigidity” (ER). An overall score can be obtained, by summing all subscales, for a global measurement. Each item is rated on applicability to their own beliefs and behaviours, from “not at all” (zero-points) to “always” (five-points). The higher the total and subscale scores, the greater the compulsive exercise symptoms.

**Qualitative Measures**

The children and adolescents were asked to rate each session on its helpfulness from one (not helpful at all) to 10 (extremely helpful). The children and adolescents were also asked a set of questions including: “What did you think about the group?”; “What did you find most helpful?”; “What did you find unhelpful about the sessions?”. These feedback forms were completed anonymously to encourage honest responses.

**Procedure**

The subjects were allocated to the JuniorLEAP group if they met the criteria, as part of the unit’s standard treatment programme.

The children and adolescents completed both the CET and EDEQ prior to commencing the group (T0), as well as following completion of the group (T1). Qualitative feedback was also collected by the group facilitators following the completion of the group. The qualitative feedback was collected anonymously, and each participant was asked to complete a feedback form independently.

Once all the qualitative and quantitative information was collected, the first author collated and evaluated the data. As the data collected was anonymised the chance of bias was reduced.

Results

**Participant characteristics**

Data were derived from seven separate groups and a total of 32 children and adolescents (31 girls and one boy), with a primary diagnosis of AN. All were in-patients at Newbridge House. The subjects’ average age was 15 years (range 11 – 17 years, SD = 1.69) and an average median BMI (mBMI) of 88.06% at the start of the programme (range 78.0% mBMI – 100.4% mBMI; SD = 5.74).

Five children and adolescents dropped out of the groups, due to pre-mature self-discharge or general negativity to therapy. These individuals were not included in the data analysis.

***Table 2.*** *Mean and Standard deviation for total EDEQ and total CET, as well as for the CET’s subscales. Mean change of eating psychopathology and exercise compulsion, identified through paired samples t-test.*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Pre-group *(N=32)*** | | **Post group *(N=32)*** | | **Pre- to post-group**  ***(N=32)*** | | | |
|  | Mean | SD | Mean | SD | Mean change | SD | *t* | *p* |
| **Eating Disorder psychopathology (Total EDEQ)** | 3.53 | 1.60 | 2.77 | 1.67 | 0.76 | 1.18 | 3.64 | 0.001\*\* |
| **Exercise Compulsion (Total CET)** | 15.39 | 6.92 | 10.90 | 6.29 | 4.46 | 6.18 | 4.08 | < 0.001\*\* |
| **CET subscales** | | | | | | | |
| **Avoidance and rule driven behaviour subscale** | 2.97 | 1.54 | 1.98 | 1.57 | 0.995 | 1.22 | 4.53 | < 0.001\*\* |
| **Weight-control exercise subscale** | 3.41 | 1.55 | 2.53 | 1.73 | 0.896 | 1.34 | 3.78 | 0.001\*\* |
| **Mood Improvement subscale** | 3.76 | 2.36 | 2.88 | 1.25 | 0.86 | 2.27 | 2.13 | 0.041\* |
| **Lack of exercise enjoyment subscale** | 1.94 | 1.60 | 1.35 | 1.42 | 0.58 | 1.21 | 2.71 | 0.011\* |
| **Exercise rigidity** | 3.31 | 1.71 | 2.16 | 1.69 | 1.17 | 7.74 | 3.80 | 0.001\*\* |
| \*\* highly statistically significant < 0.01; \* statistical significance | | | | | | | | |

**Changes in eating disorder psychopathology**

Mean and mean change in eating disorder psychopathology (EDE-Q Total) from pre- to post- groups were calculated (Table 2). Paired sample t-tests were used to compare the means (Table 2). This analysis demonstrated that there is a significant reduction in eating disorder psychopathology after the group was completed (*t* (degrees of freedom) = 3.64, *p* = 0.001).

**Changes in compulsive exercise**

Mean and mean change in compulsive exercise scores (CET Total) from pre- to post-groups were calculated (Table 2). Paired sample t-tests were used to compare the means (Table 2). This analysis demonstrated that there was a significant reduction in compulsive exercise after the group was completed (*t* (degrees of freedom) = 4.08, *p* = < 0.001. The paired t-test also demonstrated a significant reduction in avoidance and rule driven behaviour (*t* (degrees of freedom) = 4.53, *p* = < 0.001), weight control exercise (*t* (degrees of freedom) = 3.78, *p* = 0.001) and exercise rigidity *t* (degrees of freedom) = 3.80, *p* = 0.001).

**Patient Feedback**

The children and adolescents were asked to rate each session, on a range from zero to 10, on how helpful they found them. Average helpfulness ratings have been calculated (Figure 1).

**Figure 1**. Average rating of helpfulness for each session of JuniorLEAP.

Figure 1 illustrates the average level of helpfulness for each group session. No data has been obtained for the individual session zero. This is indicative of the level of helpfulness increasing as the sessions go on.

Qualitative information was also sought in order to review the acceptability of the group. All 32 children and adolescents completed the feedback forms anonymously. 20 children and adolescents reportedly found the group “good” and “helpful”. In addition, further comments suggested the group was highly informative and provided them with new knowledge about exercise. The aspects of the group that the children and adolescents found most helpful were learning facts and disproving some of their misconceptions about exercise. In addition, the children and adolescents found the strategies introduced to reduce compulsivity helpful, as well as learning about the maintenance cycle. Other comments included:

“Relating my own experience to evidence and facts”

“Being told that the amount of exercise doesn’t correlate to how healthy it is”

The children and adolescents were also asked to comment on whether there was anything about the group that they didn’t like. 13 children and adolescents reported that there was nothing that they didn’t like about the groups. Three children and adolescents reported that they didn’t like the monitoring records and one young person commented that they didn’t like sharing in the group and felt that they were being judged in the group. There was one young person that highlighted that session one was not helpful. No further negative comments were provided.

Discussion

The present study investigated the efficacy and acceptability of JuniorLEAP, a new group therapy programme specifically designed for children and adolescents with AN with compulsive exercise. Efficacy was measured by standard questionnaires and acceptability was assessed using qualitative data obtained from participants’ feedback.

JuniorLEAP was developed by an iterative process of audit and staff/patient feedback until the current version was finalised. It was designed to be an adjuvant to current standard treatment approaches, such as dietetic counselling, family therapy and CBT sessions. It was never intended that JuniorLEAP would be the exclusive programme used in treating over-exercise within eating disorders.

The results demonstrate a significant change in compulsive exercise following the completion of the JuniorLEAP group. There was a significant change in all five subscales of the CET. This mirrors the findings of previous research in adults by Hay and colleagues [13], which demonstrated a significant reduction in CET scores in adults with an eating disorder following the completion of the adult LEAP group, as well as at six months’ follow-up. This suggests that though major changes were made in creating JuniorLEAP to make it acceptable for children, the therapeutic elements that were demonstrated as effective in adult sufferers were retained.

This was an adjuvant treatment and as such it was not possible to assess whether other aspects of the treatment programme contributed to the significant results in the change of CET scores. There were no aspects of the standard treatment programme that directly addressed compulsive exercise. It is possible that other aspects of the standard treatment, such as nourishment, may have indirectly contributed to the change in compulsive exercise. However, given that compulsive exercise is not addressed in any other therapeutic programmes, it is unlikely that exercise could have improved so significantly without the JuniorLEAP programme.

That said, there are parts of the standard treatment that may support the JuniorLEAP programme. For example, the patients attended the Leisure Group, which encouraged participation in activity levels that are comparable in type and duration to typical team sports undertaken in secondary schools. This provided the children and adolescents with the opportunity to practise engaging in healthy levels of activity and to utilise some of the strategies and skills introduced to them in JuniorLEAP.

*What is already known on this subject?*

There is no evidence-based therapy for the treatment of compulsive exercise in adolescent AN patients. Treatment designed for adults was shown by the authors in pilot studies to be ineffective and to have poor acceptance by adolescents. The authors devised and tested a child-centred evidence-based group therapy programme.

*What does this study add?*

This new manualised group therapy programme specifically devised by the authors for adolescent AN patients, when used as an adjuvant with other therapies, significantly reduces compulsive exercise, measured by the CET, and is acceptable by the patients.

Limitations

This study is not a random controlled trial of JuniorLEAP. We were therefore unable to compare its efficacy to ‘Treatment as Usual’ (TAU) or another control group. We are unable to categorically state that JuniorLEAP caused all the reported changes. However, the treatment was designed as an adjuvant to TAU and the results represent its efficacy within an inpatient setting that does not otherwise address compulsive exercise directly.

This study was done in a residential setting. We do not know if the results are replicable in community settings but there is no obvious reason for believing that the effects would be different. This, however, needs to be tested.

The research was conducted on a predominately female population, due to the nature of the anorectic condition. Further research will be required to assess whether the treatment is of equal benefit to boys and girls. There was no suggestion that it would not be so. Finally, all children and adolescents who participated in the study had a primary diagnosis of AN; its efficacy in other eating disorders needs to be examined.

Conclusions

This study finds that a new manualised JuniorLEAP group therapy programme specifically adapted for children and adolescents with AN, when used as an adjuvant with other therapies in a residential setting, effectively reduces compulsive exercise, as measured by the CET. Although all non-controlled studies have weaknesses, this study shows that a group therapy programme to develop a healthy exercise pattern was effective in an in-patient population of adolescents with AN. Qualitative data suggests the programme is generalisable to other treatment settings.

Compliance with Ethical Standards

Funding was provided by Schoen-UK in the form of time by the authors. Additional small sums were paid for incidentals.

The authors declare there are no conflicts of interest.

All procedures in this study were in accordance with the ethical standards of Newbridge House Research & Ethics Committee and have been performed with the ethical standards as laid down by the 1964 Declaration of Helsinki. The West Midlands-Black Country NHS Ethics Committee did not consider formal ethics were required because this was a paper-based study on therapy routinely provided for every patient. None-the-less prior written informed consent was gained from all patients and their parents.

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