



How balloon play can support child development: A study of children aged three to four years

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Abstract

Playing with balloons is anecdotally thought to benefit children's development, in particular, by encouraging active play and allowing children to experience the shock or surprise of a burst balloon. This research aimed to explore this further to identify the physical, cognitive, and social and emotional skills that balloon play may support. A balloon play session was carried out with 20 children aged three to four years and behaviour observed. Evidence was found to suggest balloon play may support all three core areas of development in some way. In addition, children's activity levels were measured during the balloon play session, and compared with activity levels during outdoor free play, indoor gym play, and indoor quiet play. Children were shown to be significantly more active during balloon play, outdoor free play and indoor gym play than during indoor quiet play. It was concluded that balloon play may be a valuable way to encourage exercise in pre-schoolers, particularly for parents who lack time, space and/or resources for other types of active play. As well as helping children develop key physical skills, this may help to prevent obesity and related health problems, by encouraging healthy habits from a young age.

Keywords: Balloon play, Balanced Play Pyramid, active play, pre-schooler development.

How balloon play can support child development: A study of children aged three to four years

A colourful scattering of balloons is a familiar sight at any children's party. As well as being a source of great excitement for children however, balloons may be a great tool to support children's development.

Play is known to be crucial to a child's development (see Gleave & Cole-Hamilton, 2012, for a review). There are three core areas of development, all of which are supported by different types of play: physical development, which includes fine motor skills (small muscle movements) and gross motor skills (large muscle movements); cognitive development, which refers to mental processes such as logical thinking, concentration and memory; and social and emotional development, which describes learning to understand emotions and how to interact with others.

Anecdotally, there is a strong argument suggesting that balloon play can support children's development in at least two of these areas. In particular, it is thought that balloons may encourage children to play with others, developing social skills, as well as their emotional development through experiencing the shock or surprise of a burst balloon. Additionally, balloons may encourage particularly active play, helping children to practise physical skills such as throwing, catching, and kicking.

There is limited existing research to demonstrate the benefits of balloon play on the core areas of development. The purpose of the current research was therefore to begin exploring the specific skills that balloon play may benefit and gather evidence to support these claims. The present study focused on three to four year-olds as this age group are above the safety recommendations for balloons (three plus) and share an early years setting.

Method

Aims

The aim of this research was to explore the benefits that balloons may have for a young child's development. A mixed-methods approach was used.

To investigate the physical, cognitive, and social and emotional skills that may be afforded by balloon play, children's behaviour was observed during a balloon play session.

H₁ - It was predicted that children would demonstrate the use of physical skills during a balloon play session.

H₂ - It was predicted that children would demonstrate the use of cognitive skills during a balloon play session.

H₃ - It was predicted that children would demonstrate the use of social and emotional skills during a balloon play session.

It was anticipated that a balloon play session would encourage active play, so the study also looked specifically at children's level of physical activity during the balloon play session.

A repeated measures design was used to compare children's activity levels, measured as steps per minute, between four conditions: (1) Balloon play, (2) Outdoor free play, (3) Indoor gym play, and (4) Indoor quiet play.

H₄ - It was predicted that children would take more steps per minute during a balloon play session than an indoor quiet play session.

H₅ - It was predicted that children would take a similar number of steps per minute during a balloon play session, as during an indoor gym play session.

H₆ - It was predicted that children would take a similar number of steps per minute during a balloon play session, as during an outdoor free play session.

Participants

Participants were 20 children (nine male, 11 female) from Mount Carmel Kindergarten in the UK. Children were aged between three years two months, and four years four months, with an average age of three years nine months.

Of these 20 children, eight were selected for the activity tracking group (four male, four female). Within the activity tracking group, children were aged between three years four months, and four years one month, with an average age of three years eight months.

Three nursery staff members were also interviewed.

Materials

Fitbit Ace 2 Kids activity trackers were used to measure children's steps during the activities, these were chosen for accuracy and age suitability.

Biodegradable 33cm natural rubber balloons of various colours were used for the balloon play session (20 helium, on string with plastic weights; 20 non-helium).

Coloured crash mats and hula hoops were used during the adult-led games. Nursery staff were given a guide to games they could play with the balloons (APPX. 1).

Procedure

Activity tracking

Eight children were selected to have their step count tracked during a balloon play session, plus three additional play sessions that formed part of the nursery's usual schedule. Each session lasted approximately half an hour and was carried out at varying days and times.

- Condition 1: Balloon play - Activities included 15 minutes of adult-led games and 15 minutes of free play, in the nursery gym, with a mix of helium and non-helium balloons.
- Condition 2: Outdoor free play - Child-led play in the nursery garden. This includes open grass areas and outdoor multi-play equipment. Typical activities include running, climbing and using balance bikes.
- Condition 3: Indoor gym play - A mix of adult-led and child-led play in the nursery gym. Typical activities include free play on the gym apparatus, ball play, climbing frame, stepping stones and tunnels, and dancing.
- Condition 4: Indoor quiet play - Play in the art room or classroom with a variety of toys available to children. Typical activities include arts and crafts, jigsaws, construction, and pretend play.

Activity trackers were put onto children at the start of each session and removed at the end. The step count and time were recorded at the start and end of each session, the difference was then calculated to find children's step count over the session. From this, the average number of steps per minute was determined.

Balloon play session

Children took part in two class groups, with 12 children in one group and eight children in the other. A mix of free play and games was used in order to keep children engaged throughout the session, as children of this age have

limited attention spans. The order of adult-led and free play was swapped for each group.

During free play, all of the balloons were spread out in the nursery gym. Children were allowed to play as they liked, with some support from nursery staff to resolve conflicts and manage risk. Semi-structured interviews were carried out with the nursery staff during this part of the session (APPX. 2).

For the adult-led games, the non-helium balloons were used to play a variety of games. These were led by the nursery staff and tailored to the group to keep children engaged in the games. Activities included passing or hitting the balloons to one another, walking with the balloon between their legs, throwing the balloons through a hula hoop, and moving all of the balloons to a particular coloured crash mat.

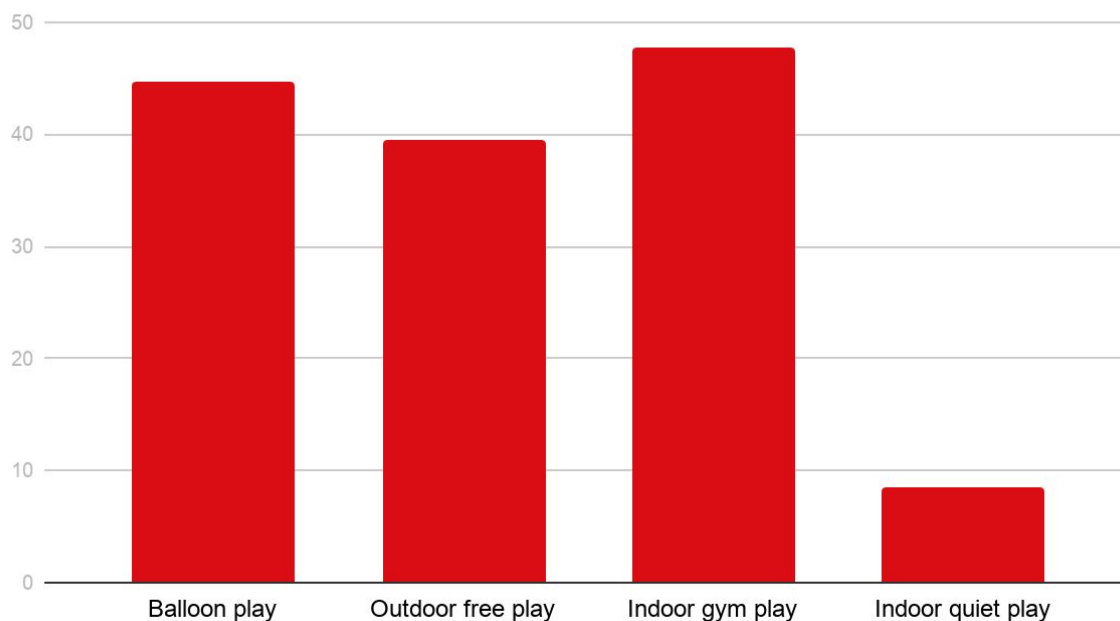
Children were observed throughout the balloon play sessions, with moderators noting examples of physical, cognitive, and social and emotional skill use.

Results

Physical activity

As shown in the graph below, the average number of steps per minute was highest in the indoor gym play condition ($M = 47.75$, $SD = 17.43$) and lowest in the indoor quiet play condition ($M = 8.5$, $SD = 3.4$). Both the balloon play condition ($M = 44.75$, $SD = 12.26$) and the outdoor free play condition ($M = 39.50$, $SD = 12.18$) also showed a higher average step count than the indoor quiet play condition, with scores comparable to the indoor gym play condition.

Figure 1: Average number of steps per minute



A repeated-measures ANOVA with a Greenhouse-Geisser correction determined a statistically significant difference in the mean number of steps per minute between types of play ($F(1.937, 13.561) = 20.738, P < .001$).

Post hoc tests using the Bonferroni correction showed that the positive difference between balloon play and indoor quiet play was statistically significant ($P < .001$).

There was also no significant difference between the mean number of steps taken during balloon play, compared to both indoor gym play ($P = 1.0$) and outdoor free play ($P = 1.0$).

Physical development observations

Gross motor - Children used their whole bodies to run, crawl, throw, catch, and hit the balloons. The non-helium balloons were particularly good for this. The helium balloons also encouraged children to walk and run, as children enjoyed holding the string and watching the balloon “follow” them around the room (Figure 3). Some children balanced their whole bodies on the balloons, using core muscles (Figure 6).

Nursery staff member: “It’s very good exercise for the whole body, using their arms and legs.”

Kicking - Children repeatedly kicked the balloons, strengthening their balance when standing on one leg and improving the coordination.

Hand-eye coordination - The slower movement of the balloon compared to a ball gave children more time to correct coordination errors and successfully catch the balloon. Children also practised two-handed throwing (Figure 2).

Cardio fitness - Children were very physical throughout the session, frequently running and jumping.

Dexterity - Holding and untangling the string on the helium balloons gave children the chance to exercise fine motor control, strengthening the muscles in their hands and fingers.



Figure 2: Children throwing balloons into a hoop (Photo credit: Mount Carmel Kindergarten).



Figure 3: Girl watching a helium balloon follow her as she walks/runs (Photo credit: Mount Carmel Kindergarten).

Social and emotional observations

Cooperation - As part of the games, children were encouraged to pass the balloons back and forth, or over their heads to other children down a “balloon train” (Figure 4). This required them to take turns and also assess how to pass the balloon in such a way that their partner could catch it, for example, considering how gentle they would need to be. Children were also seen helping one another untangle the strings on the helium balloons.

Sharing - Children chose their “favourite” balloon and some fought over these, which gave adults an opportunity to teach them about sharing. During one game in which the balloon was being passed between pairs, one boy kept hold of his balloon and didn’t want to pass it to his partner, which also gave adults the chance to encourage him to take turns. During free play children demonstrated an understanding of fairness, showing frustration when one child took all of the balloons, and sharing with other children and adults who didn’t have a balloon.

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| Girl: “You’ve taken all of the balloons!” |
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| Boy (handing balloon to adult): “I’ve got two balloons!” |
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|---|
| Nursery staff member: “Obviously it’s all the different colours, they want the colour everyone else has got.” |
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Social interaction - One girl was seen to initiate peekaboo with an adult, by hiding her face behind a balloon (Figure 5). During free play, children also hit and kicked the balloons to their friends and compared the balloons they had collected with one another. They engaged in play fighting too, playfully hitting friends over the head with the non-helium balloons.

Managing emotions - Children were seen to handle a range of emotions including excitement, disappointment (if they didn’t get the balloon they wanted), patience (waiting for helium balloon strings to be untangled), and shock/surprise when a balloon burst.

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| Nursery staff member: “If they pop the balloon they know not to be scared.” |
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| Nursery staff member: “Balloons are always something they go a bit crazy with.” |
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Empathy - Children celebrated one another's success during play, for example, when getting a balloon through a hoop or managing to collect the most balloons. Children were also seen sharing the 'best' balloons with one another. Adults used a balloon bursting as an opportunity to discuss how some people might get scared if they hear a balloon pop.

Boy (crying): "I want a big one."

Girl (offering him her balloon) "Here's a really big one."

Confidence building - During the games, children gained a sense of achievement when they completed the task, such as getting the balloon through the hoop (Figure 2) or carrying the balloon between their legs to the other side of the room.

Girl (throwing balloon through a hula hoop): "I did it!"

Imaginative play - The balloons could be used as props for imaginative play. During the adult-led games for example, children were asked to imagine that they were penguins looking after their eggs, which were the balloons.



Figure 4: Children passing a balloon down a "balloon train" (Photo credit: Mount Carmel Kindergarten).



Figure 5: Girl playing peekaboo with a balloon (Photo credit: Mount Carmel Kindergarten).

Cognitive observations

Trial and error problem solving - Children used trial and error to solve problems set by adults, or created by themselves. This included working out how to keep the balloons off of the floor, and how to make a balloon reach the ceiling or go through a hoop, by hitting and kicking the balloons. They also experimented with ways to keep the balloon between their legs while walking as part of a game; some children held the balloon with their hands, others moved slower and more carefully to avoid dropping it.

Understanding the world - Children were seen experimenting with gravity. For example, during free play two girls were throwing helium and non-helium balloons in the air and comparing how they moved through space. Children also pulled the string of the helium balloons then released it to see what happened (Figure 7), and lifted the string higher to allow the balloon to float higher. Children experimented with pressure too, learning that they could pop the balloons by lying on them (Figure 6). One girl was also seen holding the balloon up to the ceiling light and looking through it, to see how viewing the light through the balloon affected what she could see.

Girl (playing with a helium balloon): "Look, it's higher!"

Colour recognition - Children practised colour recognition during games that required them to separate the balloons by colour. They also communicated using the colours of the balloons.

Boy: "I want the blue one!"

Vocabulary building - The session prompted discussions that included words such as "weights", "helium", "floating", and "gravity".

Boy: "Two giant balloons."

Categorisation - Children went around collecting as many helium and non-helium balloons as they could carry, comparing their collections with friends.



Figure 6: Boy squashing/popping balloon by lying on it (Photo credit: Mount Carmel Kindergarten).



Figure 7: Boy experimenting with helium balloon by pulling/releasing string (Photo credit: Mount Carmel Kindergarten).

Discussion

This research was prompted by anecdotal claims that balloons can support children's healthy development. It was designed to explore skills that balloon play facilitate in young children. During the observed balloon play session children demonstrated the use of a range of physical, cognitive, and social and emotional skills. Therefore H_1 , H_2 and H_3 were supported.

It was also shown that children were significantly more active during a balloon play session than an indoor quiet play session, supporting H_4 . Additionally, children showed similar levels of activity while playing with balloons as they did when taking part in indoor gym activities, or during outdoor free play. This means that H_5 and H_6 are supported respectively.

Overall, it was clear that the balloons were very versatile tools for play. Within the same session, some children were very physical, running around and throwing, hitting, or kicking the balloons; while others quietly held their "favourite" balloon at the side of the room, or tugged on the string of a helium balloon to see how the balloon floated back up. This indicates that balloons can cater to a wide range of abilities and interests, making balloon play a good activity for fostering motivation and confidence. Children can also switch between activities, so this may provide a route into different types of play and hold their attention for longer.

Non-helium balloons appeared to be more popular for playing games, throwing, kicking, and passing type activities. Although this wasn't measured for comparison, it is likely that these balloons encourage more active play than helium balloons. However, the helium balloons were more attractive to children and encouraged lots of discussion and experimentation, as children explored how the balloons floated. This also encouraged more new vocabulary, as this was an opportunity for adults to discuss terms such as "gravity" and "weight".

Implications

Recent research shows that, based on the Balanced Play Pyramid (Figure 8), around two thirds of one to four year-olds spend less than the suggested portion of their leisure time taking part in active free play, or sports games (Gummer & Taylor, 2019). Parents of three to four year-olds are particularly aware of this gap in their child's play, with one in three saying they are concerned about this. A lack of time, space, and resources are the main reasons parents believe their child does not take part in enough active free play, or sports games.

As the present study shows that balloons can be used to promote active play, in addition to being used for sports-type games, they may be a valuable solution to this gap in pre-schooler play. Non-helium balloons are easily accessible, low-cost resources. If children are limited by a lack of outdoor space, balloons can be safely played with indoors, with a reduced risk of breakages compared to playing with a ball. Balloon games can be as quick as required for time-poor parents, with minimal set up and tidying required. As we have seen, free play with balloons can also promote active play and would only require parental supervision for safety.

Considering the current obesity crisis, it is more important than ever to encourage a good amount of physical activity from an early age, as this creates healthy habits as children get older. According to the World Health Organization (October 2017), there are around 41 million children under the age of five who are obese, up from 32 million in 1990. In addition to other preventative measures, such as a healthy nutritional diet, active play such as balloon play may help protect children from the risk of obesity and associated health problems.

Limitations

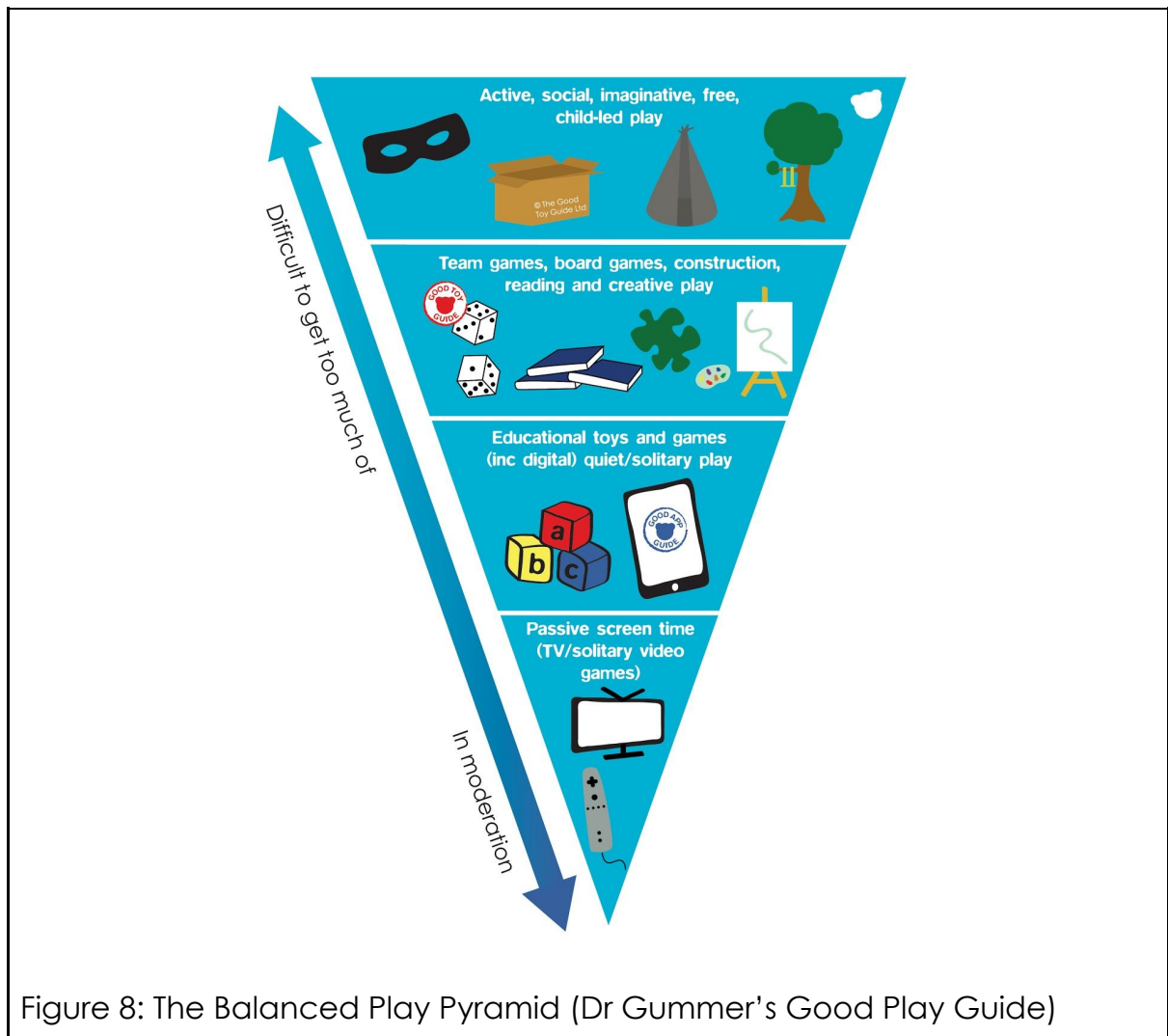
The study was carried out within a typical week at the nursery, using pre-planned activities as comparison conditions. Therefore, children took part in the activities at different times of the day, which may have affected their average step count. For example, if they had been particularly energetic in a morning outdoor play session, they may have been less so during an afternoon quiet play session. This gives the research the benefit of natural observation, as it is a routine and environment children are familiar with. For a clearer comparison, it would be ideal to measure children's steps at the same time each day, on multiple occasions, with only the type of activity changing.

A second implication of the short-term nature of the study was the fact that children's reactions to the balloons may have been the result of novelty. Longer term research would help show whether it is the balloon play itself, or the introduction of a new activity, that prompted the levels of activity and engagement observed.

Furthermore, as a mix of helium and non-helium balloons were used, it was not possible to assess which encouraged higher levels of activity. The presence of the helium balloons could also have reduced children's activity levels, as they may have played with these balloons, rather than the

non-helium balloons that seemed to encourage more physical play. The study could be repeated using only non-helium balloons to investigate this.

Finally, all children who took part were neurotypical and did not have any physical impairments. As it was found that the balloons appealed to a wide range of abilities, it would be interesting to explore how children with additional needs engage with balloon play, to understand whether balloons may be a good example of inclusive play.



Conclusion

This research has found evidence to suggest that balloon play has a variety of benefits for physical, cognitive, and social and emotional development for three to four year-olds. Balloons could therefore be a great tool to encourage holistic development.

Balloon play was also shown to encourage physical exercise at a level comparable to playing outdoors, or taking part in gym games. This suggests that it would be a useful activity for promoting exercise when children are not able to spend time outdoors or do not engage well with, or have the resources for other types of indoor active play. As well as contributing to physical development, this can help pre-schoolers get the recommended amount of physical activity and may help prevent obesity.

Further research is needed to understand whether these benefits are offered by both helium and non-helium balloons. Future studies could also explore long-term impact, and the potential benefits for children who have additional needs.

Acknowledgements

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APPENDIX 1 - Balloon game instructions

(EASY) Keep it Moving / Volleyball - 5 mins

A classic balloon game perfect for indoors for one or more children, with the aim to simply keep the balloon in the air and not let it touch the ground. Be sure to have adequate space, free from fragile items and tripping hazards. This is a great game to play to loud, hilarious party music.

(EASY) Balloon Collectors - 5 mins

Blow up several balloons and place them on the floor. Set a timer for one minute. Send the first player into the balloon pile to try and collect as many as they can in one trip. When time is up, count how many balloons the player was able to carry at once. Return the balloons to the pile. Give each player a turn to do the same. The player who collects the most wins.

(MEDIUM) Balloon Waddle Races

Have children start at the starting line, place a balloon between their knees and race to the finish line without dropping or bursting their balloon. If you have a large group and limited space, the races can be done as relays.

(MEDIUM) Pass the Balloon

Split children into even groups and have them stand in parallel lines, each child approximately half a metre apart. Give the end person an inflated balloon. Once you call start, the teams are to pass the balloon under legs then over the next person's head until it reaches the first person in the line. The winning team is the first to hold their balloon up at the front of the line.

APPENDIX 2 - Nursery staff interview questions

1. How do you think balloon play might support a pre-schooler's development?
2. What, if any, examples did you see in today's session that showed learning/development through balloon play?
3. Any other comments/notes?