Final Evaluation Report

The Impact of the Beat Fit™ Fitness Program on Individuals with Down syndrome and Their Families

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Acknowledgements

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Brief Description of the Beat Fit™ Program

Beat Fit™ is a group exercise activity that combines elements of dance, drumming, rhythm and choreographed movement accompanied by contemporary music. Equipment includes an exercise ball and base, drum sticks, and the activity is led by an instructor. During Beat Fit™ sessions, participants are encouraged to undertake activity designed to illicit moderate-vigorous physical activity (MVPA), which when undertaken on at least three occasions per week for at least 15-minutes per session, supports cardio-respiratory fitness improvements (Garber et al., 2011).

Summary of Findings

Physical fitness

- Significant cardiovascular fitness improvements across time were noted overall for Beat Fit™ participants.
- The largest gains in cardiovascular fitness occurred for participants who on average, completed two or more Beat Fit™ sessions per week over the course of the intervention.
- Participating in one Beat Fit™ session (i.e. at a Beat Fit™ venue) per week did not significantly improve the cardiovascular fitness of participants.
- Significant fitness gains across time were noted for adult but not adolescent participants.
- Parents/caregivers noted fitness benefits in their children following their participation in Beat Fit™. These benefits were reported as increased stamina, greater willingness to undertake physical activity and less fatigue completing activities of daily living.

Physical attributes of Beat Fit™ participants

- The majority of Beat Fit™ participants were classified as overweight/obese and exceeded the recommendations for BMI, percentage body fat and waist circumference.
- Beat Fit™ participants did not experience significant increases in their physical attributes over the course of the intervention, which may indicate that weight gain processes were stopped or reduced. This attenuation process is considered the first step in improving physical attributes (Donnelly et al., 2009). This is particularly noteworthy in the adolescent participants as adolescence is a developmental period typically associated with weight gain (Malina, 1999).
- Although improvements were noted, participation in Beat Fit™ did not contribute to significant reductions in weight, BMI, waist size or percentage body fat.

Perceived wellbeing

- Participation in the Beat Fit™ program has a positive (but not significant) effect on the perceived wellbeing of adults and adolescents after a single session.
- This benefit was maintained over the course of the intervention.

Community and social engagement

- Individuals involved in the Beat Fit™ program engage in community activities at levels higher than the norm for adults with intellectual disability. This finding should however be interpreted with caution as the normative sample comprised adults only (Baker, 2000) whilst the Beat Fit™ sample included both adolescents and adults.
- Beat Fit™ participants are typically accompanied or supported to engage in community activities, with only a small percentage of these activities occurring with peers.

Parent/caregiver feedback

- Feedback from parents/caregivers on their Beat Fit™ experience was largely positive, with parents reporting that the classes were greatly enjoyed by their children, that it increased their fitness and provided additional and meaningful social opportunities.
- Parents reported being unaware of the basic principles required to achieve fitness improvement, and indicated that this information should be made explicit so as to guide support to their child to complete the sessions at home. Transporting the exercise balls to and from class was reported to be challenging.
- The Beat Fit™ DVD for home sessions requires modifications and improvements that include being able to see the instructor's feet, using only one exercise ball to mimic the home environment, and creating DVD-based sessions that are shorter in duration but promote more intense exercise. Additionally, parents recommended that a set of home-based DVD sessions be offered so as to promote variety, time management, concentration and motivation, and negate over familiarity and diminished motivation.
- The use of a record keeping system to record Beat Fit™ sessions at home was viewed as beneficial and encouraged participation. Suggested

improvements include the recording by participants or others of the amount of time participants engaged in each session at home.

- The use of drumsticks and batons that illuminate when struck was enjoyed by participants.

Recommendations

Prioritise physical activity

- e.motion21 to actively promote the importance of participation in regular daily MVPA, incorporate MVPA in all dance programs, and educate participants and their families about MVPA.
- e.motion21 to continue to encourage Beat Fit™ participants to undertake at least two home sessions of at least 15-20 minutes each so that when combined with a session at a Beat Fit™ venue, fitness benefits can be accrued.
- e.motion21 to develop shorter but more intense routines for the Beat Fit™ home sessions.

Education of parents/caregivers and participants

- To promote compliance and support improvements in fitness, parents/caregivers and participants should be educated about the basic principles of fitness development (FITT), as described by the American College of Sports Medicine (2013):
    - ✓ **F**requency (at least three times a week)
    - ✓ **I**ntensity (at least moderate)
    - ✓ **T**ime (at least 15 minutes)
    - ✓ **T**ype of activity (aerobic for cardiorespiratory fitness)

Focus on healthy eating habits

- e.motion21 to continue to focus on, and promote healthy eating habits that are conducive to supporting a healthy weight. This would include the active promotion of water as the best drink when participants are involved in MVPA.

Program modifications

- Beat Fit™ venues that allow for the storage of exercise balls on-site would overcome a concern regarding transportation of the equipment expressed by parents/carers.
- Multiple Beat Fit™ home session DVDs should be produced to reduce monotony and boredom, be of shorter duration, and promote MVPA.

- The instructor in the Beat Fit™ home session DVD should use only one exercise ball and foot movements should be visible at all times.
- The use of a private YouTube channel to distribute the Beat Fit™ home sessions should be considered.

Project Description

e.motion21 is a community-based not for profit provider of specialised dance and fitness programs for children and young adults with Down syndrome. The research project was designed to provide insight into the benefits of a fitness program (Beat Fit™) for adolescents and adults with Down syndrome and sought to address the health inequity experienced by this group.

The project aimed to evaluate the impact of the Beat Fit™ program on physical attributes, fitness, social connection and wellbeing of adolescents and adults with Down syndrome**.** The Beat Fit™ program combines aspects of traditional group exercise aerobics with the powerful beat and rhythm of drums; however, fitness balls are used instead of drums. This enables participants to drum whilst engaging in various fitness activities and choreography, individually, in pairs and small groups. The group-based nature of the program is designed to foster a sense of social connectedness, cooperation, and shared endeavours leading to heightened group affiliation and community spirit. The program has been adapted to meet the unique learning and physical needs of individuals with Down syndrome. To achieve this, instructors have undertaken specialised training designed to promote learning of people with Down syndrome. Importantly, the program links well with other experiences offered by e.motion21, including dance programs and performance activities, which encourage a sense of confidence and anticipation among participants.

The Beat Fit™ research project was conducted over 20 weeks from April to September 2014. Twenty-three fitness participants and 16 parents/caregivers participated in the project's activities during this time.

The Beat Fit™ project was evaluated by a team from RMIT University, School of Health Sciences. Funding for evaluation of the Beat Fit™ program was provided by e.motion21, with in-kind support provided by RMIT University.

Evaluation

The research project involved:

1. Obtaining permission to conduct a research project from the Human Research Ethics Committees, RMIT University.

2. Determining the physical fitness levels and physical health indicators of the Beat Fit™ participants and perceptions of social engagement, social activity, and perceived wellbeing from families (parents) and adolescent and adult Beat Fit™ participants. This was done using a variety of approaches:

    - **Physical fitness measurement**: The physical fitness of the Beat Fit™ participants was measured in four ways:
        - Participation in a Multi-Stage Fitness Test (MSFT). This is a field test of cardiovascular fitness that requires participants to run continuously between two points that are 20 meters apart. The runs are synchronised with pre-recorded audio beeps that play at set intervals. As the test proceeds, the interval between each successive beep decreases, forcing the participant to increase their speed over the course of the test until it is impossible to keep in sync with the beeps. The highest level attained before failing to keep up is recorded as the score for the test. The fitness test was conducted prior to, at the mid-point, and after the Beat Fit™ research project. The test has been shown to be valid and reliable for use with adolescents and young adults with intellectual disability, including Down syndrome (Fernhall et al., 1997).
        - Resting, exertion, 1-minute and 5-minute recovery heart rate. This was assessed using hand-held portable heart rate monitors prior to, at the mid-point, and after the Beat Fit™ research project. Resting heart rate was measured for the participants immediately before they completed the MSFT, after a period during which the participants completed an interviewer led questionnaire, had physical measurements

taken, and sat quietly for approximately 2-3 minutes. Exertion heart rates were measured immediately after the participants completed the MSFT. The 1-minute and 5-minute recovery heart rates were calculated by measuring the participants' heart rates one and five minutes after they completed the MSFT and subtracting these figures from the exertion heart rate.

  - Participation heart rate. Heart rates during Beat Fit™ sessions were measured using a telemetry strap placed across the participants' chests and a wristwatch-like device. Participants were randomly selected to wear this heart rate monitor during class and were provided with their own heart rate monitors to obtain measurements during their home sessions. Average and maximum heart rate readings were collected.
  - Ratings of perceived exertion. Perceptions of exertion were measured prior to, at the mid-point, and after the Beat Fit™ research project using a pictorial version of the Children's OMNI Scale of Perceived Exertion (Robertson et al., 2000). This is a rating of perceived exertion (RPE) scale designed to assess perceptions of effort during a bout of physical activity. This task required participants to point to a picture on the RPE scale that corresponded to their perception of their effort after the MSFT. Use of this scale has been found to be useful in determining the exercise intensity of adults with an intellectual disability (Stanish & Aucoin, 2007).

- **Physical health indicators**: The participants' height, weight, waist (abdominal) circumference and percentage body fat of the participants was measured by trained researchers. Procedures and calibrated equipment were used, namely stadiometer (height), scales (weight), steel measuring tape (circumference at supra-iliac) and bio-impedance scales. These measurements were conducted prior to, at the mid-point and after the Beat Fit™ research project.
- **Social activity:** The Guernsey Community Participation and Leisure Assessment (GCPLA; Baker, 2000) was completed by

parents/caregivers at the start of the Beat Fit™ intervention. The GCPLA is both a reliable and valid measure of community participation and the use of leisure time by people with an intellectual disability; and has been validated for use by a proxy responder (Baker, 2000).

- **Perceived wellbeing:** A member of the research team administered the Personal Wellbeing Index-Intellectual Disability (PWI-ID; Cummins, Lau, Davey, & McGillvary, 2011) to adult Beat Fit™ participants or a modified version of the Personal Wellbeing for School Children (incl. adolescents) [PWI-SC] (Cummins & Lau, 2005) to adolescent Beat Fit™ participants. These measures were administered at the start of the Beat Fit™ intervention immediately before and after a Beat Fit™ class, at the mid-point and at the end of the Beat Fit™ research project.

- **Parent/caregiver feedback:** At the mid-point of the intervention, parents/caregivers were invited to provide feedback regarding their experience of the Beat Fit™ program via an online questionnaire. Focus groups were conducted at the end of the intervention to obtain further feedback.

3. Final report to RMIT Human Research and Ethics Committee and e.motion21, with reports to participants and their families at each measurement time point.

Participants Involved in the Beat Fit™ Research Project

Informed Consent

- All Beat Fit™ participants provided informed consent.
- For each participant with Down syndrome, a written medical clearance was requested related to participation in the Multi-Stage Fitness Test, and clearance was provided for all but one participant.

Multi-Stage Fitness Test

All Beat Fit™ participants with medical approval were asked to participate in a Multi-Stage Fitness Test prior to, at the mid-point and at the end of the Beat Fit™ research project. The number of participants that engaged in this fitness test comprised:

Participants before the intervention

- 9 adolescents
- 11 adults
- **20 in total**

Participants at the mid-point of the intervention

- 8 adolescents
- 8 adults
- **16 in total**

Participants after the intervention

- 4 adolescents
- 7 adults
- **11 total**

Resting, Exertion and Recovery Heart Rate

The resting, exertion, 1-minute and 5-minute recovery heart rate of the Beat Fit™ participants was measured prior to, at the mid-point and after the Beat Fit™ research project. The number of participants that provided these measurements comprised:

Participants before the intervention

- 9 adolescents
- 10 adults
- **19 in total**

Participants at the mid-point of the intervention

- 7 adolescents
- 9 adults
- **16 in total**

Participants after the intervention

- 6 adolescents
- 6 adults
- **12 total**

Participation Heart Rate

In total, 21 participation heart rate readings were obtained from 14 participants. Three of these readings occurred during home sessions. The remaining readings were taken at random during onsite Beat Fit™ sessions throughout the intervention.

Rating of Perceived Exertion

The number of participants who provided their ratings of perceived exertion using a pictorial version of the Children's OMNI Scale of Perceived Exertion prior to, at the mid-point, and after a term of Beat Fit™ comprised:

Participants before the intervention

- 5 adolescents
- 9 adults
- **14 in total**

Participants at the mid-point of the intervention

- 4 adolescents
- 6 adults
- **10 in total**

Participants after the intervention

- 3 adolescents
- 6 adults
- **9 total**

Physical Health Indicators

The height, weight, abdominal circumference and percentage fat of the dancers participating in the research project was measured at the beginning, mid-point and

end of the intervention by trained researchers using standard procedures and calibrated equipment. The number of participants who undertook these measurements comprised:

Participants before the intervention

- 9 adolescents
- 13 adults
- **22 total**

Participants at the mid-point of the intervention

- 8 adolescents
- 10 adults
- **18 total**

Participants after the intervention

- 5 adolescents
- 7 adults
- **12 total**

Social and Community Engagement

- All parents of Beat Fit™ participants in the project were asked to complete the Guernsey Community Participation and Leisure Assessment (GCPLA; Baker, 2000) at the start of the intervention.
- Seven parents/caregivers of Beat Fit™ participants completed the GCPLA.

Personal Wellbeing

All adolescents who participated in the research project were asked to complete the Personal Wellbeing for School Children (incl. adolescents) [PWI-SC] (Cummins & Lau, 2005) immediately before and after a Beat Fit™ class at the intervention's start, and at the mid-point and end of the intervention. This scale was administered as a semi-structured interview by a member of the research team. All adults who participated in the research project were asked to complete the Personal Wellbeing Index-Intellectual Disability [PWI-ID] (Cummins, Lau, Davey, & McGillvary, 2011).

This was administered in the same manner as the PWI-SC. The number of adolescents and adults who completed these measures comprised:

Participants before the Beat Fit™ class (beginning of intervention)

- 10 adolescents (7 valid)
- 12 adults (9 valid)
- **22 total (16 valid)**

Participants after the Beat Fit™ class (beginning of intervention)

- 10 adolescents (8 valid)
- 11 adults (7 valid)
- **21 total (15 valid)**

Participants at the mid-point of the intervention

- 9 adolescents (7 valid)
- 10 adults (7 valid)
- **19 total (14 valid)**

Participants at the end of the intervention

- 4 adolescents (4 valid)
- 7 adults (6 valid)
- **11 total (10 valid)**

Note: Measures were deemed invalid when participants demonstrated acquiescent responding, demonstrated no variability in their responses or responded in a set pattern.

Parent/Caregiver Feedback

- At the mid-point of the intervention, all parents/caregivers were invited to complete an online questionnaire to obtain feedback regarding their Beat Fit™ experience. In total, 14 parents/caregivers completed this questionnaire.

Focus groups were conducted at the end of the intervention to obtain further feedback. In total, 6 parents/caregivers participated in the two focus groups that were conducted.

Intervention Approach

Participants were enrolled in the Beat Fit™ program that offered two 10-week terms at one of two sites: a hall used for physical activity located in a special school, or a multi-purpose room located in a community leisure centre. During terms, participants undertook once weekly onsite sessions of Beat Fit™ instruction and practice led by an experienced professional dance instructor, supported by trained volunteer assistants. Participants were also provided with a Beat Fit™ DVD that contained a Beat Fit™ session for use twice weekly in the home environment. All participants were provided with the necessary equipment (fitness ball, ball base, and drum sticks) to complete the sessions. They were asked to complete a record book of completed home sessions, which was signed-off by the dance instructor. Upon completion of 21 sessions (onsite plus at-home), participants were able to use onsite drum sticks which illuminate when struck. Additionally, each participant was aware that a performance of Beat Fit™ would be included as a feature item in an annual concert attended by several hundred people. Coinciding with the conclusion of the Beat Fit™ project, this performance served to display participants' skills, promote confidence and self-perception, and foster community presence and engagement.

The intervention spanned the second (April to June 2014) and third terms (May to September) of the e.motion21 schedule of classes in 2014.

Attrition

The following reasons for dropping out of the intervention were reported by participants or their proxy:

Reason	Participant numbers
Competing demands	4
Unable to re-do measures at post-test	4
Illness	1
Unknown	2

Results

Physical Fitness: Multi-Stage Fitness Test (MSFT)

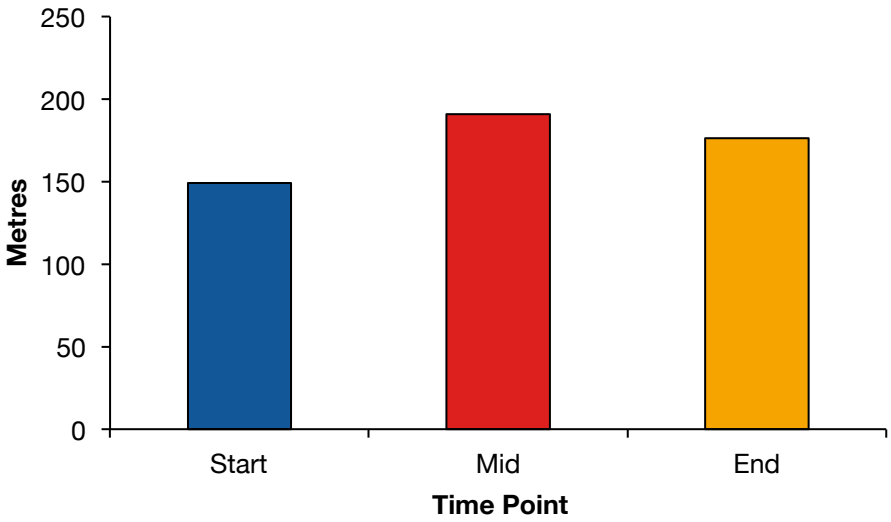
Key Findings

The results indicate that over time (i.e. the course of the intervention), there was a significant increase in the number of meters run by participants in the MSFT, $F(2,20) = 4.66$, $p = .02$, $\eta^2 = .32$). Significant increases occurred from the start to mid-point of the intervention ($p = .01$), whilst a non-significant decrease in the numbers of meters run on the MSFT occurred from the intervention's mid to end-point ($p = 1.00$). Reasons for this decrease are speculative, but may include test fatigue, reduced motivation to complete Beat Fit™ sessions during the latter phase of the intervention, or the experience of a plateau in fitness levels.

Further analysis of the MSFT findings revealed that there was a significant increase in the numbers of meters run in the MSFT over time for those participants who, on average, completed two or more Beat Fit™ sessions per week, $F(2,12) = 5.67$, $p = .02$, $\eta^2 = .49$). Participants who completed an average of one session per week over the course of the intervention did not experience significant increases in the number of meters run on the MSFT, $F(2,6) = p = .75$, $\eta^2 = .01$).

When adults and adolescents were compared, results indicated that adult participants experienced significant improvements in the number of meters run in the MSFT over time, $F(2,10) = 4.43$, $p = .04$, $\eta^2 = .47$) whereas adolescents did not, $F(2,8) = 1.33$, $p = .32$, $\eta^2 = .25$) . The adults and adolescents participated in a similar number of sessions over the course of the intervention. Thus, frequency of participation does not appear to account for this finding. There may however have been a difference in the quality of these sessions, with anecdotal evidence suggesting that the adult participants were better able to manage the self-directed nature of the Beat Fit™ home sessions.

Graph of the mean meters ran in the MSFT at the start, mid-point and end of the interventi



Physical Fitness: Resting, Exertion and Recovery Heart Rate

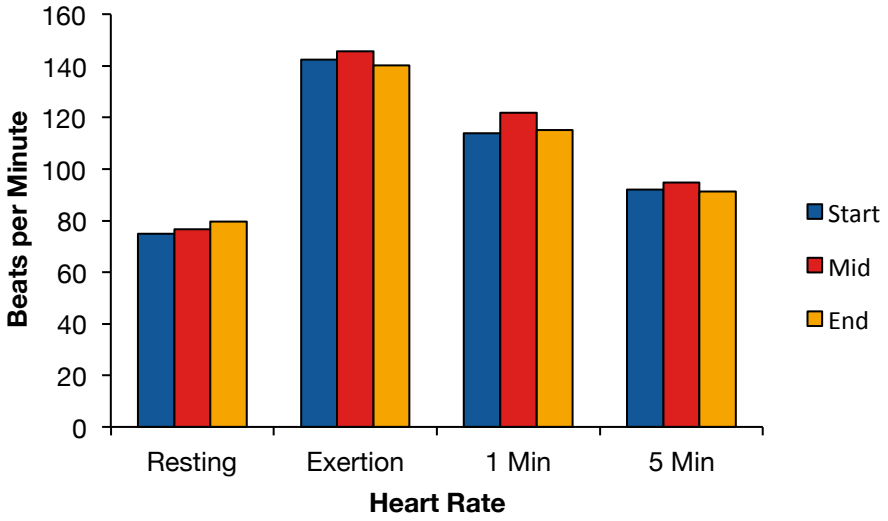
Key Findings

A lower resting heart rate implies more efficient heart function and better cardiovascular fitness. Similarly, the greater the recovery heart rate, the fitter the individual (Dimkpa, 2009).

The results indicate that overall, there was no significant difference in the resting heart rate of participants over time, F (2,20) = 1.32, p = .29, η^2 = .12). Furthermore, there were no significant differences between the 1-minute, F(2,20) = 0.77, p =.49, η^2 = .08) and 5-minute, F(2,20) = 0.29, p =.75, η^2 = .03) recovery heart rates over time.

Improvements in resting and recovery heart rates typically occur when individuals with Down syndrome participate in at least three sessions of MVPA per week (Dodd & Shields, 2005). The lack of improvement noted above is likely explained by the finding that, over the course of the intervention, individuals participated in Beat Fit™ an average of only 1.6 times per week.

Graph of the mean resting, 1-minute and 5-minute heart rates at the start, mid-point and end of the intervention.



Physical Fitness: Participation Heart Rate

Key Findings

The mean heart rate of participants during Beat Fit™ sessions was 105.71 (*SD* = 21.29), whilst their mean maximum heart rate during these sessions was 160.81 (*SD* = 48.15). These heart rates are markedly higher than the mean resting heart rate of participants across the intervention (*M* = 77.08, *SD* = 11.28). This implies that the Beat Fit™ sessions consistently elevated the heart rates of participants, an important factor when attempting to lose weight and improve cardiovascular function (Fletcher et al., 1996)

Physical Health Indicators

Key Findings

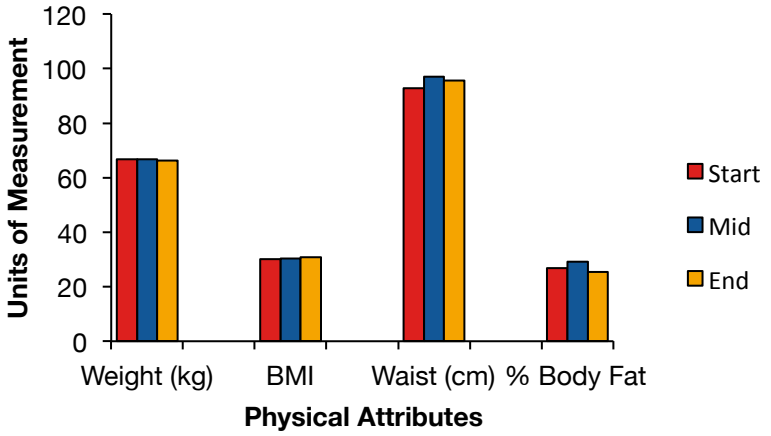
The results indicate that there were no significant changes in weight, body mass index (BMI), percentage body fat or waist circumference for the Beat Fit™ participants between the start and end-points of the intervention. The average BMI for the adult and adolescent participants at the end of the intervention was 34.51 and 27.03 respectively. This falls outside the recommended range of 18.5-24.9 (World Health Organisation, 2000).

The average waist circumference at the end of the intervention for adult male participants was 123.00cm and 95.10cm for female participants. These are above the recommended guidelines of 94cm or lower for adult males and 80cm or lower for adult females. There are currently no guidelines for recommended waist circumference for adolescents.

The average percentage body fat at the end of the intervention for adult male participants was 27.45% and 29.78% for female participants. These are above the recommended guidelines of 11-20% for males and 16-30% for females (Jeukendrup & Gleeson, 2010). There are currently no guidelines for recommended percentage body fat for adolescents.

Although participants did not experience significant losses in their weight, BMI, waist circumference and percentage body fat, it is encouraging that they did not experience significant gains either. This indicates that weight gain processes were stopped or reduced. This attenuation process is considered the first step in improving physical attributes (Donnelly et al., 2009) and is particularly noteworthy in the adolescent participants as adolescence is a developmental period typically associated with weight gain (Malina, 1999). Given that reductions in percentage body fat were noted for adolescents from the start (*M* = 25.51, *SD* = 13.34) to the end (*M* = 21.25, *SD* = 11.77) of the intervention, it is possible that a shift in their body composition occurred. Bone and lean tissue may have been added whilst body fat was maintained or lost (Reguła & Jeszka, 2008).

Graph of overall weight, BMI, waist and percentage body fat at start, mid-point and end of the intervention



Physical Fitness: Ratings of Perceived Exertion

Key Findings

A pictorial version of the Children's OMNI Scale of Perceived Exertion was administered to Beat Fit™ participants at the beginning, mid-point and end of the intervention. Despite participants receiving instruction regarding the interpretation of the scale, they consistently provided low ratings of perceived effort immediately after completing the MSFT. This appeared inconsistent with their exertion heart rates, which were generally high; and physical indicators of exertion such as sweating, breathlessness and redness in the face. Therefore, in the opinion of the investigators, the data obtained from this outcome measure did not yield valid results. As a result, this data did not undergo statistical analysis.

Social and Community Engagement

Key Findings

Findings revealed that Beat Fit™ participants are well-engaged in community activities. Of the 49 potential activities listed on the GCPLA, the participants had engaged in between 19 and 39 regularly (i.e. at least every 2 or 3 months) and between 11 and 17 frequently (i.e. at least every week). The mean number of regular activities reported in this study was 29.13**.** This was higher than the norm of 18 reported by the authors of the GCPLA. Similarly, the mean number of frequent activities (12.89) was also higher than the reported norms of 11.30. These findings should however be interpreted with caution as the normative sample comprised adults only (Baker, 2000) whilst the BeatFit™ sample included both adults and adolescents.

The participants were accompanied or supported for the majority of these activities with 37.31% of activities reported as being accompanied and 47.34% of activities reported as being supported. Only 1.75% of the activities involved peers. Overall, these findings suggest that involvement in Beat Fit™ supports community engagement for individuals with Down syndrome, and may be of particular benefit in encouraging activities involving peers.

Perceptions of Wellbeing

Key Findings

Perceived wellbeing was measured before and after class at the start of the Beat Fit™ intervention and then at the mid-point and end of the intervention.

No significant differences in overall wellbeing occurred before (M = 77.19, SD = 13.98) and after a session of Beat Fit™ (M = 81.84, SD = 14.96), $t(13) = -1.23$, p = .26, $\eta^2 = 0.11$).

No significant differences in wellbeing scores were found over the course of the intervention, $F(2,16) = 1.44$, p = .37, η^2=.15. The lack of significance is likely explained by the loss of statistical power that occurred with the small sample size.

Parent/Caregiver Feedback

Key Findings

Benefits

Results from the online questionnaire indicated that the Beat Fit™ intervention was an enjoyable activity for participants, with parents perceiving that on average, their child strongly liked participating in the Beat Fit™ classes at the special school hall and community leisure centre sites. Focus group discussions supported this finding, with parents consistently reporting that their children greatly enjoyed participating in Beat Fit™ "*She enjoys attending the class with the other participants. She is very keen to go to Beat Fit™ - more enthusiastic about that than dance actually!.. (But she still loves dance too!)"* (Bundoora Parent 1).

Results from the online questionnaire indicated that 85.71% of parents/caregivers believed their child was experiencing fitness benefits, as evidenced by increased activity, being tired and hungry after a session, being less averse to going on walks and increased willingness/capacity to achieve/endure an increased heart rate. Discussions from the focus group supported these results, with parents/caregivers commenting that they had noticed improvements in their child's fitness levels, stamina and ability to cope with the demands of activities of daily living. *"I think my child is obtaining fitness through Beat Fit™ class. I can see a little bit of difference, not so much weight loss though I find she is pretty tired after Beat Fit™ and*

hungry" (Bundoora Parent 2). *"X is fitter and less averse to taking walks with us. He also willingly does walks at his day service".* (Bundoora Parent 3). A number of parents did however feel that the intensity and frequency of the sessions were insufficient to allow for marked fitness benefits to occur. "*Since it's only once or twice a week it would be hard to know if it is benefitting fitness wise".* (Kew Parent 1).

The reported fitness-based strengths of Beat Fit™ included group-based exercise, dancers motivating each other to participate, movements such as marching and arm raising that promote fitness, improved coordination, balance and rhythm. *"The program incorporates music, dance and drumming in a way that is not obviously exercise. It is both engaging and appealing"* (Bundoora Parent 2). Parents also reported that Beat Fit™ did not require much coordination and allowed participants to build up gradually, with the option to only drum or combine the drumming with leg movements. It was noted that typical aerobics classes require a level of coordination and rapid replication of movements that likely places it out of reach for individuals with Down syndrome.

"The concept of the Beat Fit™ program is good, with music and movement. The fitness program is made fun by the use of popular music and this masks the hard work that needs to be done to complete the program" (Kew Parent 1).

The reported social-based strengths of Beat Fit™ included opportunities for both Beat Fit™ participants and parents to catch up, engage with friends, team work, improvement of social skills and offering an additional social outlet. *"Great to do this as a group and promotes friendships"* (Kew Parent 2). "*He loves to go and that is encouraging social skills. Very much a home body and unfortunately poor communications skills"* (Bundoora Parent 3). Having one class at each venue with a combination of adolescents and adult participants was regarded as beneficial as it expanded social opportunities, and reduced the divide between the adult and adolescent groups. Additionally, the combined class allowed the adolescent participants to develop relationships with the adult participants, which would presumably ease their future transition into the adult e.motion21 dance class. "*It's not just about the kids, it's about us, the parents. The networking that the parents…(sic). And it's a different group from the dance group because we're, um the kids are er from the junior group who will probably go into the senior group at*

some stage but we're starting to get to know them now whereas before, we were very isolated" (Bundoora Parent 3).

Challenges

Many of the parents reported a number of difficulties with the Beat Fit™ DVD. Some DVDs did not work in all devices, which limited where the participants could undertake their home-based sessions. Having more than one ball in the DVD was reported to be confusing for the participants as they only had one ball at home and so it was difficult to generalise the movements from the DVD to their home environment. The DVD was filmed in a manner that did not show the instructor's foot movements. This made it more difficult for the dancers to mimic the movements of the instructor during their home-based sessions. Additionally, the participants became bored with using the same DVD over the length of the intervention to conduct their home-based sessions.

Although the parents understood the need to transport the exercise balls to and from sessions owing to a lack of storage space at the community leisure centre site, they found this to be cumbersome and inconvenient. One parent remarked that if they forgot the ball in the morning, they could not attend the session as there was no time to collect it in the afternoon. The use of the cargo strap to transport the exercise balls was perceived to be helpful. Another parent revealed that ride-sharing, whereby one parent provided transport to her child and another participant, proved problematic when exercise balls needed to be transported, as the space available in her car was too limiting to allow this to happen safely and comfortably. Parents from the school hall site who did not need to transport the exercise ball, and only needed to transport the drum sticks, found this arrangement convenient.

Some parents reported that it was difficult to find the time to fit in the suggested two Beat Fit™ sessions at home as their child was already committed to a variety of extra-curricular activities. Furthermore, some parents did not realise that their child only needed to engage in15-20 minutes of Beat Fit™ at home to accrue a fitness benefit. They stated that having a shorter but more intense DVD would improve participation rates of the home-based sessions.

Suggestions For Improvement

The parents suggested that a number of changes be made to the Beat Fit™ DVD. These included providing a variety of DVDs to reduce boredom and monotony, improving the sound quality and producing a shorter but more intense DVD for the home-based sessions to promote participation and fitness gains. It was further suggested that the instructor in the DVD have only one exercise ball and that the movements of her feet be visible. Including time to allow for impromptu movements was also suggested.

The suggestion that a private YouTube channel be used to distribute the Beat Fit™ home sessions was favourably received, with the majority of parents indicating that this would be a convenient means to access Beat Fit™ tuition. The parents also noted the implications this method of delivery could have in terms of increasing access to Beat Fit™.

References

American College of Sports Medicine (2013). *ACSM's Guidelines for Exercise Testing and Prescription.*(9th ed.). Baltimire, MD: Wolters Kluwer Health.

Baker, P. A. (2000). Measurement of community participation and use of leisure by service users with intellectual disabilities: The Guernsey Community Participation and Leisure Assessment (GCPLA). *Journal of Applied Research in Intellectual Disabilities, 13*(3), 169-185.

Barisic, A., Leatherdale, S. T., & Kreiger, N. (2011). Importance of frequency, intensity, time and type (FITT) in physical activity assessment for epidemiological research. *Canadian Journal of Public Health, 102*(3), 174-175.

Cummins, R., & Lau, A. (2005). *Personal Wellbeing Index–School children*. Victoria: Deakin University.

Cummins, R. A., Lau, A., Davey, G., & McGillivray, J. (2011). Measuring subjective wellbeing: The Personal Wellbeing index–Intellectual disability *Enhancing the quality of life of people with intellectual disabilities* (pp. 33-46): Springer.

Dimkpa, U. (2009). Post-exercise heart rate recovery: An index of cardiovascular fitness. *Journal of Exercise Physiology, 12*, 19-22.

Dodd, K. J., & Shields, N. (2005). A systematic review of the outcomes of cardiovascular exercise programs for people with Down syndrome. *Archives of physical medicine and rehabilitation*, *86*(10), 2051-2058.

Donnelly, J. E., Blair, S. N., Jakicic, J. M., Manore, M. M., Rankin, J. W., & Smith, B. K. (2009). American College of Sports Medicine Position Stand. Appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults. *Medicine and Science in Sports and Exercise, 41*(2), 459-471.

Fernhall, B., Pitetti, K. H., Vukovich, M. D., Stubbs, N., Hensen, T., Winnick, J. P., & Short, F. X. (1997). Validation of cardiovascular fitness field tests in children with mental retardation. *American Journal on Mental Retardation, 102*(6), 602-612.

Fletcher, G. F., Balady, G., Blair, S. N., Blumenthal, J., Caspersen, C., Chaitman, B., . . . Pina, I. (1996). Statement on exercise: Benefits and recommendations for physical activity programs for all Americans a statement for health

professionals by the committee on exercise and cardiac rehabilitation of the council on clinical cardiology, American heart association. *Circulation, 94*(4), 857-862.

Garber, C. E., Blissmer, B., Deschenes, M., Franklin, B. A., Lamonte, M. J., Lee, I., . . . Swain, D. P. (2011). American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Medicine and Science in Sports and Exercise, 43*(7), 1334-1359.

Jeukendrup, A., & Gleeson, M. (2010). *Sport nutrition: An introduction to energy production and performance*

Malina, R. (1999). Normal weight gain in growing children. *Healthy Weight Journal, 13*(3).

Robertson, R. J., Goss, F. L., Boer, N. F., Peoples, J. A., Foreman, A. J., Dabayebeh, I. M., . . Gallagher, J. D. (2000). Children's OMNI scale of perceived exertion: Mixed gender and race validation. *Medicine and Science in Sports and Exercise, 32*(2), 452-458.

Reguła, J., & Jeszka, J. (2008). Changes of body composition during weight reduction program based on the diet and physical exercises and long term effectiveness of this therapy in obese adolescents. *Acta Scientiarum Polonorum. Technologia Alimentaria, 7*(3), 55-63.

Stanish, H. I., & Aucoin, M. (2007). Usefulness of a perceived exertion scale for monitoring exercise intensity in adults with intellectual disabilities. *Education and Training in Developmental Disabilities, 42*(2), 230.

World Health Organization. (2000). *Obesity: Preventing and managing the global epidemic*: World Health Organization.

Attachments

1. Online questionnaire
2. Focus Group interview schedule for parents/caregivers

1. Online Questionnaire

Thank you for participating in the Beat Fit™ evaluation questionnaire. The responses you provide will assist e.motion21 to improve this new program.

1. At which site does your child participate in Beat Fit™ ?
    - *X* (Community leisure centre site)
    - *Y* (School hall site)

2. What is your child's gender?
    - Male
    - Female

3. In which age group is your child?
    - Adolescent
    - Adult

4. On average, how often is your child undertaking a Beat Fit™ session at home?
    - Never
    - Once a Week
    - Twice a Week
    - Three times a week
    - More than three times a week

5. On average, how long does each home session of Beat Fit™ last?
    - 0-5 minutes
    - 6-10 minutes
    - 11-15 minutes
    - 16-20 minutes
    - 21-25 minutes
    - 26-30 minutes
    - More than 30 minutes

6. How much time is usually required of you by your child when he/she is undertaking a Beat Fit™ session at home? (This includes time spent organising, watching, participating with, supporting and encouraging your child)
    - None required
    - Less than 10% of the total time of the at home Beat Fit™ session
    - More than 10% up to 25% of the total time of the at home Beat Fit™ session
    - More than 25% up to 50% of the total time of the at home Beat Fit™ session
    - More than 50% up to 75% of the total time of the at home Beat Fit™ session
    - More than 75% up to 90% of the total time of the at home Beat Fit™ session
    - More than 75% up to 90% of the total time of the at home Beat Fit™ session

7. In your opinion, how much does your child like participating in Beat Fit™ sessions at home?
    - Strongly dislikes
    - Dislikes
    - Neither likes nor dislikes
    - Likes
    - Strongly likes

8. In the space below, please provide any suggestions for improving the enjoyment of the home sessions of Beat Fit™ .

9. In your opinion, how much does your child like participating in Beat Fit™ in sessions at Kew/Bundoora?
    - Strongly dislikes
    - Dislikes
    - Neither likes nor dislikes
    - Likes
    - Strongly likes

In the space below, please provide any suggestions for improving the enjoyment of the Kew/Bundoora sessions of Beat Fit™

10. Do you think your child is obtaining fitness benefits from Beat Fit™ ?
    - Yes
    - No

11. Please explain why or why not (when considering this answer, please think about physical exertion indicators such as increase in heart rate, sweating, red face, being out of breath etc).

12. Please provide comments and suggestions for improvement regarding the Beat Fit™ DVD

13. Please comment on the convenience of transporting the equipment to and from Beat Fit™ classes

14. Do you feel the Beat Fit™ passport is suitably rewarding for your child?
    - Yes
    - No

15. Please provide alternate suggestions (if applicable) to motivate your child to do Beat Fit™ session at home

16. What are the strengths of the Beat Fit™ program in terms of promoting fitness?

17. What are the strengths of the Beat Fit™ program in terms of social benefits?

18. What are other strengths of the Beat Fit™ program?

19. What are the weaknesses of the Beat Fit™ program (e.g.: scheduling, class time, out of class commitment)?

20. Please provide any further comments or suggestions for improvement regarding the Beat Fit™ program

2. Parents' Expectations, Aspirations and Needs Focus Group

Icebreaker	1. Introductions 2. Explain that we want to talk involvement with Beat Fit™ 3. Check that the individual consents to participate in the discussion 4. Talk about a contemporary topic (eg the weather, football, what's on TV)
Question 1	**What do you see as the benefit, or the impact, or the outcome for your child from participation in the Beat Fit™ program?**
Sub Questions	1. What positive changes have you noticed? 2. What physical/fitness benefits have occurred? 3. What social benefits have occurred?
Probes	Improved fitness, weight loss, increased activity, being with others, making friends, being in the community, being in a supportive environment, moving about/getting exercise, improved coordination, learning new things, feeling of achievement
Question 2	**What worked well with the Beat Fit™ program?**
Sub Questions	1. What were the positive aspects of the program? 2. What aspects of the Beat Fit™ program motivated you and your child to continue participating?
Probes	Location, scheduling, provision of equipment, home DVDs, reward (passport) system, dance teacher, music, cost
Question 3	**What was challenging about the Beat Fit™ program?**
Sub Questions	1. What were the disadvantages or limitations? 2. What made it more difficult to participate?
Probes	Location, scheduling, cost, transporting equipment, home DVD, mixed age group, reward system insufficient motivator
Question 4	**What was your experience of the home sessions like?**
Sub Questions	1. How easy or difficult was it to do the sessions at home? 2. On average, how many times per week were they done?

	3. What were some of the strengths and weaknesses of the DVD?
Prompts	Motivation, fitness benefit from sessions, reward system, camera angles, filming background, use of 3 balls, ability to copy instructor on DVD
Question 5	**How can Beat Fit™ be improved in the future?**
Sub Questions	1. What changes can be made to better the program? 2. What suggestions or recommendations do you have? 3. How can it be made more convenient and effective?
	Scheduling, cost, location, groups, reward system, DVD changes
Closure	1. Summarise main points 2. Is there anything we've missed about your Beat Fit™ experience? 3. Do you have any questions for us? 4. Thank you for your participation