

The Efficacy of a 12-week Exercise Intervention in 11-15 year old Adolescents with Autism

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JOURNAL

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Pre-intervention testing

Male testing conducted in Romas lab.

- ↳ most children struggle with turning pages & balance
- ↳ NB → Be aware of Yaela - has fear of colour green - avoid using green equipment with her
- ↳ Wladimir very poor balance
- ↳ David likes to overcomplicate tasks - make sure to explain exercises to him so he understands doing slow & controlled is better.

Goff

Kathleen needs assisted teacher to walk with her

→ Dile needs help to walk past cameras

Lebrun very scared. needs to be guided or helped (asked Michael to walk with).

Asked Musa to help demonstrate to some children.

Ability

Very minimal understanding in most

Group 1 children (higher functioning) understood better.

They performed better & understood when demonstration was done by someone other than me? i.e. when someone with autism showed them / demonstrated.

Maybe can use class member in group class to demonstrate others?

mile walk

not like heart rate monitor belt!

↳ Many refused to wear it. → needed to change measuring of heart rate to manual.

↳ Not interested in doing many laps - will just stop halfway.

→ Need to modify this & rest!!

Unfold calipers

Kathleen & Stuart / Emma don't like calipers

↳ Kathleen refuses at times - need to be patient.

She doesn't want to do many tasks → need to chase her around playground. Assisted teacher needs to be present for her to listen - mostly only listens to teacher.

→ Exercise classes → minimal equipment that teaches children?

→ May need assistance further for those who have assisted teachers.

→ Think avoiding free weights will be a good idea → not safe.

HR monitor belt!

#1

Group 1: All present

started session with 2 min talk on why exercise is good → typical and getting fit & healthy - strong bones etc. Michael & Leanda particularly enjoyed talk & participated in talk. Did take some time to get everyone settled for this - maybe don't make so formal? Warmup → asked participants to do 2 laps around playground track → normal walking - all managed well - Nadia quite slow but wants to participate & finish. Then tried to do "Jumping Jack dance" - started with forward & back stepping side to side then jumps & lunges → lots of confusion & not able to step one foot in front of the other and follow the other → will need to change exercise / modify also took too long - need to shorten warmup time. Lower body strength → sit to stands → all managed well (3x10). Upper body → changed → did not do knee weight bicep curls - as was a risk of safety concerns. Changed this to flat arm raises - (3x10). Flat arm circular motion → internal + external (2x10) + (2x10) forward air punches. All managed well. Was counting initially & some joined in to count with me but this got confusing - so changed this - got one participant to count frequency & changed person for each exercise done. (Nadia not to contribute with this). Attempted tug of war but did not work. Need to change this. Conscience → ~~static~~ standing marches (5x10). got very monotonous so will change this → maybe standing walking marches around track? Ball skills → did ball passing → in circle passing ball to one another, did line passing → managed well - could not do alternating line passing well (up down up down) etc. Agility - made use of tires in playground & had to weave through as quickly as possible then whirl around lap & start again (2x1 forwards, 2x1 backwards) Nadia struggles abt with walking backwards - must walk next to her. Did not manage to finish all exercises → must review length & amount of exercises. Need to leave time to talk.

Thoughts

- Need to ↓ time of talk or do talk during session with exercising.
- Need to change jumping Jack dance.
- Need to change core exercise from tug of war to something else.
- Mobile marching instead of stationary marching?
- Get very excited with ball activity → keep to end.
- Try get Nadia to interact more in class (feels scared/humid?)
- Children needs to be kept away from David - they imitate each other
- Take very willing to help with slower participant - maybe make group leader/helper?

Date

Exercise session notes

#1

Group 2: All present

started with 2 laps walking around athletics track $\Rightarrow$ all managed well, mini very slow & (wide based gait) - he was definitely beginning steps of flu so told him to just do basics & not push himself to hard. Brandon happy to do walking but suphlemba latches on to him for support? self get him? attempted jumping & dance with this gait but stuck even more $\Rightarrow$ get them to walk with high knees around the track instead. lower body $\Rightarrow$ sit to stand $\Rightarrow$ much slower & more confusion but after a few can do well. (3x10). upper body strength. Arched weights $\Rightarrow$ biceps & arm punches $\Rightarrow$ very slow to begin & all out of sync - need to count up to 10 and to till start getting activity right $\Rightarrow$ increase no. reps (start counting from first correct). Endurance $\Rightarrow$ marching $\Rightarrow$ all managed well keep not interested all the time - needs to be called many times to do task and complete it. Ball skills $\Rightarrow$ need to help 1 at a time - need to emphasise not so don't get over excited. Suphlemba really excited with balls $\Rightarrow$ need to walk 1 on 1 with him. Agility $\Rightarrow$ used tires & to weave through - Suph latches on to Brandon - Brandon can't do task correctly due to this - need to walk with Suphley. Gait $\Rightarrow$ ice walking & walking backwards $\Rightarrow$ mini struggles need much with this & so does Sup $\Rightarrow$ need to be close to them. Musa & I am very good - manage all tasks well - Musa very helpful with getting exercise together (loves to run around) takes much slower with this group. Need to shorten some exercises & leave time to teach.

Thoughts

- If do manual dexterity - don't end when all seated before stretching. change warmup done.
- watch Sup - so not hindering Brandon.
- Mini very lazy - needs constant encouragement $\Rightarrow$ start will do exercises to please.
- Performance of some exercises very poor - need constant postural corrections & explanation.

Change programme slightly?

(Weeks 1-4) $\Rightarrow$ No formal talk $\Rightarrow$ educate on performance on each exercise - maybe something at end?

(5 mins)

 $\Rightarrow$ warmup $\Rightarrow$ 2 laps athletics track? $\Rightarrow$ walking. $\Rightarrow$ 2 laps track (high knees 2) lateral walking.

(5 mins)

$\Rightarrow$ strength $\Rightarrow$ lower body - sit to stand / side lying leg raises.
upper body - punches + lat raises.
core - bridges.

Date

Exercise session notes

(5 mins)
(5 mins)

Endurance → track exercises → walking marches
Ball skills → passing ball in circle → change direction on word.
→ line passing
→ kicking ball.

(3 mins)

Balance → tandem walking on firm surface (10 m).
single leg balance *carefull with Nadia

(5 mins)

Agility → Tie ankles.



maybe combine agility with endurance

→ start → 1 lap around track
end start back at beginning?

(5 mins)

Golf → 4 lap reel walking
4 lap toe walking
4 lap walking backwards.

(5 mins)

Manual dexterity → pasta guns → Reach internet spaghetti
will be better than chickens as children
more likely to eat chicken instead of uncooked pasta.
sketching & education @ end.

#2

Group 1 → All present

warmup → 2 laps walking - some jogged some ran; walking with high knees (Nadia struggled). Reel walks → changed direction half way through lap.

stretch → sit to stand, punches & pat raises, bridges (Nadia very uncomfortable) stretch hamstrings whilst others doing bridges.

Agility & Endurance → tie weaving followed by running around track → 5 laps each

Ball skills → line passing & circle passing.

Balance → single leg & tandem walking → Nadia struggling → needs to hold on to me - Wiaan struggling → needs to do it slower

Golf → reel walking → Michael very good, tries hard, Nadia struggling. toe walking all managed well - Sche slow → chicken & Nadia.

Manual dexterity → pasta weaving → takes long → each one needs to do 2 spaghetti's - Jake always ahead - can give more, exercises to him.

sketching → hamstrings (David extremely tight); Michael tight & Nadia. Need to do sketching everywhere.

Did pet touching, sitting, glute sketch & back stretch (kneeling).

Date

Exercise session notes

#2.

Enjoyed session - said were tired at end but enjoyed it.
 Group 2 $\Rightarrow$ Mini absent.
 Started with warmup $\Rightarrow$ Musa & Kim enjoyed running and jog each other around - did 2 laps walking. 1 lap high knees (Sija struggles but does the best he can - walked with him today & this helped Brandon do warmup well) lateral walking. Kallego not listening today.
 Strength $\Rightarrow$ Sit to stand. pikes & lat raises & bridges - Brandon struggles with bridge - sways to right side - needs assistance.
 Agility & endurance $\Rightarrow$ tired wearing - all managed well - helped Sija so Brandon can work well. Ball skills $\Rightarrow$ avoided kicking but did line passing and circle passing - Sija struggles to catch ball - Kim & Musa work well together. Golf $\Rightarrow$ 3 laps - heel toe, backwards $\Rightarrow$ managed all well today $\Rightarrow$ need to focus on foot placement in heel & toe walking.
 Balance $\Rightarrow$ single leg - Brandon struggles. Sija & Mbemba needs to hold on to me. tandem walking $\Rightarrow$ Musa & Kim helped Brandon & Sija. Pasta for manual dexterity took very long but they all managed 2 pasta each. Ended with stretching. Hamstrings, glutes.

Thoughts

Groups better today $\Rightarrow$ modification of plan went well - still need a few mins to add to stretching time.

#3

Group 1 $\Rightarrow$ All present
 Followed modified programme - warmup went well - David & Chikabelsie - imitate each other - needed to separate. Added some movements to general walking around track - firm circles for ROM. Did all strength exercises. Jake & Michael tend to do more reps as they finish earlier. Nadia counted a few times & is getting more confident. Rebecca always asks for approval & needs constant reinforcement. Did not do pasta today but did more stretching & did lots of explaining of why each exercise is NS. Michael asked if exercises will help him loose weight as he is struggling with it this (gave advice). All enjoyed session.

Group 2 $\Rightarrow$ 1 absent

Followed modified programme. Sijathemba very imitable today. Session went well - Musa & Kim enjoyed it - at end of session did extra laps. Ichanya very quiet today - did centring for some exercises but said was tired.

Date

Exercise session notes

#4

Group 1 = All present

Followed programme

warmup $\Rightarrow$ 2 laps walking, high knees, side walking.

strength $\Rightarrow$ sit to stand, punches & lat raises, bridges (Need to stretch nadia while others do this - also help her do cunches - managed this better but struggles to get up in straight line.

A+E $\Rightarrow$ tried weaving & running

Ball skills - went well - no problems

Balance - onkabeke & David fighting - had to separate 11cm.

David - does tandem walk too quickly - likes to speed up all exercises - need to get him to do more slow & controlled movements.

Gait - all done well - nadia getting better @ backwards walking.

M.D - All managed 5 paces.

stretching at the end better tried today - spoke about why stretching is good for us & why too much is not good for us

$\Rightarrow$ enjoyed session

Group 2 $\Rightarrow$ 3 absent

Followed programme

Brandon did much better today as siya not at session.

Musa & kim doing well, khanya slow but tries hard -

balance is improving & confidence in counting.

Kim lead all stretching today. Brandon struggles with kneeling stretch - help him individually.

#5

Group 4 = all present

No problems with programme - all managed well.

Assisted nadia with backward walking.

onkabeke confused with tires today - Jake assisted.

Group 2 = 3 absent

Followed programme - no problems today.

#6

Group 1 - All here

Jake late today $\pm$ 5 mins.

warmup = 4 laps total $\Rightarrow$ nadia getting better $\Rightarrow$ doing aches

much quicker & with ease. Strength - sit to stand bridges & arm

exercises. Had to correct khanya alot today with

arm movements - David continues to speed up exercises.

David kids to wear unstable shoes - (Cross today for him) 5 mins.

$\Rightarrow$ suggested more stable shoes.

A+E $\Rightarrow$ went well $\Rightarrow$ David tried backwards & managed - all others wanted to try $\Rightarrow$ all managed - nadia some difficulty.

Date

Exercise session notes

⇒ maybe when progressing will include backwards + the weaving as they seemed to enjoy it.
 BS ⇒ went well - David tries to throw ball too hard - receive can't often catch ball - needed to walk 1 on 1 with David today.
 B ⇒ went well.
 Gail ⇒ went well - asked them to try go guider if possible & all managed well. All support each other - Michael always encourages the others.
 MP = 5 pastas each
 Stretching ⇒ upper & lower body.
 Socks about balance today.
 Group 2 = 2 not here.
 Mini came ± 10 mins late to session.
 Followed programme.
 During agility - tie weaving - Kim fell & grazed her knee - I took her to wash knee. Told Musa to get rest to do 2 laps high knees toes heels. Took him to secretly and put plaster & disinfected him knee. She was in 1/10 pain and wanted to continue with class. I told her to continue but not do it and if further pain must stop.
 Rest of session went well - no further problems.

#7

Group 1 ⇒ All present
 Followed programme - all went well no problems.
 Take seems to be getting bored & did discuss change & new exercises in following weeks.
 Included backwards + the weaving in session as they enjoyed it last session.
 were very tired today but did enjoy session.
 Group 2 ⇒ 1 absent
 Mini struggled with getting up & down from floor today - requested help - I showed him how to get up in easier way using body shifting & this helped him - was very lazy today in doing laps & agility exercises.

#8

Group 1 ⇒ All present
 Last day of programme (week 1-4)
 Followed programme & asked about how they were enjoying programme. All said enjoying but would like new & more exercises because feeling strong.
 No problems with session ⇒ taught pasta guns today & thoroughly enjoyed it.

Date

Exercise session notes

Group 2 $\Rightarrow$ 2 absent

Session went well

asked if enjoying programme & also said would like some new exercises.

No problems in session.

WEEKS 4-8

↑ warmup $\Rightarrow$ ↑ no of laps?

$\Rightarrow$ Add jumping jacks instead of dance?

Strength $\Rightarrow$ 3 upper body $\Rightarrow$ Add seated rows: add memory go round
2 core $\Rightarrow$ Add crunches (step ups)

A+E $\Rightarrow$ Add laps (↑ time & reps)

$\Rightarrow$ Add backwards tire weaving + add jumping

MD $\Rightarrow$ ↑ time $\Rightarrow$ ↑ passes to complete

Group 1 5 $\Rightarrow$ 10

Group 2 2 $\Rightarrow$ 4

BS $\Rightarrow$ Weighted ball

ball passing - ↑ speed & distance

B $\Rightarrow$ ↑ distance + add holding object

single leg ↑ time

G $\Rightarrow$ ↑ distance - toes ↑ 2 laps

heels ↑ 2 laps

To make balance different add on balance beam?

Change marching to marching up on memory go round?

#9

Group 1 = 1 absent (sick)

Stalled with programme for (weeks 4-8)

warmup $\Rightarrow$ 3 laps around walking + 1 lap high knees + 1 lap side walking

added jumping jacks = 2x10 $\Rightarrow$ all enjoyed this.

Strength $\Rightarrow$ sit to stands, crunches, bridges, seated rows,

squats $\Rightarrow$ David did a squat & jumped after so I

told him those were called 'Bogs' and that they

could do 10 bogs if they wanted to.

A+E $\Rightarrow$ Did 6 laps instead of 5 & included backwards weaving.

MD $\Rightarrow$ Asked them to do 10 passes $\Rightarrow$ this was taking a while

so ↓ passes to 8. Jake & Michael managed 10, Khanya 9.

BS $\Rightarrow$ ↑ distance between passes - they made more mistakes

but enjoyed the challenge.

B $\Rightarrow$ ↑ distance of tandem walk & introduced holding a

tennis ball in front of them. (decided against weights

for safety) Ended off with stretches - David getting better

Date

Exercise session notes

group 2 $\Rightarrow$ 1 absent

Followed week 4-8 with group; Matteo came 5 mins late
Manned well

Kim not very happy today - says her teacher kicked her out
of class & she is very sad. Hold her exercising will be fun
& she did most activities but needed lots of encouragement today.
Struggling with backwards weaving but got them to pull her up
to help each other

Enjoyed balance beam walking

#10

group 1 = All present

Followed programme

Michael very frustrated on balance beam - keeps falling off
within 5 steps - Jake helped Michael. Nadia struggles alot
on balance beam but always tries to complete it.

Warm up was good $\Rightarrow$ according to everyone & they are enjoying
new exercises.

group 2 = 3 absent

Session went well.

Musa did not want to participate in most things to begin
with but eventually did after much encouragement

Group enjoy balance beam & loves step ups on merry go round.

(#11, 13, 14 next)
page

#12

group 1 = All present

During warmup David asked if he could try doing a
"star jump lap" so I said he could - the others loved this
idea and all wanted to do a lap.

They were exhausted after lap but enjoyed it.

Completed all warmup tasks but not the star jumps as
this was done in form of a lap.

B $\Rightarrow$ Michael did a bit better today on balance beam &
seemed less frustrated - he seems very conscious of
his weight problem as he asked again today how to
lose weight & if I thought he had lost weight since
starting the programme.

Rest of programme went well $\Rightarrow$ spoke about the
importance of agility today & ended off with stretching.

Group 2 $\Rightarrow$ 1 absent

All exercises went well today - all enjoyed step ups on
merry go round & love to shout numbers loud when on it.

All did well on balance beam today. Matteo likes to help
people crossing the beam - always helps Brandon & Sija -
Sija tends to hold on Brandon on beam - I need to talk
intent of him to prevent this.

Date	Exercise session notes
1/9/2014. #11 (written by Kristen)*	1ST GROUP: 8 people present, 1 on holiday. Warm up: 2 laps, star jumps Agility - weave through tyres forwards/backwards - T test Gait - walking backwards / heels / toes / tandem Balance - single leg balance / beam Strength - sit-to-stand, Frog Stretch, 2ND GROUP: 5 people present. Warm up: 2 laps, Agility - weave through tyres. Gait - walk on heels/toes/sideways / tandem Balance - single leg balance / beam Strength - quick feet, SL Raiser, high knees. Arms - ROM (circles) Stretches - upper body, lower body
8/9/2014 #13*	1ST GROUP: 7 present. Warm up: 2 laps, star jumps. Agility - weave through tyres forwards/backwards. Gait - walk forw / back / heels / toes Strength - sit to stand, quick feet, Frog legs. Stretches Balance - SL / DL / beam 2ND GROUP: 5 present Warm up: 2 laps, star jumps walking around the block (forwards/backwards/high legs / sideways) Gait - heels / toes / tandem Strength - sit-to-stand, quick feet Balance - stand on one leg.
11/9/2014 #14*	G1: 8 present WU: 2 laps, star jumps Agility - through tyres / forwards/backwards Gait - heels / toes around block Strength - calf raiser / sit-to-stand Balance - stand on beam (x2) Ball throwing, passing, up & over / side-to-side Stretcher. G2 - 5 present WU - 2 laps, star jumps

Date	Exercise session notes
11/01/2014 continued	Agility - through & around tyres. Strength - quick feet, frog legs, hedges/shoulders/knees + toes. Ball throwing / bouncing ball. Gait - heels / toes / forwards / backwards / big steps / side to side Aims - circles (forwards / backwards) bicep curls 1 lap sprint / walk. Balance - stand on one leg. Battled to get the low-anchoring group to do exercises. Kept changing exercises to try get them to do it but today they were all not interested. Katlego did most of class Musa + Kim were at music Mini didn't do all exercises, tried a few Siyathemba held onto Brandon for most of lesson - tried a few exercises.
#15	Group 1 = All present Followed programme. For those that were finding balance beam to easy - progressed to backwards beam - further progressed to backwards tandem walking on floor so weren't left out. Added side weaving through tires (alternating) Group 2 = All present. Followed programme. No problems or issues today Musa helped get others in order & all listened to him.
#16	Group 1 => 1 Absent Last day of weeks (4-8). Asked if they were enjoying programme - they say enjoy it but can make it harder. They are going to a soccer camp soon & want to be fit for it. Jake & Michael help with those struggling. Nedia has improved with balance - can now walk on balance beam unassisted - does walk slowly but manages to do whole task. Group 2 => 2 Absent. Mini very aggressive today - was shouting and was pushing others around, did not want to listen to instructions and was getting very angry when I asked him to do exercises => I called him away

Date

Exercise session notes

from others and spoke to him calmly - this helped calm him down a bit - I told him he didn't have to do all exercises if he didn't want to - just does as many as he can.

Week 8-12

progressions

- ⇒ jumping jacks good addition
- ⇒ add quick feet for coord & speed
- ⇒ add exercise for lower body - frogs - squats
- ⇒ increase duration for strength
- ⇒ If enough time, add manual dexterity pegs exercise
- ⇒ balance ⇒ tandem walking backwards, eyes closed
- ⇒ Gait ⇒ (backwards) all

#17

Group 1 ⇒ started new programme (8-12) All present
warmup ⇒ Really enjoying jumping jack lap ⇒ For more advanced they do this 2x.

Strength ⇒ managing squats well ⇒ added jump (frogs) & doing well.
Nadia still struggles with bridge.

A&E ⇒ No problems

B ⇒ Nadia much better - all managing backwards exercises.

BS ⇒ kicking to each other & distance doing better

on cat set she still too excited with ball but has good skills.

Deandra likes to lead stretching and all enjoy end session.

Today spoke about ball skills.

Group 2 ⇒ Mini came late, 2 absent

Managing well - sualemba struggling with bridging & balance

she can't do single leg balance without support

A&E ⇒ Musa & Kim enjoy this the most ⇒ often do extra laps - today did 3 extra laps

Happy with progressions.

#18

Group 1 ⇒ All present

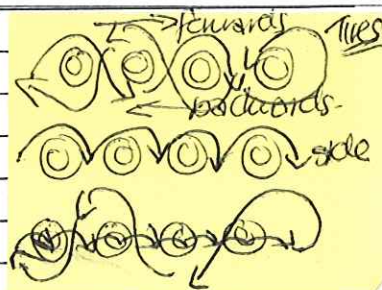
Followed programme ⇒ no problems

Enjoyed session ⇒ tried new tile acts.

Group 2 ⇒ 2 absent

Followed programme ⇒ no problems

Enjoyed session.



#19

Group 1 - All present

warmup went well ⇒ Did exercises in reverse order & not monotonous.

All managed exercises well ⇒ Biggest concern is still flexibility -

most still very tight ⇒ paws still needs 4 or 7 help with.

Date

Exercise session notes

stefano. Nadia & Wilson have become a lot more in tune and seem generally more happy. Higher functioning participants rather walked passed session today and said they are all doing much better in class $\Rightarrow$ concentration & seem to follow tasks better.

Group 2 $\Rightarrow$ absent.

Very difficult class today $\Rightarrow$ all seemed very interested - very discipline & very tired - had to end class early.

Did not do MD & gait today as everything took very long $\Rightarrow$ seemed very agitated today.

#20

Group 1 = All present
Followed programme
No problems.

Group 2 = 1 absent
Followed programme.

Kim & Musa seemed to be fighting with each other.

Brandon very lazy today - had to walk with him with gait exercises & warmup as he did not want to do them alone.

Lara did well with pasha today - spoke a lot today & not much spinning.

#21

Group 1 = All present
Followed programme.

Jack tried today, Michael in "arguing mode" but did everything.
No problems.

Group 2 = All present

All happy today - No problems.

#22

Group 1 = All present

Group decided to see if they can do 3 Jumping Jack laps in a row $\Rightarrow$ All succeeded - Michael found very difficult but managed to complete this - was VERY proud of him!

Nadia has improved unbelievably well with balance - can now do single leg eyes closed $> 30s$!

No issues.

Group 2 = All present

Followed programme

Did not want to do pasha today. (Left this out - added +1 gait lap).

No other changes.

Date

Exercise session notes

#23

Group 1 $\Rightarrow$ All present
 Followed (8-12) programme.
 No problems.
 Group 2 $\Rightarrow$ All present
 $\hookrightarrow$ needed to find kettle.
 Followed programme
 No problems.

#24

LAST CLASS:

Group 1 $\Rightarrow$ All present.
 No problems $\Rightarrow$ Class went well all really enjoyed it -
 all asking when I will see them again & They all did
 very well and tried their hardest.
 All said they liked programme.
 Jake & Michael very thankful.
 Group 2 $\Rightarrow$ 2 absent
 Great session; all worked hard.

Thoughts

- Future intentions $\Rightarrow$ focus on flexibility?
- Home programmes (individual)
- standard programmes for schools?
- Balance & ability seemed to improve the most.
- seems very little lack of knowledge on benefits of exercise.
- Many fixated on food (Khangas $\Rightarrow$ only conversations) ??
- Many sick throughout intervention
 $\hookrightarrow$ discuss compliance rates in write up ??
- Future study $\Rightarrow$ qualitative data
 $\hookrightarrow$ test best parents
 $\hookrightarrow$ implement in classroom + home?