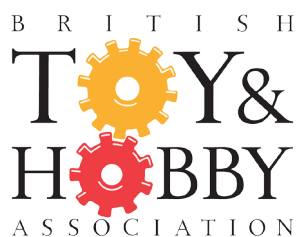




The Impact of Toys and Play on Children's Physical Activity





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January 2012

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Acknowledgements:

The research team are grateful to:

- The headteachers of the two primary schools who granted us access into their schools and to the teachers who allowed us to disrupt their lessons.
- The children who engaged in this study and to their parents/guardians
- Staff at the British Toy & Hobby Association (BTHA) who supported the project
- Andy Barnettson and Paper www.paper.org.uk, for supplying the cardboard boxes
- Members of the BTHA for supplying the toys
- Cathie Taylor and Gail Matthews who provided invaluable support to the team



1. Executive Summary

This exploratory study built on research findings that indicated that children were more likely to engage in 'fun' activities and that children were more active when given a choice of toys to play with (Hemmings, 2007). A mixed-methods design was utilised to compare physical activity levels and the type of activities during play with toys and a toy substitute (cardboard boxes) and during the school break, school lunch-time and PE sessions of primary aged children from Year 3 (ages 7-8). The play and activity sessions were:

- Indoors with a selection of cardboard boxes to play with;
- Indoors with toys (designed to promote/enable physical activity) to play with;
- Outdoors with a selection of cardboard boxes to play with;
- Outdoors with toys (designed to promote/enable physical activity) to play with
- School break
- School Lunch-time
- School PE lesson

Participants (n=51) were recruited to the study from two primary schools. The children were allocated into small groups of four children by their teachers. The majority of these groups were single sex groups but in each school there was one group that was made up of two girls and two boys. Each group of children participated in each of four activity sessions of 30 minutes duration on each of four days.

The order in which each group participated was randomised, but each group undertook their sessions at the same time on each of the four days. The children were given a standard set of instructions by the researcher at the start of each session. These instructions provided minimal information about what was expected of the children during the 30 minute session.

The children wore accelerometers during the duration of the school day. The research team recorded when the children were in the classrooms, break times and when PE sessions took place. Each of the sessions was videoed and an observer noted down specifics about the session, such as the date, time and group. In addition, the observer recorded general comments about the session (e.g. weather conditions, group dynamics, popular toys and unpopular toys etc). Every five minutes, a snap-shot was taken of what the children were doing so that more descriptive explanations could be included. All the participants took part in a focus group after their involvement in the activity sessions.



The children who engaged in this study thoroughly enjoyed their involvement and they appreciated the additional opportunity to play for half an hour on each of four school days. The study confirmed that children will use their imaginations to create games and be active when they are given the opportunity to engage in free play with the stimulus of toys or boxes.

In response to the research questions it was found that:

- The children were more active when playing with toys and boxes than they were when they were not playing with toys or boxes. The children in the study spent a higher proportion of time in activity of a moderate-vigorous intensity in all the play sessions with toys and boxes (61%) than they did in PE (38%), school break (47%) or lunch-time (36%).
- When comparing the four toy and toy substitute sessions the children were least active in the indoor session with toys, but even in this session they were engaged in more activity of a moderate-vigorous intensity than they were in PE, school break or lunch-time.
- The results indicated that the boys were slightly more active than the girls in the play sessions (20 minutes for boys in comparison with 17 minutes for girls of moderate-vigorous physical activity in a 30 minute play session)

The findings indicate that traditional outdoor toys (e.g. bikes and scooters) remain very popular with children. The children perceived that they had more toys to play with outside and yet the actual number of toys was the same indoors and outdoors. The session with outdoor toys in the outdoor space was generally perceived by the children as the session in which they were most active. The children enjoyed the indoor toys to varying degrees with some toys being more popular than others and, as with the outdoor toys, some toys offered the children more opportunity to be active than other toys.

The findings also indicated that children were more likely to be active when they had a stimulus to encourage active play and the toys and the boxes proved to be a popular stimulus to imaginative play. Many of the children played co-operatively with the toys and many of the children enjoyed playing with the boxes far more than was initially anticipated. The reasons that the boxes were popular varied between the children but included novelty, freedom to play in ways that were unconstrained or not directed by adults and opportunities to play 'make believe' games. Some children strove to keep the boxes intact, but in most sessions the boxes were completely



destroyed by the end of the session and therefore would not have been available for future play. In contrast none of the children deliberately broke the toys.

The headline findings contained in the report do not currently account for intra-group and inter-group variation across all four of the activity sessions. The ways in which the children played with both toys and boxes were affected by many factors including: previous experiences, skill level, group membership, gender, location, personal preferences, weather/temperature and sophistication of play and social skills. Thus the study demonstrates the complexity of making sense of children's play. It should also be noted that the physical activity of the sessions with toys may have been slightly underestimated in this study as cycling activity would not have been picked up by the accelerometer counts.



2. Introduction

2.1 Background to the Project:

At a recent conference presentation (2011) by researchers at the University of Buffalo¹ and an expert panel discussion in May 2011², physically active play was acknowledged by members of the active panel as being a means through which children could meet daily physical activity recommendations. However, concerns were expressed that children were not engaging in as much physically active play as they needed to and, moreover, that there was evidence for emerging links between declines in physical activity and declines in physically active play (amongst British children). The present Physical Activity Guidelines for children and young people (5-18 years) state:

- All children and young people should engage in moderate to vigorous intensity physical activity for at least 60 minutes and up to several hours every day
- Vigorous intensity activities, including those that strengthen muscle and bone, should be incorporated at least three days a week
- All children and young people should minimise the amount of time spent being sedentary (sitting) for extended periods

Start Active, Stay Active (2011) - A report on physical activity for health from the four home countries' Chief Medical Officers

Thus, it would seem logical to assume that gaining a better understanding of the conditions in which children choose to engage in physically active play may be of benefit. The study undertaken at the University of Buffalo helps to provide insight into one such condition: that children are more physically active when provided with a choice of toys to play with (3 or 5 toys, in comparison to no toys).

Building on Hemming's (2007)³ finding that children were more likely to engage in activities that they found fun and the finding that children were more active when given a choice of toys to play from (Feda et al. 2011)¹, the research presented here

¹ Feda et al. (2011). Effect of increasing toy variety on children's physical activity. *Med. Sci. Sports Ex.* 43(5):604. doi: 10.1249/01.MSS.0000401668.84402.3c.

² Make Time to Play Expert Panel (2011) A World without play: an expert view. Play England and the British Toy and Hobby Association.

³ Hemmings, P. (2007) Renegotiating the primary school: children's emotional geographies of sport, exercise and active play. *Children and Geographies*, 5, 353-371.



explored the impact of toys on children's levels of physical activity in comparison to their levels of physical activity when provided with a substitute toy (cardboard boxes) and with school break, lunch-times and PE lessons. The research also sought to establish whether or not there was a difference in physical activity when playing indoors and outdoors with toys typically associated with active play.



3. Methodology

3.1 Research Questions

The following research questions were identified for the study:

1. Are children more active when playing with toys than a substitute toy or during school breaks, lunch-time or PE classes?
2. Are children more active when playing with toys indoors than outdoors?
3. Do differences exist between males and females for any of the conditions (toys vs. substitute toy; and indoors vs. Outdoors)?

3.2 Project Overview

The research sought to examine the physical activity of children (aged 7-8) in four different activity sessions:

- Indoors with a substitute toy (selection of cardboard boxes) to play with;
- Indoors with toys (designed to promote/enable physical activity) to play with;
- Outdoors with a substitute toy (selection of cardboard boxes) to play with;
- Outdoors with toys (designed to promote/enable physical activity) to play with

These were compared with;

- During school break
- During school lunch-time
- During school PE lessons

3.3 Research Design

A mixed-methods design was utilised in order to explore physical activity levels in children from Year 3 (ages 7-8). The participants were allocated into small groups of four children by their teachers. The majority of these groups were single sex groups but in each school there was one group that was made up of two girls and two boys.

Each group of children participated in each of the four conditions in 30 minute sessions over a period of four days. The order in which each group participated was randomised, but each group undertook their sessions at the same time on each of the four days. The children were given a standard set of instructions by the researcher at the start of each session. These instructions provided minimal information about what was expected of the children during the 30 minute session.

The children wore accelerometers during the duration of the school day. The research team recorded when the children were in the classrooms, break times and when PE sessions took place.



3.4 Preparation for the study

• Selection of Toys

The toys selected for the study were chosen to be age appropriate and designed to promote active play and sourced and purchased by staff from the BTHA with approval from the research team. The selected toys were:

Indoor Toys

- Table Tennis
- Indoor football game with static football
- Hide & Seek Tunnel
- Indoor Boomerang
- Bowls
- Space Hooper
- Hula Hoop
- Sticky pad and balls
- Dance Mat
- Air Hockey Table

Outdoor Toys

- Scooter
- Skateboard
- Skipping Rope
- Bike
- Frisbee
- Football
- Cricket ball & Bat
- Space Hooper
- Small Trampoline
- Pogo Stick

• Ethical Approval

Ethical approval was sought from Loughborough University's Ethical Committee. All research conducted within the Institute, involving children, is subject to strict ethical guidelines and, as such, the following requirements were adhered to:



- Consent was sought from the head teacher at each school, the parents or guardians of each young person involved, and assent was sought from the children involved in the study. As part of this process,

Information sheets and consent/assent forms were designed and distributed within each of the schools. Staff, children and their parents were made aware that participation was voluntary and that, even if they volunteered to be involved in the project they could withdraw from the research at any time without having to give a reason:

- Pupils remained anonymous in all reports;
- Permission to video and audio tape the children was obtained from head teachers, parents and children;
- Data were stored in accordance with university regulations;
- All researchers involved in the project had enhanced CRB clearance and extensive experience of working with children in schools and using the research methods proposed.

3.5 Participants

The initial proposal for the study stated that a minimum of 36 children (18 males and 18 females) would be recruited from 2 schools. The research team successfully recruited two schools to be involved in the study. Within these two schools 36 children participated at the first school and 16 were recruited at the second school. An even number of boys and girls were recruited in each school. Having gained head teacher consent each school distributed the following documents to the children to take home to their parents/guardians:

- Parental Letter
- Information Sheet about the study
- Parental Consent form
- Health Questionnaire

The Parental Consent form and the Health Questionnaire were returned to school by the parents prior to the study commencing. The children involved in the study completed assent forms on the first day they were involved prior to completing their first session. It was made clear to the children that their participation was voluntary and that they were able to withdraw at any opportunity.

3.6 Research Team

In School A there were five 30 minute play sessions per day whilst in School B there were two 30 minutes sessions per day. Parallel sessions took place in each time slot with an outdoor session and an indoor session taking place simultaneously.



The initial research team was expanded in order to ensure that four members of staff were in school on each of the four days on which data collection took place. This enabled two members of staff to be present at each of the play sessions.

3.7 Data Collection

- **Quantitative Data**

Physical activity was measured using accelerometers and heart rate monitors for the duration of the school day. The accelerometer used for this project (the ActiGraph GT1M, see picture) is currently the most widely used motion sensor for physical activity research (De Vries et al., 2009). It is attached to a waist belt and worn above the hip and did not interfere with the normal activities of the child.



The research team recorded when the children were in the classrooms, break times, when PE sessions took place and when the children were involved in each of the four play sessions identified above.

The children's gender, ethnicity, height, weight and date of birth were also collated.

- **Qualitative Data**

The research team observed each session noting down points of interest relevant to the study.

Each session was video recorded and videos were taken of each session.

Short focus groups were conducted with the children following participation in all four activity sessions. Focus group questions sought to clarify queries arising from the researchers' observations and also to explore the children's experiences of the four activity sessions.

3.8 Data analysis

Accelerometer data

Data was downloaded from each accelerometer at the end of the school week and processed using the ActiGraph Analysis Tool (created for a previous Institute of Youth Sport evaluation project). This tool enabled calculation of the average time children spent in different physical activity intensities e.g., rest, light, moderate, vigorous and moderate-to-vigorous physical activity.



Observation notes

Prior to the focus groups, the observation notes were analysed in order to generate focus group questions specific to each group of children. Observation notes were analysed in order to help elucidate the findings from the quantitative data.

Focus group data

Focus groups were audio taped and transcribed. Transcriptions were categorised, coded and thematically analysed.



4. Research Findings

4.1 Introduction

The research findings in the section are drawn from three data sources:

- Observations,
- Quantitative measures of physical activity and
- Focus groups conducted with the children one week after completing the physical activity sessions.

The observations provide a useful insight into the ways in which the children engaged in the sessions. The quantitative data is used to address the three research questions:

- Are children more active when playing with toys than a substitute toy or during school breaks lunch-time or PE sessions?
- Are children more active when playing with toys indoors than outdoors?
- Do differences in activity levels exist between males and females for any of the conditions?

The focus groups offer insights into the children's experiences of the sessions and help us account for some of the quantitative findings.



4.2 Observations

4.2.1 Introduction

During each activity session one member of the research team took on the role of observer. The researchers noted down specifics about the session, such as the date, time, group and condition. In addition, they made general comments about the session (e.g. what the weather was like, group dynamics, popular toys and unpopular toys etc). Every five minutes, a snap-shot was taken of what the children were doing so that more descriptive explanations could be included (e.g. one girl was riding the bike, two were playing football and one was trying to use the pogo stick). Additional detail was also added when the researcher felt that it would be helpful.

The purpose of the observations was threefold:

- To explain unexpected data from the heart rate monitors and accelerometers;
- To inform the focus group questions;
- To provide an overview of some of the ways in which the children played in each of the four conditions (the following section will detail this).

4.2.2 Descriptions of the play sessions

Using the observation notes, it was possible to record all the different ways in which the toys and boxes were used (indoors and outdoors). These notes were then later analysed. The children played in a variety of ways in each of the four activity sessions

A general trend in the toys sessions seemed to be that the children would rush to try each of the toys before settling on their favourites. In a number of sessions, it was noted that if the children did not find immediate success when playing with the toys, then they tended to move on. The bike and the scooter seemed to be consistently popular and the boys in particular engaged in racing using these toys. Where the children could not easily master a new skill such as skateboarding, inventive games such as using the skipping rope to pull other children on the skateboard were used. Many of the children played co-operatively with the toys. There was very little damage to the toys during sessions and no intentional damage of any sort.

The ways in which the children chose to play with the cardboard boxes were fascinating and some examples of these follow at the end of this section. The boxes clearly provided the children with very novel experiences. In general, the children either played very creatively or very destructively and in some sessions, they would play creatively having destroyed the boxes! The smallest box was often used as a



hat, a football and a basketball, whilst the larger boxes were often used as houses/dens/forts or as vehicles (e.g. cars and boats). The remnants of the boxes were also put to good use and became 'wings' so that the children could be birds/aeroplanes or they were worn as items of clothing or made into pretend weapons. In most of the play sessions the boxes were completely destroyed (20 out of 26 sessions) and therefore would not have been available for future play sessions. No intentional damage was done to the toys which could have been used for future play sessions.

Two examples of each type of play within the toys and substitute toy and indoor and outdoor sessions are provided below. Examples of playing with toys are shown first:



Playing indoors with toys

Example 1 – All boys

The first example of children playing indoors with the toys involved a group of four boys from School A. The start of the session was characterised by short, sporadic play with a number of different toys (i.e. each boy tried a variety of toys for a short amount of time). The space hopper and the tunnel were described as being popular. A popular and more prolonged activity involved one of the boys standing up in the tunnel whilst the other boys filled it with toys!

Example 2 – Mixed group

The second example involved a mixed group of children (2 girls and 2 boys) from School A. The dynamics of the group meant that the two girls often played games together (e.g. mini table tennis and air hockey) and the two boys played together (e.g. sticky pads). There was, however, some group interaction and this was more obvious towards the end of the session. The children tended to play with the toys for short periods of time and then moved on to others.



Playing outdoors with toys

Example 1- All boys

This session involved a group of four boys from School A. At the start of the session, they tried out a variety of toys individually (bike, scooter, trampette, bat and ball). They spent a short while experimenting with the brake on the scooter (as this made sparks when used) and this caused great excitement amongst them (as well as some discussion over whose turn it was and who had been 'hogging' it). After about twenty minutes, one of the boys tried to use the pogo stick; he, however, seemed unsure of how to use it and put it down. Towards the end of the session, the boys decided to race laps of the coned area on the bike and scooter; one of the other boys sat and watched on the trampette and the fourth acted as a starter for the races.

Example 2 – Mixed group

The second session involved a mixed group of two boys and two girls from School B. One of the boys was not at the start of the session as his tooth had been bleeding at break time (he joined after about three minutes and quickly got his pads and helmet on). The group went straight to the scooter, trampette and bike and then turned their attention to the pogo stick. The first girl who tried to use it struggled to even get on and one of the boys offered to help her saying, "Watch this... I used to have one of these". He seemed more skilled at using the pogo stick, but still only managed a few bounces and soon gave up trying. One of the girls tried the bike and was overheard saying, "I can't do anything. I'm not good at anything". She then sat out at the side and explained to one of the researchers that she still had the stabilisers on her bike at home. She sat out for about 10 minutes and then rejoined the group and played with the scooter. At the end of the session, three of the children decide to use the skipping rope to pull each other along on the skateboard and this activity caused great excitement and shouts of, "Faster, Faster"!

One of the boys was noted as being very active and quite skilled at using the equipment, for example, he seemed to have used a skateboard before and he also spent a short while cycling very fast in and out of the cones. football was hardly touched throughout the session.



4.2.3 Playing with boxes

The play with boxes was clearly a novelty for the children and these sessions resulted in very different responses from the children in different groups. Analysis of the observation sheets revealed the following categories of play (some examples of the types of play related to each category are also included):

- Use of whole/intact boxes:
 - Boxes used as houses, dens, forts, cars, castles, boats;
 - Boxes used to sit/stand/lie in;

- Use of small box:
 - Box used as a football/ ball;
 - Box used as a jewellery box;
 - Box used as a TV or other household item.

- Use of scraps/remnants of card:
 - Used as wings (bird/aeroplane);
 - Used to throw (in a game to see who can throw the highest, as Frisbees, at each other).

- Use of flattened/opened out boxes:
 - Used to slide on;
 - Used to hide in or under;

- Destruction of boxes:
 - Kicked/hit/punched/thrown;



Some specific examples of group play with boxes follow:

Playing indoors with boxes

Example 1 – All girls

This session involved a group of four girls from School B. Two of the girls went straight to the middle box and walked around the room with it on their heads; one of the girls was in the big box and the other was sat in one of the boxes with the smallest box on her head. Some exploratory play was noted to start with and this led to more prolonged play at the end (with three of the girls sat inside the biggest box pretending to be kittens and the fourth girl stood outside the box stroking them). Other activities included: rocking the box with other girls stood inside; pushing the box around the floor; playing mums and dads in the box; playing police games; flattening the boxes and sitting or lying on them; and spinning round inside the boxes.

Example 2 – All boys

The second example involved four boys from School A. The boys entered the room talking about smashing up the boxes and once they were told that they could start, they instantly started kicking, punching, hitting and throwing the boxes. The boxes were quickly destroyed so that only scraps of card were left and then these were thrown around the room and at each other. One of the boys was hurt and left the session and the remaining three continued with their very rough play (on a few occasions, one of the boys could be seen hiding behind or under a bit of box). The activity quietened down to some extent towards the end of the session and there seemed to be a few more periods of rest and one of the boys did some gymnastics instead.



Playing outdoors with boxes

Example 1 – All boys

This session involved a group of boys from School A. The boys' immediate response was to kick and hit the boxes. Having destroyed most of the boxes, they played more creatively with the remnants, for example, they used the bits as a Frisbee, threw them to see who could throw the highest, and used them as a scarf. With the boxes that remained intact, they played games where they filled them with leaves, used one (the smallest) as a football, and used the large box to hide in when playing tig.

Example 2 – All girls

The second example involved a group of four girls from School B; it was a very windy day. Due to the weather conditions, the girls spent some time chasing the boxes as they blew across the field. At other times, they tended to spend time sat/stood in the boxes. It was noted that the smallest box was not really used and that the larger boxes seemed more popular. The girls also flattened the boxes out and rolled around inside them.



4.2.4 Observations of physical activity

It was noted that the children were physically active to some extent during all four 'play' conditions. In sessions where the boxes were completely destroyed (kicked/hit to pieces), it was evident that the children had been engaged actively. Likewise, when the children had races on the outdoor toys or ended up playing football, they seemed to be more physically active.

The observation notes imply that the start of each session was often more active than the end (although this was not always the case) and that there were many times throughout each session when the children were less active (but not necessarily inactive). Such occasions included: sitting inside the boxes when playing role play games, using the boxes as beds, trying to work out how the equipment is used, setting up the skittles, and during times of transition between toys.

It was certainly clear that allowing children half an hour of play with props, regardless of what they were given to play with, would encourage them to be active. It was also noted as a possibility that the children may have been more active had they known how to play with some of the toys (e.g. the dance and football mat) and if they had been more skilled (e.g. on the pogo stick and skateboard). However, when faced with toys that they were unfamiliar with, some of the children invented new ways of playing that enabled them to use them (e.g. kneeling on the skateboard and using feet to move along; using the skipping rope to pull others on the skateboard; and filling the tunnel up with toys).



4.3 Quantitative measures of physical activity

4.3.1 Introduction

As well as observing the child participants as they played, and discussing with them their experiences following all the sessions, the children wore an accelerometer throughout four school days. The activities (e.g. play session with toys or boxes inside or outdoors, break, lunch, PE lesson) undertaken by the children during each of the four days of the study was recorded by researchers, and subsequently matched with the accelerometer output at the end of the data collection.

4.3.2 Are children more active when playing with toys, a substitute toy or during school break, lunch-times or PE lessons?

The average amount of moderate-vigorous physical activity undertaken by the children during the 30 minute play sessions was just under 20 minutes (Table 1).

Table 1: Time (minutes) and proportion of session (%) spent in moderate-vigorous physical activity (MVPA) in each of the 4 play sessions and during other activities (mean \pm standard deviation, n=47).

	Time (minutes) spent in MVPA	Proportion (%) of session spent in MVPA
Indoors Boxes	19.3 \pm 4.9	64.4 \pm 16.1
Indoor Toys	16.5 \pm 4.5	54.9 \pm 15.0
Outdoors Boxes	19.0 \pm 4.0	63.4 \pm 13.2
Outdoors Toys	18.2 \pm 5.0	60.5 \pm 16.7
Break	8.3 \pm 2.4	46.6 \pm 11.5
Lunch-time	24.1 \pm 5.1	35.7 \pm 7.6
PE lesson (n=34)	10.3 \pm 2.2	37.8 \pm 7.0

The proportion of time (60.8 \pm 11.1 %) spent by the children in moderate-vigorous intensity activity when playing with toys or a toy substitute was almost twice that seen when they participated in PE lessons or played at lunch-time (38 and 36% on average respectively), and was also noticeably greater than the proportion of moderate-vigorous intensity activity they undertook at break (47 \pm 12%). The statistical analysis conducted suggested that children undertook slightly less



moderate-vigorous physical activity when playing with toys compared to playing with a toy substitute (cardboard boxes). However it should also be noted that the physical activity of the sessions with toys may have been slightly underestimated in the present study as the cycling activity would not have been recorded in terms of accelerometer counts.

The children involved in this study did seem to be quite active generally as age based recommendations suggest that children of their age should be taking at least 60 minutes (and up to several hours) of moderate-vigorous physical activity each day⁴; the amount actually recorded averaged between 78-87 minutes daily, over the 4 days of the study. Of course, approximately 20-23% of this activity was due to the play sessions completed as part of the research study and consequently without these sessions the amount of moderate-vigorous physical activity undertaken would have been substantially reduced (and much closer to the 60 minute threshold).

These findings demonstrate that a relatively short session (30 minutes) of activity with toys or some sort of toy substitute (in this case cardboard boxes) could make an important contribution to the quantity of moderate-vigorous physical activity undertaken by children.

4.3.3 Are children more active when playing with toys indoors than outdoors?

There was some evidence that the children were least active in the indoor toy session compared with the other play sessions (16.5 minutes compared with 18.2-19.0 minutes). This might suggest that when playing outdoors the children were more active. However, it should be remembered that 55% of the indoor toy session still resulted in activity of a moderate-vigorous intensity (compared with 61-64% in the other play sessions), which was higher than that seen during break- or lunch-times and during physical education lessons (Table 1).

4.3.4 Do differences in activity levels exist between males and females for any of the conditions?

The statistical analysis suggested that the male children were a little more active than the female children during the play sessions (19.5 ± 4.6 compared with 17.1 ± 4.3 minutes respectively) regardless of whether or not the play was indoors or outdoors.

⁴ Physical activity guidelines for children and young people (5-18 years): Factsheet 3. Crown copyright 2011.



4.4 Focus groups

4.4.1 Introduction

Each of the 13 groups of children took part in a focus group one week after completing the study. The children had no problems remembering their involvement in the study and they needed no encouragement to share their experiences with us. They had clearly enjoyed their involvement in the study.

4.4.2 Activity and toys preferences

The children were asked which activities they had enjoyed the most. There was considerable variation in responses. Some children named individual toys that they had enjoyed playing with:

- *I liked doing the spark scooter and playing Golden Eagles and ripping all the boxes up(Boy)*
- *Going on the roller scooter and stuff and going outside (Boy)*
- *I liked playing on that bike (Boy)*
- *The boomerang, yes, I loved it when it went woo, woo, woo (Boy)*
- *I liked the mini table tennis (Boy)*

For some children the boxes were the most enjoyable aspect:

- *I liked the boxes...I kept running along with the box and then going inside it*
- *We all made this big kind of castle (with the boxes) outdoors and we kept trying to get inside it one of them, but we couldn't fit. Then we had this idea, there were two big boxes so we connected them and put one brick here, one brick here, one brick here and one brick here, then they (girls) had their house and we (boys) had ours, and we shared a TV (Boy)*

There were also children who stated that they enjoyed 'everything' or 'all of it'.

The toys that were identified most frequently as being good fun were the bike, scooter, trampoline, football and space hopper.

The children were also asked whether there had been any toys or activities that they had not enjoyed. They found this question a lot more difficult to answer and for most they struggled to remember anything they did not like. Where they did state they had not enjoyed something it was either because they had hurt themselves (minor injury) or because a toy or box had been taken from them by another child.

Factors which affected the children's enjoyment of the toys included whether the toy was 'fit for purpose'(e.g. size, bouncy enough), whether the toy was rewarding (e.g. gave positive feedback) and the child's ability to play with the toy. The skateboard



and the pogo stick for example were clearly more difficult to use for some children and this affected both usage and enjoyment.

- *I didn't like the trampoline. It wasn't very bouncy (Girl)*
- *Well I didn't like a bit the polo stick because I can't really do them (Girl)*

The children were asked whether they preferred the toys or the boxes. Again there was no consistent pattern in responses with many children unable to choose whether they preferred one over the other having enjoyed play with both toys and with boxes.

- *I actually liked both (Boy)*

Those who preferred toys stated:

- *Because the boxes aren't really stuff that you can play with and other stuff like bikes you can ride on and scooters (Boy)*
- *Toys best. You got more and there's football. (Boy)*
- *Toys, because they were colourful and you could move about with them a bit more (Boy)*

Those who preferred boxes offered the following explanations:

- *I always play with toys and I have played with cardboard boxes before but not for a long time (Boy)*
- *Yes, rip them up, slide on them, with the little box you could play teleporters (Girl)*
- *You can have any game with boxes and stuff (Girl)*
- *You could play in it or you could play out of it or you could use it as a step if you weren't big enough (Girl)*

4.4.3 Location – Indoors or Outdoors?

The children were asked whether they preferred to play inside or outside. Generally they seemed to prefer outside but there were some exceptions to this. Comments from children who preferred outside were:

- *When we were playing with toys outside it was fun because we had more room to play around (Girl)*
- *Because it was like fun because when we were playing with the boxes the wind blew them and we had to run after them (Girl)*
- *Because we could play with more stuff outside (Boy)*
- *Well because we got more toys to play with and we could play football out there and I like football. (Boy)*



- *Because you get fresh air and you get boiling inside (Boy)*

Those who stated they preferred inside offered the following explanations:

- *I preferred inside because you can't get hurt that much inside (Boy)*
- *Indoors. Because you get to play with that little thing (Table Tennis) (Girl)*
- *Probably indoors, because I didn't get as cold (Girl)*

4.4.4 Perceptions of activity levels

The children were asked whether they thought they were more active indoors or outdoors. The majority of children felt that they were more active outside than they were inside. They attributed this to having more space, to certain toys (e.g. football, bike, scooter) and because they had more opportunity to run outside. The following comments were typical:

- *Because we were playing football and just running around.(Boy)*
- *Because it was a bigger play space.(Boy)*
- *I think I was more active in here (the community room) but also outside as well. I think I ran around more outdoors...because outdoors there is more space (Boy)*
- *I did more scootering outdoors (Boy)*
- *Outside...because outside all of us were running around or going on the bikes and scooters, and when we went on the scooters and things we went really fast (Boy)*
- *Outside...because I ran around more and it was fun (Girl)*
- *Because we could run around and we couldn't run around as much inside (Girl)*
- *I think the bike because you could stretch all your legs and things (Girl)*
- *We could run around and we had more room (Boy)*

The children were also asked whether they felt they were more active playing with the toys or playing with the boxes. Opinion was more divided in response to this question with more children stating toys, some stating boxes and others stating that were just as active playing with both toys and boxes. Comments included:

- *Probably toys when we were playing football.(Boy)*
- *Because with boxes you can't be very active because you have to imagine (Girl)*
- *Actually, I think both. I liked the boxes (Boy)*
- *(Boxes)because we were jumping on them.(Girl)*



4.4.5 Group dynamics

In the majority of cases the children played in single gender groups. There were only two groups that were made up of two boys and two girls. All children reported being satisfied with the group they had been allocated to. The children were asked the question 'Do you think you'd have played differently if you'd been in a group with different people?'. Some children took this to mean a bigger group and they said they would have played different games. Some others felt that they would have played different games because other children may not have known their game or would have wanted to play differently. A few children noted that they would have liked to have their siblings play with them.

The children in single gender groups were then asked whether they would have played differently if they had played in groups with the opposite gender. The following comments were offered:

- *Yes because boys will want to play with more rough than girls and we probably want to make something else with the box and they probably want to rip them up. (Girl)*
- *It would not be fair. (Girl)*
- *Because they wreck everything and they're just boring and take it all...(Boy)*
- *Girls are boring and they take all our ideas and girls just talk. (Boy)*
- *Because girls would play pony games (Boy)*
- *We always play different games (Boy)*
- *Girls don't like skill games (Boy)*
- *Because girls are different to boys (Girl)*
- *They (girls) like different things and some boys play different.(Girl)*
- *Yes, because my girlfriend, I've played with her a lot and she's faster than me sometimes. I would have enjoyed it more if she had been in my group (Boy)*
- *I wouldn't have liked it as much if there had been girls in the group. I just prefer playing with only boys (Boy)*

The mixed gender groups were happy with their grouping and felt that they had played differently to other groups but they felt that this was positive because they had played fairly and because they automatically had two teams:

- *Because we had both sides.(Girl)*
- *Yes and the other bits that good is like you can have boys and girls and a boy and girl and it fair because if you were in the army there would be fair teams in the group because four is a good round number. (Boy)*



- *I think having boys and girls is better (Girl)*

4.4.6 Reflections on involvement in the sessions

The children were asked to reflect on their involvement in the study and asked if they had to say one thing about being involved what would they say?. The children were clearly very enthusiastic about being involved and the following were typical comments offered:

- It was fun (Boy)
- I'd give it 1 million out of 100 and it was the best time ever (Boy)
- Very good (Girl)
- Amazing (Girl)
- Wow (Boy)
- Really good (Boy)
- Excellent, amazing and excellent again (Girl)
- Amazing (Girl)



5. Discussion

The children who engaged in this study thoroughly enjoyed their involvement with many asking whether they could repeat their involvement. They appreciated the opportunity to come out of the classroom and play for half an hour on each of four days. The study confirmed that children will use their imaginations to create games and be active when they are given the opportunity to engage in free play with stimulus including toys and boxes.

In response to the research questions the study found that:

- The children were more active when playing with toys and boxes than they were when they were not playing with toys or boxes. The children in the study spent a higher proportion of time in activity of a moderate-vigorous intensity in all the play sessions than they did in PE, school break and school lunch-time.
- When comparing the four toy and toy substitute play sessions, the children were least active in the indoor session with toys, but even in this session they were engaged in more activity of a moderate-vigorous intensity than they were in PE, school break and school lunch-time.
- The results indicate that the male children were slightly more active than the girls in the play sessions.

The findings indicate that traditional outdoor toys (e.g. bikes and scooters) remain very popular with children. The majority of children (but not all) children could ride the scooter and bike indicating that they had access to these toys at home and yet these were the toys that were identified as most popular in the focus groups. The children perceived that they had more toys to play with outside and yet the actual number of toys was the same indoors and outdoors. The outdoor toys along with the outdoor space were generally seen by the children as the sessions where they were most active. Some children used the outdoor toys to create new games in the same way that the boxes were used to create new games. Examples of this were children riding the bike between the markings on the playground and using the skipping rope to help pull children on a skateboard along the playground. Some of the outdoor toys required a skill level that most of the children did not have (e.g. skateboard and pogo stick) which potentially inhibited their activity levels whilst they tried to master the skills they needed. Teamwork and creativity meant that the children played with these toys but not always in traditional or active ways. The trampoline was popular



but some comments suggested a larger trampoline would have been more popular but this was not offered due in part to logistical and safety concerns.

The children enjoyed the indoor toys to varying degrees. The bowling, table tennis and ice hockey game were popular and the children were active when they had to find the ball or puck. The tunnel was too small for some children to use. Most children tried the hoop, bouncy hopper and indoor boomerang but did not persist with them for too long. Some of the boys were put off the dance mat because it was themed in a way that they felt made it a girls' toy. Many of the children, boys and girls, tried unsuccessfully to use the indoor football. They found it difficult to understand and found the voice offering feedback de-motivating. The game also broke three times. Some of the indoor toys were a useful stimulus for other games. An example of this was girls using the sound track of the dance mat so they could perform their own dance. Their activity levels were however hampered by their inability to agree on which dance they should perform.

The findings indicate that children are more likely to be active when they have a stimulus to encourage active play and both the toys and the boxes proved to be a popular stimulus. Currently only 51% of boys aged 4-10 and 34% of girls aged 4-10 meet the governments guidelines for minutes of moderate and vigorous physical activity per day (2008, Health Survey for England), so if children they were to undertake an additional 30 min of play activity per day many more would reach the national guidelines. Our study has shown that girls and boys are similarly active when playing with toys, so play activity with toys could be a particularly important source of physical activity for girls who at present overall tend to be less active.

The boxes were different to the toys in that the children had to use their imaginations if they were to play in the sessions with boxes as noted by this perceptive girl:

Because of the boxes we had to imagine everything was there, but with the toys we could just play with them (Girl)

Many of the children enjoyed playing with the boxes far more than was initially anticipated. The reasons that the boxes were popular varied between the children. For some children the box sessions clearly provided them with the freedom to do something that they do not typically do in school which was to have free reign to do what they pleased and for them this meant destroy the boxes. This was clearly liberating for the children who chose this approach. Once they had destroyed the boxes the same children then continued to use the broken pieces of the boxes as a stimulus for new games such as walls for fortresses or wings for birds. Other children protected the boxes and kept them in tact throughout the session taking great delight



in hiding under the boxes, building with them or using them as stimulus for other games. As one boy noted:

The boxes were fun to play with but they were not as good as toys because toys could be played with again and again (boy).

In fact, in most of the sessions the boxes were completely destroyed by the end of the play session and therefore would not have been available for future play.

Whilst we have focused in the study on four different activity sessions the results reinforce the complexity of children's play. There was intra-group and inter-group variation across all four of the activity sessions. In one group for example a child with complex special educational needs found a book and sat reading this inside the fortress whilst his classmates acted out a battle whilst including him in the game. The ways in which the children played with both toys and boxes were affected by factors including: previous experiences, skill level, group membership, gender, location, personal preferences, weather/temperature and sophistication of play and social skills.