Supplement 1: Comprehensive overview of the SHINE programme using the TIDieR framework (Hoffman *et al*. 2014)

Programme Rationale

The programme was developed to fulfil a gap in provision of weight management services for children and young people, aged 10-17 years, with severe obesity. Severe obesity is not yet internationally classified, however within the UK, a standardised BMI ≥ 99.6th centile is often used to identify this population group [1]. At present throughout the UK, limited intervention is offered to those with severe obesity, which should include appropriate referral to a Tier 3 programme [2; 3]. Tier 3 programmes often consist of multi-disciplinary input and more intensive intervention. SHINE sought to work within this operational deficit for Tier 3 programmes in Sheffield.

The mission aim of the programme is:

> "*To help young people to understand their weight problem so that they can manage it more effectively in an independent way*" [4]

Programme Procedures

Referral: Participants refer via: self-referrals, GP referrals, Child and Adolescent Mental Health Service referrals, school referrals, Multi-Agency Support Teams, Sheffield Children's NHS Foundation Trust referrals and referral from Social Services (including those on care plans). Other smaller referral avenues also exist.

Participants are eligible for the intervention with a BMI SDS ≥2.67 units; classifying the individual as above the 99.6th centile [1]. Participants are also accepted who have a BMI SDS ≥ 98th centile (BMI SDS ≥ 2.00 units) and with associated co-morbidities (e.g. Depression, Hypertension, Fatty Liver Disease, and TII Diabetes).

Pre-programme: Phase 1 of the PSI approach invites families to attend an in depth, pre programme assessment with a senior member of the SHINE team (includes assessment of physical, psychological, behavioural and social needs of the young person). The session provides young people and their family with an overview of the programme content and an opportunity to discuss any weight-related issues. The family is also informed on the severity of obesity, and programme staff seek to ensure the family understand their responsibility in the management of their child's obesity [5]. Families are signposted to the most suited programme using a stepped care approach [6].

Programme: Most families (~95%) who attend the one-to-one assessment are signposted to the 12 week intervention delivered by SHINE. This is the Phase 2 of the PSI approach. Children are educated independently from their parents. Although the programme does not educate both parents and children simultaneously, the parents are offered a training day in which all session content is covered. In some instances, parent sessions have run concurrent to sessions for the children – this is not standardised across the programme but determined by need. For the 5% of participants who are not signposted to the PSI programme, they are offered alternative treatment options (e.g. one-to-one therapy). This is due to the complexities of this small subgroup, and the knowledge that a group-

based PSI programme may not yet be an appropriate treatment. This subgroup are not included in these analyses.

The first and last week of the programme are dedicated to introduction and celebration respectively. Week's 2 to 6 educate participants about dietary modifications which align to the guidance of NICE (2013) and thus includes sessions on portion control, healthy alternatives, food labelling etc… During week's 7 to 11, the programme focuses on the psychosocial elements of obesity: targeting self-esteem, satiety and self-control, body image perceptions, stress management and support on bullying. All sessions are designed to be interactive and engaging, often consisting of group work and practical demonstrations/activities.

Physical activity sessions are run throughout the week by SHINE. These use local facilities and are exclusive for the participants. A total of seven hours, optional physical activity is available. This includes swimming sessions, game-based sessions and circuit/gym work. The sessions aim to be enjoyable and inclusive for participants. Participants pay a membership fee of £5 per week.

Maintenance: The maintenance programme of SHINE is Phase 3 of the PSI approach. Participants are invited to attend the maintenance programme upon completion of Phase 2. The maintenance programme is made up of three modules, each lasting approximately 12 weeks with weekly contact (1. Healthy Lifestyles, 2. Managing Social Relationships and 3. Making the Most out of Leisure). In total, participants can attend SHINE for up to 15 months, however some stay with the programme longer.

The maintenance modules have health and obesity management related content interwoven into all sessions i.e. personal hygiene, relationship development, benefits of healthy eating etc… Some modules behold nationally recognised accreditation which provides employability and life skills to the participant. Additional opportunities are available for participants such as one-to-one counselling and psychotherapy – uptake of these sessions is low relative to the three main modules.

Follow Up: No formal follow up processes are in place.

Materials Used

Staff are provided with session plans for the Phase 2, 12 week programme: this outlines the delivery of the sessions, appropriate delivery style and helps to ensure programmes are delivered in a standardised manner. Standardised session plans are also provided for the maintenance (Phase 3) modules within the SHINE programme. Several of the maintenance modules are designed around a nationally recognised accreditation body, which provides a framework for the session plans and materials used. Portfolios can be submitted by participants to gain a nationally recognised qualification in Personal and Social Development.

A number of incentives are provided for participants on the SHINE programme. These include portion control plates, lunch boxes, pedometers, fitness tracking bands, certificates and prizes for the final week celebration.

Programme Provider

SHINE is a not-for-profit organisation. Sources of funding are therefore from trusts, charities and private avenues. This funding enables approximately 100-150 new participants to attend each year.

The core team of SHINE employees/volunteers (n = 30: 67% Graduates) is relatively small, and has the input of a Board of Directors, each Director with expertise in their respective areas. Phase 1 of the PSI

approach is delivered by a senior, experienced member of staff. Phase's 2 and 3 are delivered by the core team: predominantly final year/post graduate university students who have all completed a minimum of one year, in-house training.

Specialist staff members (qualified therapists, nutritionists, psychologists, nurses and youth workers) are available should an individual require one-to-one, intensive intervention.

The SHINE model has been implemented in other areas of the UK (Salisbury, Bath and North East Somerset, Wiltshire, Weston, Plymouth). These programmes have been modified to meet the needs of the local commissioners (e.g. adapted to be a Tier 2 programme, and adapted to work with younger children etc…), and additionally, are run independent of the Sheffield-based SHINE programme. As such, the central programme in Sheffield does not have access to their data. The SHINE model has not yet been implemented internationally.

Mode of Delivery

The first phase (one-to-one assessment) of the PSI programme is delivered to the individual family unit.

The second phase (12 week programme) is group-based. Initial groups comprised of ≈20 participants, however recent programmes often have 10-15 participants as the complexities of those attending have increased.

The third phase of the PSI approach (maintenance programme) is predominantly delivered in small groups (10-15 participants). For participants who require specialist intervention (e.g. nutritional or counselling therapy), sessions are delivered on a one-to-one basis.

Programme Location

SHINE is located in one of Sheffield's most highly deprived areas. Many of the participants live within a short distance of the central venue, although some travel from further parts of Sheffield.

The central venue is used by Phases 1 to 3 of the PSI approach, though some of the maintenance modules are delivered in external settings. The venue has the appropriate resources for group-based activities and a common room/lounge area for parents. A separate room is used for anthropometric assessments to ensure privacy. A private therapy room is used for the one-to-one sessions/assessments.

Physical activity sessions use local sports/leisure facilities.

Sessions predominantly run on a weekday evening (between 6-8pm) or a Saturday morning, dependent on the module/intervention phase being attended.

Programme Frequency/Duration

The Phase 1 assessment lasts for approximately 1-1.5 hours dependent on the participant.

Phase 2 is 12 weeks in length, with weekly sessions typically lasting 1-2 hours dependent on the learning ability of the group. Physical activity sessions last approximately 1-2 hours.

The maintenance programme (Phase 3) varies by module attended. The three main modules require participants to attend 12, weekly sessions of one hour. Should a participant attend for therapy, they

are offered six to eight sessions– each lasting 50 minutes. Hourly, one-to-one nutrition sessions are available to those with increased dietary needs (i.e. Type 2 Diabetes) or who have experienced relapse or weight regain.

Sessions are arranged around public holidays/mid-term school holidays and resume again once school re-commences. Programme running dates align with the school terms (Jan – March, April – July, September - December).

Drop in sessions are available to all young people throughout their attendance. These are booked on a 'needs' basis and are not utilised by all.

Tailoring

SHINE is tailored to the individual from the outset. Through the provision of the stepped care approach, families are signposted to the best suited (agreed by family and SHINE) level of care delivered by SHINE. Although many families go on to attend the 12 week Phase 2 programme, some are offered individualised counselling when deeper, psychological issues arise. Parent sessions can be delivered concurrent to the 12 week programme for the young people. These are optional for the parents to attend.

Participants have an assessment from SHINE every 6 weeks with content similar to the initial assessment. Parents accompany their child – this gives families time to have a detailed discussion with a senior SHINE staff member on any weight-related issues.

On completion of a module, families are informed of other opportunities provided by SHINE that they may wish to attend. One-to-one counselling and family intervention work is also offered at this point if needed.

Families can also contact the senior staff members at any point in time throughout their attendance. This contact could be via phone, email or a personal meeting.

Programme Modifications

Programme modifications have been informed by the evaluation and feedback received from families and young people. Modifications include: making the sessions more interactive, delivering more demonstrations and learning through games and experiential activities. SHINE has a Young Peoples Management Committee (YPMC) which meets at the end of each module and feedback the comments from their participating peers. The Chair of the YPMC can suggest programme modifications to the Board of Directors.

Programme Reporting and Fidelity

SHINE has developed since its establishment in 2003. The delivery is standardised through detailed session plans for all module sessions. In addition, the majority of the programmes are run from the central venue in Sheffield which ensures sessions are delivered in a consistent manner upholding strong programme fidelity.

Session fidelity is dependent on the programme participants and the complex needs of these participants. Approximately one in four participants attending SHINE has a diagnosed learning disability and sessions are adjusted to cater for these needs in terms of session length, delivery

method and staffing requirements. Staff members still aim to satisfy the sessional objectives independent of participant need.

Data is recorded by a senior staff member at the point of data collection. Data has been stored electronically since 2011 on a database and can be accessed by senior staff members.

References

[1] Cole, T. J., Freeman, J. V., Preece, M. A. Body mass index reference curves for the UK, 1990. Arch Dis Child 1995;73:25-29.

[2] Department of Health. Developing a specification for lifestyle weight management services: Best practice guidance for Tier 2 services. London, UK: Department of Health; 2013.

[3] Sharman, K., Nobles, J. Bridging the gap: SHINE – a Tier 3 service for severely obese young people. Br J Obes 2015;1:158-163.

[4] SHINE. SHINE philosophy and mission statement. Available at: http://www.shinehealthacademy.org.uk/about_us/courses/. Accessed March 16 2015.

[5] Sharman, K. Taking a psycho-social approach. HCPJ 2012;12:34-39.

[6] Sharman, K., Nobles, J. SHINE: A stepped care approach to the management of severe obesity in young people Prim Health Care 2016.