Activity and health prevention in preschools - contents of an activity-based intervention programme (PAKT - Prevention through Activity in Kindergarten Trial)

Roth, Kristina; Mauer, Sonja; Obinger, Matthias; Lenz, Dorothea; Hebestreit, Helge

Activity and health prevention in preschools – Contents of an activity based intervention programme (PAKT – Prevention through Activity in Kindergarten Trial).

Kristina Roth[1], Sonja Mauer[1], Matthias Obinger[2], Dorothea Lenz[1], Helge Hebestreit[1]

[1] University Children´s Hospital, Julius-Maximilians-University Wuerzburg, Josef-Schneider-Str. 2, 97080 Wuerzburg, Germany,

[2] Institute of Sports and Sport Science, Julius-Maximilians-University Wuerzburg, Judenbuehlweg 11, 97082 Wuerzburg, Germany,

Corresponding author:

Dr. K. Roth
University Children´s Hospital
Josef-Schneider-Str. 2
97080 Wuerzburg
Germany
E-Mail: roth_k1@klinik.uni-wuerzburg.de

Abstract:

Aim: To establish an effective and feasible physical activity intervention programme for preschools.

Methods: A multi-component physical activity intervention programme with three components was developed for the preschool setting based on the psychomotor concept: daily structured physical education lessons for the children provided by the kindergarten teachers, physical activity homework for the child and his/her family, and parental education. The kindergarten teachers were invited to two workshops providing information on the background of the intervention and practical training for planning and organising the activity lessons. Regular supervision at the kindergartens was implemented.

Results: A manual describing the background and the content of the intervention as well as practical examples for the physical education lessons became available for the kindergarten teachers. Furthermore, 183 illustrated cards with about 400 exercises and games were generated to plan the physical education lessons. In addition to describing the exercise tasks, their main focus and possible modifications, the cards summarise the requirements with respect to space, equipment, and staff. This collection of exercises and games suits the needs of preschools with different sizes, equipment and staff resources. The focus of the exercises given was on fun and cooperation of the participating children while improving coordinative skills, perception, and abilities of muscle strength, power and endurance. The cards were organised according to the main focus of the exercise. Likewise, 52 homework cards were generated illustrating games and motor tasks for one participant as well as for the whole family and accounting for seasonal requirements. Finally, three seasonal homework cards with further activity games as well as educational material for the parents (focussing e.g. the importance of motor abilities and physical activity in preschool children, of healthy nutrition and a reduction in media use in childhood) were provided.

Conclusion: The programme will now be distributed to preschools in Germany and also – after translation and adjustment to the local requirements - established in Chile.

Key words: preschool children, physical activity, motor skills, prevention, activity programme

Background

The preschool age is considered as a very important time period for the normal and healthy development of children. As it is assumed that the child is acquiring fundamental motor skills at this time (Gallahue & Donnely 2003), the training of motor proficiency is mandatory and needs to contain a diversity of motor tasks. Dealing with motor challenges enriches the child´s store of experiences and so enables him or her to adopt the acquired knowledge to future motor problems (Clearfield & Thelen 2008).

A lack of movement abilities and support in motor development, especially in today´s children, lead to a decline in coordinative skills (Raczek 2002; Roth et al. 2010a; Zimmer 2002). In children, low proficiencies in coordination are associated with a high risk of accidents and injuries (Kambas 2004, Kunz 1989) and a low level of physical activity is related to overweight and obesity (Trost et al. 2003; Veldhuis et al. 2009; Wake et al. 2009), as well as to other health related risk factors.

Since many 3- to 6-year-old children spend a large proportion of their day at day-care, the influences of this setting on health-related behaviour and the development of the children´s motor skills and abilities (Giagazoglou et al., 2008) as well as on the amount of the children´s physical activity (Dowda et al., 2004; Pate et al., 2004) can be estimated to be large.

Consequently, physical activity and motor skills in children have been targeted by several setting based intervention programmes in preschool children. However, the reported results are conflicting as many of the studies, but not all, showed a significant increase in motor skills and/or physical activity and/or positive effects on other health related risk factors (Cardon et al. 2009; Hannon & Brown 2008; Krombholz 2004; Mo-Suwan et al. 2009; Reilly et al. 2006; Riethmueller et al. 2009; Venetsanou et al. 2009; Weiß et al. 2004; Zimmer et al. 2008).

One limitation of the existing programmes possibly explaining the inconsistent proof of effectivity might be that the interdependency between motor proficiency, physical activity and personal as well as environmental factors in preschool children were not adequately considered. Motor development of children is proceeding in an individual way and is modified by a large number of factors such as the existing motor knowledge and experiences, the social and residential environment (Starker et al. 2007), the opportunities to deal with motor tasks and take part in sports activities (Steffen et al. 2007), as well as the existence of a chronic disease or risk factor (i.e. obesity, chronic heart diseases) (Bös et al. 2004, Collela et al. 2009).

A possible way to foster motor development irrespective of the individual baseline and environment is the holistic pedagogic approach of the psychomotor concept (Hünnekens & Kiphard 1975; Kiphard & Leger 1975; Zimmer & Cicurs 1987; Zimmer 2002). This approach embraces the individual motor, social, cognitive, emotional and sensory development of a child and allows for child-appropriate and joyful activities while training motor skills. Children are encouraged to deal with motor tasks in their personal way to find their own solution for the exercise given. In addition to strengthen the child´s motor abilities, the experience of successfully dealing with motor tasks enhances the self-competence and self-esteem of the child.

In any case, a prevention-oriented intervention programme using physical activity should include mandatory physical activity, or physical education lessons, since current research has shown that such programmes seem to be more effective than those with optional physical activity courses or just an educational physical activity approach (Connelly et al. 2007; Kriemler et al. 2010).

Aims

The main objective of this project, the "Prevention through Activity in Kindergarten Trial (PAKT)", was to establish a feasible and effective physical activity programme for the setting kindergarten improving motor skills and physical activity in 4- and 5-year old children. The intervention was planned to target three groups: the children, the kindergarten teachers and the parents of the participating children. Great effort was taken to the realisation of child-appropriate intervention contents and the transferability of the programme to kindergartens with different premises in sports material, personnel, and/or space. Furthermore, the programme was designed to allow the kindergarten teachers to continue the activity programme without further support after the end of the development and evaluation phase.

Methods

The PAKT intervention was planed as a multi-component programme with three main elements:

Daily physical activity lessons

One main component of the programme was daily 30-minutes physical activity lessons in kindergarten offered by the preschool teachers. The structure of the physical activity lesson was standardised while the main focus of each lesson could be determined by the teacher. To familiarise kindergarten teachers with the background and aims of the project and the intervention itself, two workshops were organised. Furthermore, the teachers received regular supervision during the physical education lessons and could ask for advice and counselling any time during the intervention. To support the teachers with the preparation of the lessons, a categorised collection of activities and games was to be developed.

Physical activity homework

To stimulate activity outside the preschool setting and to include the parents and the siblings in the activity intervention, it was decided to develop physical activity homework cards. Of these illustrated cards one ore two were given to the child per week to practice at home. Furthermore, to stimulate an active lifestyle of the child and his or her family in general and especially during holiday times, seasonal letters to the family suggesting activity games needed to be prepared.

Parental education

In addition, three educational interactive meetings were planed for the parents focussing on development and promotion of motor skills during preschool years, as well as the importance of physical activity, healthy nutrition and on the reduction of media consume in childhood. The information provided during these workshops was also summarised in educational materials.

Evaluation of the programme

To evaluate the intervention programme PAKT, 41 kindergartens in the cities and surroundings of Kitzingen and Wuerzburg, Germany, were recruited. The cluster-randomised, controlled study was approved by the Ethics Committee of the Medical Faculty of the University of Wuerzburg, written informed consent was obtained from the parents of all participating children. The programme was realised in 21 kindergartens randomly selected from the participating facilities. The remaining 20 kindergartens served as controls. Further information on the study design and the evaluation of the programme is provided elsewhere (Roth et al. 2010b).

Results

All contents of intervention were developed in collaboration by physical education scientists, paediatricians, a dietician and a physiotherapist. The contents of the programme including all available materials are presented in detail below.

Daily physical activity lessons

To plan the physical activity lessons, the following guidelines were given to the kindergarten teachers: Each activity lesson should last at least 30 minutes and follow certain requirements of structure and contents. Teachers were free to extend the lessons, especially if the introductory part took relatively long. In case of cancellation of one lesson, the missed time should be added to one of the following lessons of the week to allow for a minimum of 2.5 hours of physical activity education per week.

~~There were also~~As ~~recommendations for the structure of the lessons given to the k~~Kindergarten teachers ~~they~~ were asked to ~~: Each lesson should~~ start ~~the~~each lesson with an initial ritual indicating the beginning of the lesson, followed by an introduction period. This part of the lesson was meant to focus on the topic of the physical activity unit. The introduction period could also be used to familiarise the children with new sports equipment. Building on the introduction section, the main period of the lesson encouraged the children to use and develop their motor skills and abilities while engaging in playful activity tasks. The main focus of this period was the training of coordinative skills and perception (optical, acoustical, tactile, vestibular, kinaesthetic). Additionally, the kindergarten teachers could choose exercises and games to train physical endurance, power, speed, flexibility, ball skills, creativity and/or inter-individual cooperation. The final part of the lesson was realised as a cool-down in which a game could be played, or a child-appropriate relaxing activity was planed or the used sports materials were stowed away. A feedback round completed the lesson and/or gave an outlook to the following lesson(s).

The content of each part of the lesson, namely the games and activity tasks, could be freely chosen by the kindergarten teachers as long as the standardised structure of the lesson described above was realised. To support the teachers with the planning and practical realisation of the physical activity lessons, a large number of games and exercises was compiled. Illustrated cards describing the tasks in detail were organised in a classified order to allow the kindergarten teachers to select games based on different considerations: the focus of the lesson, the special motor needs and experiences of the group, the sports material available, the number of children in the group, the space available, the composition of the group (i.e. girls-boys, younger-older children, children with low-high motor skills), the proclivity of the kindergarten teacher with respect to organisational aspects (i.e. deductive-inductive, practicing in small-large groups-alone), or the time of the day the lesson was realised (i.e. activating games in the morning, relaxing focus in the afternoon).

One objective of the physical activity lessons was to include the children´s creativity on how to solve the motor problems or how to modify the games and tasks. To achieve this educational goal, the kindergarten teacher had to adjust his or her initially planned lesson to the input of the children.

Collection of games and exercise tasks

The developed collection of games and exercise tasks consists of 183 different cards presenting about 400 ideas for games and exercises arranged in 15 categories: welcoming games, games for warming up, games to improve perception (optical, acoustical, tactile, vestibular, kinaesthetic), games to improve power, games to improve speed, games to improve coordination, games to improve physical endurance, games, to improve flexibility, games to improve ball skills, games to improve cooperation within the group, relaxing games, activating stories, special games for outdoors, games to improve creativity, and games with commonly available materials (ie. plastic cups, newspapers, boxes, skateboards, gymnastic poles). Since many games belong in more than one category, some cards appeared more than once in the categorised collection.

The figures 1, 2, and 3 show examples of translated cards from this collection available to the kindergarten teachers to plan and organise the physical activity lessons. Each card has a field with brief information about the required material and space, the focus of the game and the dedicated category. A detailed textual instruction of the activity is provided in a separate field. For many of the games and exercise tasks, instructions for differentiation are provided (figure 2), some of them are additionally explained by pictures (figures 2 and 3).

> Please insert figure 1 “Traffic lights”, figure 2 “Guiding the blind person” and figure 3 “Playing tag with the floe” about here

The collection accounts for the different sizes, equipment and staff resources of kindergartens as there are games requiring little space as well as games that are most suitable for a gymnasium. The collection also contains games that can be played either without any sports equipment or with all kinds of material.

Workshops and manual for the teachers

To train the kindergarten teachers in conducting the physical activity lessons and the use of the collection of games and exercise tasks, two afternoon-workshops for the kindergarten teachers, regularly supervisions and a PAKT-manual were realised.

The kindergarten teachers of the intervention group completed a first workshop right before the start of the intervention. In this workshop, physical education specialists and a physiotherapist explained the rationale, the aims and schedule of the project. The teachers were then familiarised with the components of the intervention programme and were educated about the impact of physical activity and motor proficiency on a healthy development in childhood. The main focus of the first workshop was the training of the kindergarten teachers in planning and organising the PAKT physical activity lessons. Some example lessons were presented with active participation of the teachers in the games.

The second workshop, realised at about halftime through the intervention, addressed three main topics: motor skills development and disorders, strategies for a healthy nutrition in childhood and an interactive exchange about the experiences of the kindergarten teachers with the PAKT-intervention programme. The importance and influences on physical activity and motor skill acquisition in childhood for the social, psychological,

physiological, emotional and motor development were pointed out in this workshop. Strategies on how to identify and deal with motor disorders in children, especially in cooperation with the parents, were discussed in detail (Figure 4).

Please insert figure 4 “How to improve motor skills in every day life” about here.

To implement the basic essentials of healthy eating in preschool, strategies to implement ‘the healthy nutrition pyramid’ in every day life were developed together with the kindergarten teachers. The recommended composition of meals prepared in the kindergarten and of the lunch bags brought from home was discussed, also addressing a child-appropriate and pleasant presentation of vegetables and fruits.

A manual summarising the background and the contents of the PAKT intervention programme was compiled and given to the teachers In addition to providing general background information on the importance of physical activity in preschool children and the rationale for the PAKT-study, the manual contains an introduction to the pedagogic concept of psychomotor training. It also suggests strategies to prevent accidents during physical activity lessons, repeats the predetermined structure of a PAKT-lesson, gives some examples of physical education lessons and gives methodological advice for the organisation and planning of a lesson. The manual also summarises the equipment suggested to realise the PAKT-physical activity lessons. In general, all sports materials and materials of every day life are considered suitable as long as there is no malfunction or any excessive demand on the children caused by size or form of the equipment. The teachers were advised to consider three points when selecting materials: available in sufficient numbers, stimulating to the children, and useful in several ways to allow for modification of the level of difficulty. Finally, the manual includes a table of contents listing all games and exercise tasks included in the collection as well as a register of the games organised according to the materials needed.

Physical activity homework

To stimulate activity outside the preschool setting and to get the family involved, PAKT intervention programme includes two types of written homework instructions, developed by a physiotherapist and a physical education specialist: 52 activity homework cards and three seasonal homework letters. Each week, one or two activity homework cards were selected by the teachers from the collection according to a special seasonal focus (i.e. autumn games), current weather conditions (i.e. games for inside or outdoors) or a current topic in motor skills training in the kindergarten (i.e. ball skills). Kindergarten teachers practiced the game or exercise task described on the homework card with the children and gave each child the respective card to take home. With this approach, the children received the knowledge to practice the homework game on their own without parental reading assistance. However, most activity homework cards show exercise tasks and games which might also be performed together with parents, other family members, or peers to stimulate involvement of the family and neighbourhood. Each card contains the description of the game or task illustrated by pictures on the front side (see figures 5 and 6). The back of the card provides information about the materials needed for the game, the preferred location (inside marked by a “house” or outdoors marked by a “sun”), the level of difficulty (one up to three PAKT-logos for “easy” up to “difficult”), the possibilities to adapt the game for different ages, needs and degrees of difficulty, and the special focus of motor skill training intended by the game (see figure 5 and 6).

Please insert figures 5 “Universe throw” and 6 “Sliding with the ice bears” about here

The second approach to get the families physically active was three special seasonal activity homework letters given to the children before Christmas, Easter, and Pentecost holidays. These letters describe further games and encourage an active lifestyle (figure 7).

Please insert figure 7 “Easter card” about here

Parental education

For parental education three educational meetings, two booklets summarising the contents of the first two meetings and three informational letters were provided. The focus of the first educational meeting and the first booklet was the important role of motor proficiency and physical activity for a normal and healthy development during childhood. It was stressed that parents act as a role model for their children’s active or non-active lifestyle. The second educational meeting was moderated by a dietician, a physiotherapist and two physical education scientists. During this interactive meeting, advices on healthy nutrition, family meal rituals, the contents of lunch bags and support on how to deal with a child’s individual disgust to healthy food were given. Another focus of this meeting was the risks of a high media consume in childhood and reasonable alternative leisure time activities. At this meeting, the parents received a publication of the Bundeszentrale für gesundheitliche Aufklärung (Federal Centre for Health Education 2006) with important information about healthy eating and physical activity in childhood. The third and last educational meeting was realised as an expert panel (“parents ask – experts answer”): The parents posed questions, and a paediatrician, a physical education teacher and exercise scientist, a physiotherapist and a dietician answered. The results of this expert round were also presented in an information letter to the parents. The other two letters addressing the parents informed about a healthy nutrition in childhood and gave advice for creating an active lifestyle, especially in autumn and winter.

Evaluation

As intended, the intervention programme could be implemented in kindergartens of different sizes and equipment. The programme was well accepted by the teachers and the children. The programme was continued after the 1-year controlled intervention period in most of the participating facilities and has been successfully transferred to other kindergartens in the region of Wuerzburg and Kitzingen.

Conclusion

The aim of the project was to create and establish a feasable and effective multilevel physical activity programme for the setting kindergarten in order to increase physical activity, motor skills and other health related factors. The experience in the intervention kindergartens proofs that these goals were met (see also Roth et al. 2010c). The PAKT-programme can be transferred to kindergartens independent of their spatial situation, equipment, and staff resources.

The strategies used in the project empowered the kindergarten teachers to organise the lessons by themselves and thus ensured that the programme was continued in the participating kindergartens after the end of the intervention phase. In a further step the nationwide transfer of PAKT will be realised in cooperation with a health insurance company (BARMER GEK). To evaluate the transfer process and the effectiveness of the transferred programme a standardised questionnaire for the preschool teachers and the collection of health related data from the participating children will be used. In addition, in cooperation with the German Institute for Teacher Training Wilhelm von Humboldt (LBI), Santiago di Chile, the programme will be translated into Spanish~~,~~ and adjusted to the special requirements in Chile. After a pilot study evaluating the adjustments for the needs of German Chilean preschools, the PAKT programme will be ~~and~~ integrated into the education routine of preschool teachers in the LBI~~kindergarten routine~~.

Conflict of interest

All authors declare that they have no competing interests.

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Figure 1

"Traffic lights", an example for a game used in the PAKT-intervention programme to improve children´s ability of optical perception

Figure 2

"Guiding the blind person", an example for a game used in the PAKT intervention programme to improve children´s ability of vestibular perception

Figure 3

"Playing tag with the floe", an example for a game used in the PAKT intervention programme to improve children´s ability of coordination, physical endurance, leg power and cooperation

Figure 4

Information about the ways to introduce daily motor training in kindergartens and families life given to the kindergarten teachers

Figure 5

Homework activity card “Universe throw” to illustrate and describe the homework game for the children and their families (front) and to give information about the needs, aim and modifications of the game to the parents of the child (back)

Figure 6

Homework activity card "Sliding with the ice bears" to illustrate and describe the homework game for the children and their families (front) and to give information about the needs, aim and modifications of the game to the parents of the child (back)

Figure 7

Easter activity homework card to encourage familiy activities

“Traffic lights“

Required equipment:	**Dedicated category:**
one hoop per child; one red, one yellow and one green cloth or sheet	Games to improve perception
Required space:	**Focus of training:**
Room in kindergarten, gymnasium, open-air site	Optical perception (sense of sight), depending on playing time and intensity: physical endurance

Description of the game:

Each child uses his or her hoop as a steering wheel to imitate driving through the room like a car. The kindergarten teacher plays a traffic policewoman/policemen and notifies the children with the help of color signs (the red, yellow and green cloth or sheet), whether the “cars“ need to stop (red cloth or sheet) or drive (green cloth or sheet). The yellow cloth or sheet means “running on the spot“ (“engine idle“).

“Guiding the blind person“

Required equipment:	Dedicated category:
Hawser, chairs, benches, small sandbags	Games to improve perception
Required space:	**Focus of training:**
Depending on group size the game can be played anywhere	Vestibular perception (balance ability); with modifications: training of courage and cooperation

Description of the game:

Several arrangements with sports equipment challenging the balance abilities are placed in the room for training course:
A hawser lying on the floor, several chairs in a row as a bridge with handrail and several little sandbags are piled up as a mound etc.
Then, the children are having a first try in the balancing tasks.

Possible modifications:

One child is guiding a „blinded“ child over and through the specific balancing tasks.

Note: The guiding child is holding his or her partner at the shoulder/upper arm.

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“Playing tag with the floe“

Required equipment:	Dedicated category:
one carpet tile per child; 1-3 bands to mark the catcher(s)	Games with commonly available materials
Required space:	Focus of training:
Room in kindergarten, gymnasium	Physical endurance, coordination, cooperation, power of the legs

Description of the game:

Every child uses his or her carpet tile to slide over the floor like an “ice bear“ on his “floe“ (place one foot on the floe and use the other foot to push). Some of the children are marked as catchers (“hunters“) who try to tag the “ice bears“ by sliding on their own “floe“. If an “ice bear“ is caught, he or she becomes a “hunter“, too, sliding over the floor hand in hand with each other. Catching even more “ice bears“ will build longer and longer chains of children.

Note: When playing the game with a large number of children, the chains with 4 or 6 children should separate into smaller chains with 2 or 3 children.

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How to improve motor skills in daily life?

Physical activity homework

Balance skills	Balancing “everywhere“ (i.e. on the playground, on the kerbstone, standing with one foot on a cushion)
Coordination skills	Playground (climbing, layaway, sliding), walking like a crab, walking and balancing while holding something in hand/on head simultaneously, trampoline jumping, playing tag)
Jumping skills	French elastics, hopscotch, skipping rope
Ball skills	throwing and catching while standing on a bumpy surface; integrate the ball into leisure time (going for a walk, times in the garden)

Universe throw

Paint a sun in the upper left corner of a cloth (for example an old bed sheet) and a moon in the bottom right corner. The cloth is placed outdoors by hanging it on a wall, a clothesline or elsewhere. Each player throws a ball three times targeting the sun and three times aiming at the moon. Who gets the most hits?

1. Paint a moon and a sun on a cloth.

2. Try to hit the moon and the sun.

Universe throw

Level of difficulty:

Location:

Essential material:
bed sheet with sun and moon painted on it

Active family

Be creative in your family and design the „universe“ together with the whole family.
Take a cloth (for example an old bed sheet which is not used any more), watering colours and have fun!

Accuracy in a small (outer) space

With this exercise children learn how to make direct hits by choosing their own level of difficulty and challenge: After every second hit the children step back a little to increase the distance to the “sun“ and the “moon“.

What is important?

The smaller the “sun“ and the “moon“, the higher the level of difficulty. Hitting can become a real challenge.

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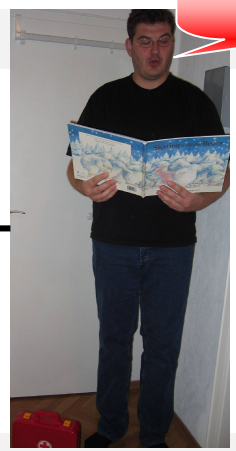
Sliding with the ice bears

A smooth floor, i.e. the hall way, is the rink for this game. The players sit down at the end of an imaginary lane on the floor. Place a red toy at the other end of this lane. A referee tells a story about an ice bear. Every time the players hear the word „red“ the race begins: They slide on their bum along the lane as fast as they can towards the red toy. Whoever is first wins a point. The game is finished after a predetermined amount of glissades.

1. Place a read toy at the end of the lane

2. Tell a story about ice bears



3. With the sound of the word “red“, all players are sliding towards the toy. Who is first?

Sliding with the ice bears

Level of difficulty:

Location:

Material:

a red toy

Active family

To race on the bum is fun for young and old! The greatest fun for the children will probably be to tell the story about the ice bears and sending the parents on a glissade.

Reacting fast and improving power

Reacting fast to the signal (the keyword “red“) is important. But you also have to be fast in the race to come off as winner. This game trains the power of the legs and the coordinative skills. The longer the lane, the more you can train your endurance.

Easter homework card

Prevention through Activity in Kindergarten Trial

Dear parents,
Usually, the weather conditions around Easter time are good and your child surely spends a lot of time playing outside with other children or looking for some Easter nests. With this Easter card we would like to give you additional ideas for realising an active and joyful time outdoors during the holiday.

Hidden treasure

The children are running all over the place to find Easter eggs? This is too simple! Arrange a treasure hunt instead of a searching for eggs: The children have to unravel a mystery or have to follow some hints on a map to find the big Easter treasure.

Paper chase

There are some arrangements to make, but with fine weather it is a great pleasure for the whole family: a paper chase. The first team determines a secret route and starts off one hour before the chase. They leave paper hints on the route to highlight the right way for the second team. If you are playing in a residential neighbourhood you can also easily mark the direction by drawing arrows with chalk on the street. The second team then follows the hints to find the first team.

Rolling eggs

Each child has an egg made of plastics or polystyrene. A further egg is placed in the middle of the room. Every player tries to roll his or her egg as close as possible to the egg in the middle. The one with the smallest distance wins the game.

Footrace of the Easter bunnies

Balloons, wooden spoon and four baskets or boxes (the “Easter nests”) are needed for this game. Divide the group of Easter bunnies into two groups and dispend the “giant Easter eggs” (balloons) equally to two “Easter nests” (baskets or boxes).
Place an additional “Easter nest” (basket or box) in front of each group of “Easter bunnies” at a self-defined distance.

The goal of the game is to bring all “giant Easter eggs” (balloons) from one “Easter nest” (basket or box) to the other. Before starting the game the group commits to the way of locomotion of the Easter bunnies: they can run, jump on both feet, jump on one foot, walk backwards etc….