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Play integrated in physiotherapy for children with chronic health conditions

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ABSTRACT

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Background: Play is the child's natural world. According to psychoanalytical studies, play has an important role in children's development, and the absence of play during a child's life could lead to severe pathological implications. Based on this theory and being aware that physiotherapy treatment programs could be long lasting, tiresome and lacking motivation for children, this literature review presents a perspective regarding the integration of play within physiotherapy programs and examines the physical and emotional outcomes during this integration. **Aim:** To investigate the outcomes of integrating play in physiotherapy for children with chronic health conditions. **Method:** The research strategy for this review was a thorough search of peer-reviewed articles in the databases CINAHL and AMED which include articles from the fields of allied and complementary medicine, as well as the database Scope Med. Participants were children with chronic health conditions, ranging from 2-18 years old. In the term 'play' virtual reality and video game activities were included due to the lack of research. In addition, articles from a previous literature review conducted by the author were also included in the present paper. **Results:** The focus of researchers on children with CP and the lack of evidence for children with other health conditions, the persistence of physiotherapists to assess mainly physical outcomes and not emotional needs of children, and the measurement tools used for this purpose are presented. **Conclusions:** For children with chronic health conditions who attend physiotherapy sessions, play could serve as a mediate and an appropriate developmental approach in order to achieve physical and emotional changes. There is a need for physiotherapists to balance physical and emotional needs, and have a more 'human' relationship, rather than a 'bodily' - strict professional relationship with children. Although the information presented in this review is not considered as sufficient to draw conclusions, it could serve as a first step for researchers to study this integration in greater depth, and to focus on children with conditions other than CP.

Keywords: childhood chronic health conditions, children with brain injuries/cancer/cardiovascular disease/CP/cystic fibrosis, physiotherapy/physical therapy, play,/play therapy,/therapeutic play

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Abbreviations

Active Video Game – AVG

Cerebral Palsy – CP

Virtual Reality – VR

I Introduction

Play is the child's natural world. According to studies in neurobiological development and the psychological trauma field, play stimulates the neural structures in the brain and is essential for normal development (Homeyer & Morrison, 2008). The Office of the United Nations High Commissioner for Human Rights in 1989, acknowledged play as the right of all children to achieve optimum development. It is reported that play makes children and adolescents cooperate into a working alliance with health care professionals and that it helps them to overcome resistance to therapy. The environment becomes less threatening, and thus, they are more likely to engage in the therapeutic process. Physical therapists, occupational therapists, speech therapists and other professionals working with children can use therapeutic play to achieve treatment goals according to their own disciplines. By integrating play in therapy sessions, children can engage more effectively in the intervention process, prepare for surgical procedures, express feelings and fears, and develop gross and fine motor skills. In addition, participating in an activity and enjoying play is by itself therapeutic. This procedure contributes to a sense of well-being, decreases the stress of living and uplifts the spirit (Homeyer & Morrison, 2008). Currently, different types of play therapies exist, and can be used to work with special populations of children, such as developmentally delayed and physically challenged (Porter, Hernandez-Reif & Jessee, 2009). Physiotherapists working with children should structure therapy sessions taking into account the child's motivations and find ways to achieve goals by engaging the child in the therapy process. Although the value of play in the development of children has been thoroughly documented, fewer studies have examined the role of play in physiotherapy sessions. The general aim of this review is to provide theoretical information regarding play and to investigate if play can serve as a developmentally appropriate approach within physiotherapy for helping children with chronic health conditions.

I.1 Rationale

Play is a normal and essential activity for all children, through which they communicate, explore their world and develop. Chronic health conditions may hinder children's play, but maybe play could be partly replaced for children attending physiotherapy sessions. Physiotherapy sessions could be more effective and fun by focusing on the physical, as well as the emotional needs of children, and thus lead to holistic and child-based interventions. There is a lack of evidence in research regarding the integration of play in physiotherapy for children with chronic health conditions.

2 Background

2.1 Chronic health conditions

‘Chronic disease is a term for diseases that are potentially life threatening, have a long duration, frequent reoccurrence, and generally slow progression. It is a broad term for many types of conditions’ (Champaloux & Young, 2015, p.98). Prevalence rates of chronic diseases in children are difficult to estimate due to various existing definitions and different approaches of measurement. However, it is reported that the prevalence has doubled between the 1960s and 1980s, and that has been increasing during the 21st century. According to the U.S National Survey of Children’s Health in 2007, 13.6% of children aged from 0-17 years old had at least one current health condition, except obesity, and 8.7% had two or more chronic health conditions. In addition, the 2009/2010 U.S National Survey of Children with Special Health Care Needs showed that 65.6% of children’s daily activities were affected by their conditions (Riner & Sellhorst, 2013).

Depending on the situation and the severity of the condition, children may experience hospitalization and extensive medical care (Champaloux & Young, 2015), including physiotherapy. Affected children may suffer from pain, emotional, behavioral and developmental problems, as well as a poor quality of life. Emotional problems occur from experiences such as the disturbed function of the family, separation from family members due to hospitalization and long stays in hospital. The illness itself, medication and medical procedures can lead to behavioral and developmental problems if the child is not in a position to cope with these stressful experiences (Blackman, Gurka, Gurka, & Oliver, 2011). Children with chronic health conditions may also have other health related problems and/or disabilities which might require physiotherapy. In contrast to healthy children, they are often constrained from play and participation in activities, as a result of ‘real or perceived limitations imposed by their condition’ (Takken & Hulzebos, 2013). For the purpose of this literature review the term chronic health conditions includes children with cancer, cerebral palsy (CP), brain injuries, cardiovascular diseases, and cystic fibrosis.

2.2 Play and play therapy methods

‘Play is a variety of spontaneous activities that promote maturation and development of capacities and skills necessary for survival’ (Guzzi DelPo & Frick, 1988, p.261). Through the process of play children communicate thoughts, beliefs, feelings and wishes that are unable or

unwilling to express in words. Development of communication and motor skills, release of energy and emotion, and social interaction are promoted during play. In addition, 'children expand their thinking and reasoning processes as they engage in the self-initiated and self-paced challenges that play provides'. During play, children explore their world, reenact stressful experiences and adopt roles that were not part of the real experience, change from passivity to activity, unite fantasy and reality, and develop coping strategies against stressful experiences (Guzzi DelPo & Frick, 1988). Furthermore, through the process of play children maximize their independence and expand their individual ambitions and goals (Carmichael, K.D, 1994).

Discussions regarding play as a therapy tool for children began in 1909 with the work of Sigmund Freud, Anna Freud (1928), and Melanie Klein (1932) (Porter, Hernandez-Reif & Jessee, 2009). The term play therapy refers to therapy work in child psychiatry and it is considered to have similar nature with psychotherapy for adults (Chambers, 1993), with the difference that children use play as their communication tool in contrast to adults that use words (Guzzi DelPo & Frick, 1988). Play therapy originally referred 'to forms of therapy for children based on analytic formulations and characterized by a child's spontaneous play in a prepared environment with a trained therapist'. However, since play was recognized as a medium for communicating with children the term 'play therapy' developed, consisting of a wide range of play techniques used for communication with children either individually or in groups (Guzzi DelPo & Frick, 1988).

Play therapy is a tool used by psychotherapists in order to initially assess and then support the treatment of emotionally disturbed children (Chambers, 1993). Three common types of play used by child life specialists are normative play, medical play and therapeutic play. Normative play includes activities such as reading books, playing board games, and engaging in pretend play, activities spontaneous and pleasurable that children usually engage in their everyday lives. As children, for example in a pre-school age have a need for exploration and participation in pretend play, normative play activities can promote physical, cognitive, emotional, and social development. In addition, normative play can increase coping strategies because it's an opportunity for the child to participate in familiar routines (Burns-Nader & Hernandez-Reif, 2016).

Medical play is a common technique that provides to the child the opportunity to explore and play with medical equipment and supplies, in order to cope with medical procedures and medical visits or hospitalization, and reduce negative feelings such as feelings of anxiety and anger. Medical play involves a medical theme, in which the therapist provides simple medical equipment to the child, such as band-aids, stethoscope or thermometers, and the child decides what to do with them. By becoming familiar with medical equipment children will probably be less anxious when this equipment is used on them. Role rehearsal, indirect medical play and medical art are the three types of medical play. Role rehearsal occurs when the child plays the role of a health care provider and uses medical equipment, for example on a doll which has the role of the patient. Indirect medical play refers to a more structured process, where through songs and games with a medical theme, the child becomes familiar with medical equipment and medical procedures. Finally, medical art involves an art activity, such as medical collages or syringe painting using a medical theme. During medical play children have the lead of the play experience, for example by using medical equipment on a doll, and thus, feel that they have control and increase their self-confidence. In this way, it is easier for them to express fears and emotions and it is also easier for professionals to identify misconceptions, provide accurate information and increase children's understanding regarding medical experiences (Burns-Nader & Hernandez-Reif, 2016).

Therapeutic play on the other hand, can also be used by health professionals from different disciplines and not only by play therapists or psychologists, and refers to the use of play as a therapy. It is reported that therapeutic play can help children master their experiences, deal with medical and health procedures, help them cope with difficult life situations such as chronic health conditions and hospitalization, by rehearsing or reliving them in a way that does not seem as a threat to them (Chambers, 1993). Therapeutic play is a type of structured play that increases children's coping strategies, psychosocial well-being and development, by promoting their emotional expression. Through therapeutic play professionals can better understand children's feelings as they expressed during the play experience, and plan interventions according to the child's needs (Burns-Nader & Hernandez-Reif, 2016).

Therapeutic play sessions are planned based on knowledge of child development and understanding of children's reactions to threatening life experiences, and they require skills in using play as an interaction process. The purpose of therapeutic play interventions is not to change and distort children's development, but to promote their potentials and help them achieve

goals. Therapeutic play interventions aim at promoting children's psychosocial, cognitive and behavioral skills, help them express feelings and ideas, and cope with stressful life experiences such as a chronic health condition. Furthermore, play provides opportunities to change and 'correct' learning experiences, and gain information regarding themselves, other people and life experiences, as well as gain self-care behaviors appropriate for their age. During therapeutic play the therapist prioritizes goals according to the child's needs, and planning interventions could include an individual child, a group of children or a child together with his/her parents (Guzzi DelPo & Frick, 1988).

The two most important types of therapeutic play are directed and non-directed therapeutic play. Directed play means that the therapist controls the play and its objectives (Chambers, 1993). The therapist predetermines the theme and content of the play process and the activity in which the child will participate. Spontaneous play is limited due to the preplanned content of the process, although the child is active. Mainly, the child's role is to gather information which is presented in a playful way by the therapist, as well as to develop new skills and attitudes. Examples of materials used in this type of play are puppets, coloring books, films and videotapes (Guzzi DelPo & Frick, 1988). Directed therapeutic play is often used to prepare children for upcoming medical procedures or hospitalization (Chambers, 1993).

In non-directed play, although the environment and the materials used are selected by the therapist in order to stimulate a specific play activity or achieve a certain goal, it is the child that controls all aspects of the play (Chambers, 1993). Basically, the child selects the theme and spontaneously chooses play materials which are available from the therapist in a prepared environment. The materials selected from the therapist are usually specific in order to stimulate and encourage certain outcomes as the child is 'playing out' experiences. Fantasy is a key element in non-directed play and the continuous interaction between the child and the therapist can promote development and build a relationship between them. Having an adult as an observer, and simultaneously as a support, allows the child to re-experience unpleasant situations and painful life events, under different circumstances and with a companion (Nabors et al., 2013). Mutual storytelling, unstructured play, toys and board games are some examples of non-directed therapeutic play (Guzzi DelPo & Frick, 1988).

The methods and bases of each type of therapeutic play are different, but the intended outcome of both types 'is the provision of experiences that enhance development by facilitating

children's ability to cope with and master difficult life experiences and resolve internal conflicts'. However, health care professionals who want to use play as a therapy tool need to have educational background which provides them knowledge regarding child development and deeper understanding of the theories and techniques of therapeutic play. Taking into account the uniqueness of each child, play may or may not be therapeutic or appropriate for the child's specific needs (Guzzi DelPo & Frick, 1988).

From a therapeutic point of view, for play to be beneficial it should include opportunities for diagnostic assessment, communication and a working relationship between the therapist and the child, verbalization of feelings and thoughts, and a breaking down of defenses. In addition, providing therapeutic release and helping children to prepare for future life events are also important aspects of play. Nevertheless, while considering the most appropriate play therapy approach to use, the therapist should individualize each case and consider contextual factors, such as who will be involved in the therapy procedure and where will the therapy session take place, as well as consider the expected outcome (Porter, Hernandez-Reif & Jessee, 2009).

2.3 Cultural issues during therapy

It is also important for professionals to consider cultural issues that may become barriers in therapy. Professionals interact with diverse populations, so there is a need to develop skills and knowledge, and thus, become culturally competent. Play behavior is not similar across cultures. In general, play therapy supports expressing feelings through verbalization, discussing life experiences with parents, and it is based on a relaxed relationship between the therapist and the patient. Play therapy is also focused on problem-solving approach usually. On the other hand, in many cultures directly expressing feelings or discussing personal life events is inappropriate. In addition, in many non-European cultures holistic approaches are more effective than methodological problem-solving approaches, and furthermore, parents may also find it difficult to understand how play with a 'stranger' (therapist) would help their child (Porter, Hernandez-Reif & Jessee, 2009).

To minimize errors regarding cultural issues during therapy, professionals should initially understand their own culture in order to understand others. It is important for therapists to develop culture specific knowledge and not take away a child's identity by generalizing or underestimating the significance of cultural factors. Therapists should collect information and

study play in different cultures, as well as research what kind of play materials are suitable and familiar to children and parents across different culture groups. Asking the parents and/or the child if they have questions regarding this issue, and respecting historical, political and psychological aspects of each culture is a way to make the family feel accepted and build a relationship based on communication and trust (Porter, Hernandez-Reif & Jessee, 2009). In order to create effective interventions one must know the family they are working with well enough to identify problems from several perspectives (Björk-Åkesson, Granlund & Olsson, 1996).

2.4 Physiotherapy and play for children with chronic health conditions

When working with children with chronic health conditions and/or disabilities, a therapist must initially understand what play means for these children and specifically understand what play means for children with different types of disabilities. For example, children with motor disabilities might be less active or creative, and may find it difficult to play with peers if they are not capable to move by themselves. It is reported that non-directed therapeutic play, where the therapist provides play materials and a safe environment for the child and the child leads the play, is a good way to promote self-esteem and feelings of isolation. Children with physical disabilities often face rejection from others and have feelings of inadequacy, so the key is to focus on the child's growth and developmental level, as well as to promote independence, encourage the expressing of emotions, and provide the opportunity to learn new coping skills (Porter, Hernandez-Reif & Jessee, 2009). In addition, it is reported that play is an emotionally engaging and creative experience, through which levels of oxytocin increase. Oxytocin is a hormone that increases feelings of emotional well-being and trust; therefore play can promote a stronger relationship between the child and the therapist (Stewart, Field & Echterling, 2016).

For children with chronic health conditions physical therapy usually is a long process that involves several repetitive movements and tasks, which change according to the child's needs and improvements (Howcroft et al., 2012). Repetition for long periods of time can become boring and tiring for children, and decrease the child's interest and engagement in the therapeutic process. Thus, this may prevent the child's improvement and slow down the process. Therefore, physiotherapists should find ways to make therapy appealing, meaningful, and motivating for children in order to achieve goals. It is reported that the quality of physical activities and therapies depends on several factors, including psychological motivation such as en-

joyment (Howcroft et al., 2012). In addition, physiotherapists during sessions usually draw the patient's attention away from internal body focus (e.g. feet movement), so the patient can focus more to an external focus which is related directly to the goal (e.g. avoiding obstacles on the floor) (Carr & Shepherd, 2006). In the case of children, this technique could easily take place while playing, using for example toys, and stories or pretend play.

Depending on the child's health condition and disability, physiotherapists often use techniques such as Neurodevelopmental therapy (NDT), Vojta's technique, Proprioceptive Neuromuscular Facilitation (PNF), icing and stretching techniques (Buddhadev & Arya, 2012). These various techniques are established by researchers over time, but often they are focused only on the physical abilities or disabilities of children. In addition, these techniques do not focus on the child's emotional/motivational needs. Children's emotional needs, during physiotherapy, are taken into account usually depending on the therapist's background and education. According to Buddhadev & Arya (2012, p.159), 'apart from the techniques mentioned above, play therapy is among one of the recent advances in physical therapy'. Play therapy can improve fine and gross motor skills, and help the development of hand-eye coordination (Buddhadev & Arya, 2012), which are some examples of what a physiotherapist would try to achieve for a child during a physiotherapy session depending on the child's condition. Play cannot provide solutions for all the needs of each child, and cannot be considered on its own as a physiotherapy technique, but as mentioned earlier, play makes therapy sessions more fun and provides a safe environment. Play may serve as a key element to make children cooperate and be engaged in the therapeutic process of physical therapy, while using all the above established physiotherapy techniques (e.g. NDT).

2.5 Virtual Reality and Video Game based physiotherapy

Because of the lack of evidence in research regarding the integration of play in physiotherapy for children with chronic health conditions, for the purpose of this literature review play will include exercises such as playing with dough, play in water with toys, play with puzzles or play in sand. In addition, active video game play and virtual reality game-based physiotherapy sessions will be discussed. These gaming consoles use motion-sensing technology to detect acceleration and orientation, which allow the child to control games by means of movement and posture. 'The games provide feedback, consistent repetitions of realistic tasks, and may motivate users to increase practice duration or intensity' (Levac, Miller & Missiuna, 2012, p.181). Basically, it could be mentioned that virtual reality and video game based physiother-

apy sessions are the means to achieve collaboration between the physiotherapist and the child, meaning that the physiotherapist will try to achieve physical changes in a way that would be engaging and fun for the child, and thus, eventually achieve physical as well as emotional changes.

Games and activities through a screen set (internet, television, and video games) are highly valued by children, with and without disabilities. Active video game play (AVG play) can provide light to moderate physical activity in an enjoyable way for children, since they require body movements such as stepping and swimming and provide the opportunity to address specific therapeutic goals (e.g. targeted joints), in contrast to sedentary conventional games. It is reported that AVG's can promote and increase participation and engagement in physical therapy sessions, even though future research is required in order to address more details about how much and in what way AVG's are effective during physiotherapy interventions for children (Howcroft et al., 2012).

Virtual reality (VR) refers to a computer-generated scenario in which the user can feel as a part of the scene while interacting in a 3 dimension virtual world. For several decades virtual reality was used for psychosocial therapy interventions, but since 1990 its use expanded in the field of physical rehabilitation. VR offers stimulus control and consistency, real-time performance feedback, a safe and controlled environment, and motivation for the user to participate within the physiotherapy session (Keshner, 2004). Generates more interest to patients and for a longer time than other methods, it is interactive and exciting (Albani et al., 2002). It is reported that these artificial environments may improve brain function, enhance learning ability and reduce the cognitive impairment caused mainly by a brain injury (Rose, Brooks & Rizzo, 2005). The disadvantages of the method are mainly related to the equipment in terms of cost, as well as to reliability during their use (Priore, Castelnuovo, Liccione & Liccione, 2003). The Wii Fit electronic device which is particularly widespread in the trade and which is used as an electronic game is considered as a low cost alternative method of virtual reality (Sapnosnik et al., 2010). However, if the use of the method is prolonged it may cause side effects. Reported symptoms include dizziness, nausea, flashbacks, seizures, as well as intense anxiety and anti-social behavior in some cases (Romano, 2005).

This review is expected to promote a greater interest in therapeutic play by providing information about the theory of play as a therapy tool and promote a deeper understanding of the

concept of play. The aim of the study is to provide information about therapeutic play integrated in physiotherapy and examine the outcomes of this integration for children with chronic health conditions.

3 Aim

To investigate the outcomes of integrating play in physiotherapy for children with chronic health conditions.

3.1 Research questions:

1. What are the assessed physical outcomes of integrating play within physiotherapy for children with chronic health conditions?
2. What are the assessed emotional outcomes (e.g. enjoyment, motivation) of integrating play within physiotherapy for children with chronic health conditions?

4 Method

The research strategy used for this systematic literature review was a thorough search of peer-reviewed articles which started in February 2016. In the initial search, key words such as play/play therapy/therapeutic play were used individually in order to gather theoretical information regarding play therapy, and it was observed that research about play was mainly a technique used in the fields of psychology. Therefore, databases such as CINAHL and AMED which include articles from the fields of allied and complementary medicine were used, so that information regarding play integrated in physiotherapy could be searched. Search words such as play therapy, therapeutic play, play and physiotherapy/physical therapy, childhood chronic health conditions/children with cancer/brain injuries/cerebral palsy/cardiovascular disease/cystic fibrosis and play and physiotherapy were used in both databases, while using the database thesauruses.

Inclusion criteria were peer reviewed articles written in English, from 2000-2016. Children ranged from 2-12 years old, with chronic health conditions such as cerebral palsy, and which attended physiotherapy sessions in hospital and/or in rehabilitation services were included. Exclusion criteria were articles which were not peer reviewed and not written in English. Articles written before 2000 were excluded. Children without chronic health conditions, younger than 2 years old and older than 12 years old were also excluded. Home and school based

physiotherapy sessions were excluded as well, due to the fact that the author's field of interest is mainly hospital and/or rehabilitation services.

During the search process most of the articles found were based on a theoretical level of information regarding play, and there was a lack of articles regarding the integration of play in physiotherapy sessions. After it was observed that there was a lack of research for the purpose of this study, play and physiotherapy were used as key words in Google and an article that originally is from the database Scope Med was found for full article screening. Therefore, Scope Med was also included in the database search using the same search words as in AMED and CINAHL, but from the 21 articles found none was included for full text screening. Thereby, from the 3 databases 89 articles were found in total. In AMED from the 42 articles found, 30 were excluded from title and abstract screening, 4 were duplicates, and 8 were included for full text screening. In CINAHL from the 25 articles found, 24 were excluded from title and abstract screening and 1 was a duplicate.

However, articles regarding virtual reality and video game based physiotherapy sessions were found to be a more common technique used by physiotherapists. Due to this fact, virtual reality and video game activities were included, and therefore children older than 12 years old were also included. The final inclusion and exclusion criteria can be found in Table 1 below. Eventually, 7 articles were included in total (2 from AMED and 1 from Scope Med) for the purpose of this review. In addition, 4 articles from a previous literature review conducted by the author were also included. By changing somewhat the inclusion criteria more articles could be used, but the majority of them referred to virtual reality and video gaming as part of physiotherapy sessions, and cerebral palsy was the most common health condition included in these articles. Detailed information regarding the research process and the articles which were included or excluded for the literature review can be found in a flowchart (Appendix A).

Table 1

Inclusion and exclusion criteria for title and abstract level, and full text screening

Inclusion Criteria	Exclusion Criteria
Publication type: - full text available - published in English - published in peer reviewed journals - published from 1/1/2000-...2016	Publication type: - abstracts - conference papers - theses - books - published before 1/1/2000
Place of study: - treatment in hospital and/or rehabilitation ser-	Place of study: - treatment in schools, home-based, or other

vices	environments
Design: - qualitative - quantitative - case studies	Design: - literature reviews - protocols
Population: - children with chronic health conditions - age range 2-18 years old	Population: - children without chronic health conditions and/or conditions which are not considered as chronic - younger than 2 years old, and older than 18 years old

Furthermore, a detailed protocol was used for title and abstract level, as well as for full text screening of the articles included for review. The questions/criteria used for the completion of the protocol are also presented in a document (Appendix B). In addition, a quality assessment check for the included articles was formed in order to address if the quality of each article is high, medium or low. The quality assessment was formed according to Gustafsson et al. (2010) and the manual included in this systematic review. Certain questions of the sections ‘M’ and ‘N’ of the manual were selected and some were modified according to the subject of the present literature review, in order to be possible to identify the quality of the articles. The quality assessment is presented in a document as well (Appendix C).

5 Results

5.1 Purposes, participants, play and physiotherapy methods

In all the articles the participants were children with CP including diplegia, hemiplegia, dyskinetic, and spastic hemiparetic type of CP. In 1 out of the 7 articles the type of CP was not stated. Defining CP however is observed in each of the articles, independently of the type of CP of the participants, with slightly differences. CP is a common non progressive but changing neurological disorder (Buddhadev & Arya, 2012), that occurs due to a defect or insult to the immature brain, and it is reported to be one of the most common causes of disability (motor and cognitive) in childhood (Tarakci et al., 2013). In addition to the motor dysfunctions, other disabilities may occur such as sensory, visual and/or hearing deficits, eating difficulties, and cognitive impairments (Winkels et al., 2013). Furthermore, due to the limited physical activity children with CP are at an increased risk of developing obesity, diabetes, cardiovascular disease, cancer, joint disease, and musculoskeletal pain, in combination with reduced emotional and psychological health (Howcroft et al., 2012). CP usually has an impact on chil-

dren's capability to perform daily activities, such as self-care and play (Rostami et al., 2012). Regarding CP intervention programs therapists are constantly being challenged to find a balance between activities that are effective and engaging at the same time (Gordon et al., 2012). Since CP is considered to be a chronic disorder, it is crucial to make rehabilitation treatment programs challenging for these children by integrating play and leisure occupations in therapy (Michiel et al., 2008). In Table 2 below, the characteristics of the participants from each article included in this review are presented. As mentioned, in all the articles the participants were children with CP. However, in 6 out of the 7 articles, the researchers had established a wide range of exclusion criteria even for children with CP depending on their study, meaning that additional to CP health related problems could serve as exclusion criteria. For example, in the study of Michiel et al. (2008) children with CP who also had visual or auditory impairment, epilepsy, and/or mental retardation were excluded. Detailed information regarding the study population and the inclusion and exclusion criteria of the participants are listed in Table 2.

Table 2

Participants - Study population

Author	Participants	Participants' characteristics and Inclusion criteria	Participants' exclusion criteria
Tarakci et al., 2013	26 children of which 12 left, and the remaining were 14 with ambulatory CP (7 had diplegia, 5 had hemiplegia, and 2 had dyskinetic type of CP)	5-17 years old, normal or mild level of intellectual disability,	Epilepsy, GMFMCS-ER level 4 or 5, spasticity of 3 or more according to Modified Ashworth Scale in the lower extremities, and inability to cooperate with exercise or measurement.
Winkels et al., 2013	14 children with spastic CP (9 were spastic bilateral and 6 were spastic unilateral diagnosed), and 1 with ataxic CP	6-15 years old, most participants had GMFCS level I, 4 had GMFCS level III (moderate hand function and reasonable upper arm function), all children followed special need education of which 9 children were known with learning disabilities. 7 children had a Wii device at home, the children were in a sitting or standing posture, depending on their ability	-
Gordon et al., 2012	7 children with dyskinetic form of CP, of which one left the program after the end of four weeks	6-12 years old, adequate cognitive function to understand the requirements for interaction with the gaming system, and had visible shoulder and elbow movement	Any children involved in an exercise/rehabilitation program or diagnosed with any other medical problem that could affect their ability to participate in the training
Rostami et al., 2012	32 children with spastic hemiparetic CP	6-12 years old, medical diagnosis of spastic hemiparetic CP, at least	Health problems not associated with CP, seizure, hemispatial

		20° wrist and 10° active finger extension from full flexion, more movement deficits in 1 upper extremity, muscle tone less than 3 on the Modified Ashworth Scale, normal or corrected-to-normal vision and hearing	neglect, orthopedic surgery on the involved upper extremity, botulinum toxin therapy for the affected upper extremity within the past 6 months or within the study period, balance problems
Buddhadev & Arya, 2012	30 children with spastic CP	3-7 years old, diagnosed medically as spastic CP fall in grade I spasticity according to Modified Ashworth Scale and have achieved up to the fine motor milestone of extended reach and grasp	Children with other type of CP or with cardio vascular disorder or recent trauma in upper limb
Howcroft et al., 2012	17 children with CP (2 diplegia, 14 hemiplegic)	8-11 years old, only children categorized as level I or II on the GMFCS (to ensure that they could independently play in a standing position)	Fractures or orthopedic surgery in the last 6 months, botulinum toxin treatment in the last 3 months, epilepsy or chronic asthma, injury/disability that would make moderate exercise unsafe, visual/cognitive/auditory disability that would interfere with game play
Michiel et al., 2008	12 children with CP	7-16 years old, diagnosis of CP, understand the Dutch language, and can stretch and bend the shoulder and elbow of their affected arm	visual or auditory impairment, epilepsy, mental retardation

Regarding play therapy used, 6 out of 7 articles included some type of electronic device. VR was used in 1 article (Rostami et al, 2012), Wii Fit in 3 articles (Tarakci et al., 2013, Winkels et al., 2013, Gordon et al., 2012), AVG in 1 (Howcroft et al., 2012), and the Eye Toy device (play that consists of a game disc and a USB camera that is plugged into a PlayStation 2 and that incorporates motion capturing) also in 1 article (Michiel et al., 2008). Regarding these devices the games that children played were similar in some cases, for example boxing and tennis, but in general the range of games was diverse. Ski slalom, soccer heading, tilt balance, walking a tightrope, baseball, bowling, and a dancing game were also chosen in the training programs. The Eye Toy game included totally different game themes, such as Kung Foo (hitting virtual characters jumping from a Chinese tower), Wishi Washi (wash virtual windows by making gross arm movements), and Keep Ups (keep up a virtual ball with their arms). Only in the study of Buddhadev & Arya (2012) the play method used referred to play exercises like make hand impression in play dough, roll play dough to ball and snakes, cut with scissors, play in water with toys in sink or tub, play with wooden puzzles, play with clay, blocks and pegboards frames, and play in sand. It is worth noting that none of the articles referred to

play therapy in terms of defining the type of play used (i.e. normative, medical, directed/non-directed play).

Regarding physiotherapy techniques, each article used a different method to achieve physical activity and/or the desirable body movements depending on the goal of the article. In one article physiotherapy method is referred as ‘regular physiotherapy program’, without defining what is included in the program used (Michiel et al., 2008). Stretching, icing and ball exercises for the hand are used in an article (Buddhadev & Arya, 2012), and CIMT (constraint-induced movement therapy) (Rostami et al., 2012) in another regarding hand function. In the remaining 4 articles that used game devices such as the Wii Fit and AVGs in their training programs, physiotherapy goals were achieved with balance exercises on the Wii balance board (Tarakci et al., 2013), with participants holding the controller of the game in their affected hand (Winkels et al., 2013), and by playing in a standing position or sitting unsupported on a stool depending on their ability (Gordon et al., 2012). Furthermore, a wide range of upper and lower limb movements was achieved during play time with the AVGs (Howcroft et al., 2012). The aim of this literature review is not to analyze physiotherapy techniques or to explain in what way the above methods are considered physiotherapy methods. Further explanations will be available by the author upon request.

Table 3

Play and physiotherapy methods used

Author	Physiotherapy method	Play method
Tarakci et al., 2013	balance exercises on the Wii balance board	Wii Fit (ski slalom, soccer heading, tilt balance, walking a tightrope)
Winkels et al., 2013	holding the controller in their most-affected arm (sitting or standing posture, depending on their ability)	Wii Fit (boxing and tennis)
Gordon et al., 2012	Participants who were wheelchair dependent were trained in unsupported sitting on a stool, whilst those who were ambulant were trained in standing	Wii Fit (boxing, baseball and tennis)
Rostami et al., 2012	CIMT (prolonged constraint of the uninvolved arm; intensive, repetitive practice of motor activities by the affected arm)	Virtual Reality environment
Buddhadev & Arya, 2012	physiotherapy methods like icing on long flexors of forearm stretching of long flexors of forearm and sponge ball exercises for hand	make hand impression in play dough, roll play dough to ball and snakes, cut with scissors, play in water with toys in sink or tub, play with wooden puzzles, play with clay, blocks and pegboards frames, and play in sand
Howcroft et al., 2012	in bowling and tennis played with Wii remote in the dominant hand, in boxing players use both the Wii remote and the nunchuck, dance game played with the	AVGs (bowling, tennis, boxing, and a dancing game)

	remote, nunchuck and dance mat (range of upper and lower limb movements)	
Michiel et al., 2008	regular physiotherapy program	Eye Toy (Kung Foo, Wishi Washi, and Keep Ups)

Even though in all articles the researchers used a method of play, the primary goal was to measure physical outcomes of children participating in the studies. Play was used as a mediate tool to measure balance and the walking function of children (Taracki et al., 2013), overall motor function (Gordon et al. 2012), and physical activity (Howcroft et al., 2012). In 4 out of the 7 articles the goal was to measure the effects on the upper limb and hand function of the participants while using a play method (Winkels et al., 2013, Rostami et al., 2012, Buddhadev & Arya, 2012, Michiel et al., 2008). Emotional outcomes were either a secondary goal or were mentioned without being measured.

5.2 Measurement tools of physical and emotional outcomes

In all the articles physical outcomes were assessed using similar and/or different measurement tools. The most common tool is the Gross Motor Function Classification System (GMFM) which measures and evaluates changes in the gross motor function of children with CP. An Expanded and Revised version (GMFMCS-ER) measures gross motor function which is influenced by physical, social, environmental and personal factors and is also used in one of the studies. In the same study tools assessing physical outcomes are the One leg standing test which measures balance of postural stability, the Timed up and go test which measures speed during functional tasks that might threaten balance, the Reach test which refers to the margin of stability, the 6 minutes walking test for the functional status of patients, and the Modified Ashworth Scale in order to measure spasticity levels of children. Other measurements tools are the Melbourne Assessment for the quality of the upper limb function, and the ABILHAND-Kids which is a functional scale measuring how easy it is for children with CP to perform daily activities. Hand function, finger dexterity and unilateral gross manual dexterity were assessed by the Speed and Dexterity subtest of the Bruininks–Oseretsky test of motor proficiency (BOTMP), the Pre-test measurement of the Box and the Block test and Nine Hole Peg test respectively. A portable cardiopulmonary testing unit was used to measure oxygen consumption, single differential surface electrodes for electrical muscle activity, and an optical motion capture system for motion data were used in another study. Furthermore, the Manual Ability Classification System (MACS) was used in a study as a measurement tool of manual function and the Zancolli classification for the assessment of hand function.

On the other hand, emotional outcomes were assessed via measurement tools only in 3 of the 7 articles included in the present review. Pleasure and enjoyment were evaluated through a user satisfaction questionnaire and a visual analogue scale for one of the studies. Through the visual analogue scale children scored their perceived enjoyment of playing tennis and boxing. A Physical Activity Enjoyment Scale (PACES) through which children rated positive and negative statements regarding feelings of enjoyment during playing games was used for another study and a Post-experience user satisfaction questionnaire also completed by the children and concerning attitudes and feelings during play time was used as an assessment tool for a different study. From the remaining 4 studies included in this research process 1 did not include emotional outcomes of integrating play into physiotherapy at all, and 3 articles mentioned emotional outcomes such as enjoyment, confidence and motivation without the use of measurement tools. Physical and emotional measurement tools used in each article included in this literature review can be found in Table 4 below.

Table 4

Measurement tools for physical and emotional outcomes

Author	Physical measurement tools	Emotional measurement tools
Tarakci et al., 2013	Gross Motor Function Classification System Expanded and Revised (GMFMCS-ER), one leg standing test, timed up and go test, reach test, 6 min walking test, and Modified Ashworth Scale	No measurement tools were used for emotional outcomes
Winkels et al., 2013	GMFM, The Melbourne Assessment of Upper Limb Function and the ABILHAND-Kids	pleasure and enjoyment were evaluated by the children through a user satisfaction questionnaire and a visual analogue scale
Gordon et al., 2012	Gross Motor Function Measure (GMFM)	No measurement tools were used for emotional outcomes
Rostami et al., 2012	Speed and Dexterity subtest of the Bruininks-Oseretsky test of motor proficiency (BOTMP)	No measurement tools were used for emotional outcomes
Buddhadev & Arya, 2012	Pre-test measurement of the Box and Block test and Nine Hole Peg test	No measurement tools were used for emotional outcomes
Howcroft et al., 2012	portable cardiopulmonary testing unit, single differential surface electrodes, optical motion capture system	Physical Activity Enjoyment Scale (PACES) through which children rated positive and negative statements regarding feelings of enjoyment during playing games
Michiel et al., 2008	Melbourne Assessment, GMFCS, the Manual Ability Classification System (MACS), and the Zancolli classification	Post-experience user satisfaction questionnaire completed by the children, concerning attitudes and feelings during play time

5.3 Physical outcomes

In 4 out of 7 articles the goal was to measure the effects on the upper limb and hand function of the participants while using a play method (Winkels et al., 2013, Rostami et al., 2012, Buddhadev & Arya, 2012, Michiel et al., 2008). For each study a different play method was used. Regarding the Wii Fit device the quality of movement of the upper limbs did not change. However, significant improvement was reported regarding the convenience of using the upper limbs during the execution of daily activities. In general, it was concluded that the Wii Fit does not take enough into account the limitations of all children with CP. Therefore, for children with severe CP characteristics rehabilitation games should be specially developed (Winkels et al., 2013). No significant differences were found either during the use of the Eye Toy between the control group and the intervention group, but since 2 out of 5 children in the intervention group showed improvements, it was reported that the Eye-Toy has the potential to improve arm function in children with CP (Michiel et al., 2008). In the study regarding VR, the researchers concluded that the combined treatment of conventional physical therapy in a virtual environment could be a promising restoration process which exploits the advantages of both techniques in order to improve the upper limb function of children with CP (Rostami et al., 2012). Concerning other play methods, for example play in water with toys in sink or tub, it was reported that the combination of play and physical therapy had better outcomes of hand function, grasp and release, and that play therapy along with conventional physiotherapy was more effective (Buddhadev & Arya, 2012).

In the 3 remaining articles, the researchers reported that the Wii Fit is a safe, comfortable, convenient and effective rehabilitation method for improving balance and walking ability in ambulatory children with CP, which could be added to a conventional treatment program. Specifically it was reported that the games improved movements of the trunk and extremities, as well as dynamic balance and trunk control during right and left transfer of body weight. In addition, it was reported that improving the functional balance of children, which is an element of postural control, allows children to perform activities of daily living (Taracki et al., 2013). A positive conclusion was observed also for the Wii Fit device regarding the overall motor function of the participants, mentioning that it may provide a type of virtual reality for the users and could be an important recovery tool for children with CP. Nevertheless, the researchers stressed as well the need for more clinical trials to determine whether a technique like this could lead to important results for improving gross motor function of children (Gor-

don et al., 2012). Furthermore, regarding physical activity and rehabilitation therapies for children with CP it was observed that even though there is a need for future research and that AVGs are not a replacement of structured exercise and physical therapy, children can attain moderate levels of physical activity while playing AVGs that require full body movements. In addition, AVGs encouraged repetitive goal-oriented movements, and provided vibrotactile, visual, auditory and cognitive feedback to the users (Howcroft et al., 2012).

5.4 Emotional outcomes

Regarding emotional outcomes, in 3 of the 7 articles where measurement tools were used in order to evaluate emotions such as enjoyment and/or motivation for example, positive outcomes were reported in general. Children were enthusiastic and motivated to move, play and win, as well as play with other children which increased their social interactions. Occasionally, some children experienced less enjoyment during the gaming program (Winkels et al., 2013). Regarding the AVGs high level of enjoyment was reported and it was concluded that the high levels of enjoyment suggest that motivation was also established during the process (Howcroft et al, 2012). The Eye Toy game and its characteristics, such as moving objects and figures, were very interesting for the children which were overall satisfied from the game. Children liked the fact that they could see themselves in the games and reported that the game was easy to understand, although some of them had learning difficulties. In addition motivation was also reported, especially for children who had a strong feeling of winning after finishing the game and receiving negative feedback from the system (Michiel et al., 2008).

In the articles where emotional outcomes were mentioned but not measured (Taracki et al., 2013, Gordon et al., 2012, Rostami et al., 2012), it was reported that Wii-based training is fun and provides motivation because when children play interactive games during a physiotherapy session their attention is directed away from the repetitive nature of a rehabilitation program, which includes the usual exercises, and turns to the entertaining part of the process providing more incentives for them to participate in the therapy treatment (Taracki et al., 2013). In addition, it was observed that children were fully engaged during the program, despite the constrained space and the several distractions, and the fact that the children attended all sessions was regarded as an indication that they accepted this kind of treatment program, and that they were motivated to continue. Furthermore, it was reported that feelings of self-efficacy, confidence in their abilities, and the feeling of being able to do things like their peers during VR training, was also a fact of motivation for the participants to continue the program (Gordon et

al., 2012). Concerning the VR environment it was also observed that several characteristics of training in a VR environment increased performance and participation of children, and thus, their motivation to continue training. The use of repetitive motor practice was conducted through simple, colorful and interesting environments with new and up to date games, and due to the fact that the tasks performed were within the limits of the children without the fear of injuries or frustration, a sense of confidence and self-control was reported. In addition children received stimulations, (sensorimotor, visual, and auditory feedback) which were reported for each child during the process and/or immediately after the end of the game based on their performance, without the feedback from an external source (therapist). Furthermore, it was reported that children were happy and amused during the playing process since playing is meaningful for them anyhow, and that these activities could foster task-oriented practice (Rostami et al., 2012).

Lastly, one article was mainly focused on the physical outcomes of integrating play therapy with physiotherapy, as there was no mention of emotional outcomes during or after the treatment process (Buddhadev & Arya, 2012). General information regarding physical and emotional outcomes of each article which occurred after the physiotherapy/play sessions is presented below in Table 5.

Table 5

Physical and emotional outcomes after the session of physiotherapy in combination with play

Author	Physical outcomes	Emotional outcomes
Tarakci et al., 2013	Improved balance function, walking, and functional balance (element of postural control), dynamic balance, improvements in the FRT, TUG, and the 6 min walking test, the games improved movements of the trunk and extremities, trunk control through right and left transfer of body weight	safe, enjoyable, suitable and effective method that can be added to conventional treatments to improve the static balance of patients with CP
Winkels et al., 2013	significant increase of convenience in performance of daily activities, some children sensed more physical effort during boxing and some children during playing tennis compared to regular physiotherapy	high level of enjoyment, but occasionally some children experienced less enjoyment during gaming, motivated for playing boxing and tennis together with other children, boxing and tennis games were easily understood and attractive for all children
Gordon et al., 2012	All participants showed improvement in crawling and kneeling, attempting to push themselves off the chair into a standing position, positive outcome regarding the overall motor function	Engagement, the fact that they attended all sessions was viewed as an indication that this form of training was acceptable to them, and they were motivated to continue training, the ability to play the games could have led to an enhanced

		feeling of self-efficacy which may have contributed to their motivation to continue the training
Rostami et al., 2012	children who received training sessions consisting of modified CIMT in a virtual environment had greater improvement in the amount of use, quality of movements, and speed and dexterity of the affected limb versus children who received the VR, modified CIMT, or conventional movement therapies, new and up to date games (progressively changing the demands of the activities such as speed, strength, range of motion, and accuracy within the base of the child's capabilities) because learning new motor skills is necessary for relearning and functional neuroplasticity	VR improved motivation, performance, and participation and had the ability to encourage continued practice, it involved repetitive motor practice in a simple, colorful, motivating, and interesting environment, lack of frustration or fear of injury, development of a sense of personal control and self-efficacy, new and up to date games, sensory stimulations (sensorimotor, visual, and auditory feedbacks), amusement in performing their favorite games
Buddhadev & Arya, 2012	better outcomes of hand function, grasp and release	no mention of emotional outcomes
Howcroft et al., 2012	Children can attain moderate levels of physical activity while playing AVGs that require full body movements, AVGs encouraged repetitive goal-oriented movements, and provided vibrotactile, visual, auditory and cognitive feedback to the users	high level of enjoyment which suggest that motivation was also established during the process
Michiel et al., 2008	No significant differences	Satisfaction, moving objects and figures were interesting, children liked the fact that they could see themselves in the games, easy to understand, motivation

6 Discussion

The aim of this literature review was to investigate the outcomes of integrating play in conventional physiotherapy for children with chronic health conditions, and to examine the physical and emotional outcomes during this integration. Due to the lack of research and adequate evidence to support this review, it is stated that a lot of the following information is based on the experience and reflection of the author. References are used when appropriate in order to support this information.

During the research process it was observed that physiotherapy treatment is mainly connected to children with CP and due to this fact only articles which involved children with several types of CP were reviewed. According to the articles the overall physical outcomes were related to positive changes regarding balance, hand and walking function, body movements, and convenience in performing daily activities. It was generally concluded that VR and AVGs could be integrated in physiotherapy programs for children with CP, be used as tools in reha-

bilitation therapies, and lead to physical changes in a positive way. Physiotherapy treatments however refer, not only to children with CP, but to children with a wide range of chronic conditions such as cancer, cystic fibrosis, and cardiovascular diseases, which were also searched and not found in the literature.

For children with cancer, there is also a need of physical activity and physiotherapy due to several co-morbidities that may occur for this population of children. Low physical activity level, metabolic syndrome, diabetes, cardiovascular diseases, osteoporosis, bone mineral density problems, muscular weakness, deficient motor skills, reduced muscle elasticity and ligament laxity are some of the characteristics children with cancer might suffer from. According to studies, physical activity is highly recommended for children with cancer, and in addition, it is reported that activity must be age-appropriate and motivating (Kauhanen et al., 2014).

Children with cystic fibrosis (CF) suffer from respiratory problems and physiotherapy aims to reduce, delay and treat the clinical manifestations of CF. Regular exercise for these patients has many benefits since it improves lung function, increases sputum clearance, and leads to a general feeling of well-being. It is reported that there is a need of planning varied physiotherapy programs that are also enjoyable in order to increase compliance and produce overall benefits for these children (muscle endurance, cardiorespiratory fitness, bone density, flexibility, etc.) (Samuels, 2000).

On the other hand for children with cardiovascular diseases, congenital or acquired, there is usually some degree of exercise limitation. The lack of physical activity can have a negative impact on those children cardiovascular, musculoskeletal, and psychosocial development. According to several studies, physiotherapy and training programs could lead to the improvement of submaximal exercise efficiency as a result of training, improvements in muscular flexibility, strength, coordination, and aerobic capacity. In addition, it could increase cardiac output, improve lower extremity flexibility, decrease body fat, and improve psychosocial measures of independence, initiative, and self-confidence. (Tomassoni, 1996).

The aim of this study is not to provide detailed information for every condition considered as inclusion criteria of this review. Although, since during the research process it was observed that research regarding the combination of physiotherapy and play for children was focused on children with CP, it is worth noting that there is a need of highlighting other groups of children concerning this issue. The lack of research can be a result of the therapists' interests

in CP and/or the fact that CP is one of the most common lifelong developmental disabilities with a percentage of 1.5 to 3 per 1000 live births (Gordon et al., 2012). Furthermore, it could be a result of the obvious (visible) physical problems that children with CP have, in contrast to the other health conditions mentioned above in which the focus is directed on the condition itself and maybe also on the fear of death (e.g. cancer). Anyhow, since every child with any of these conditions is in need of physiotherapy appropriate to the situation and for different reasons, it is important to increase the number of studies related to the integration of play into physiotherapy programs for these children. In addition, there is need of including a larger number of participants in the studies, as it was observed that in all the articles the number of children was less than 50 children, and thus, generalization of the results is not possible.

The need of integrating play into physical therapy programs and the need of conducting research on this matter is, as mentioned, essential. The common view regarding physiotherapists is that a physical therapy program includes mainly exercises in order to gain strength and/or to stretch muscles and/or to treat a fracture for example. Physiotherapy interventions are usually directed at the body part of the patient depending on the situation and/or the physiotherapists' interest, background and education. However, in several cases a physiotherapist's work is often misunderstood. It is a fact that physical training and treatment refer to body structures and/or the function of the brain as a part of neurorehabilitation therapies, but regarding children and their needs these therapies can be boring, stressful, and lacking motivation. According to Foss & Bardsen (2013, p.109), 'A growing body of research has shown that child-initiated, play and context based activities are better suited to optimize child development than systematized training directed at specific bodily problems'. Play is accomplished through movements and cannot exist without them, so for children, movements during play are experienced as easy and natural. Thus, while children play they are absorbed in the activity, 'which leads to a spontaneous tendency of repetition' (Foss & Bardsen, 2013), and repetition is one of the key elements of a physical therapy program in order to achieve the desired outcomes related to body and/or brain function.

Related to the number of children included and the lack of play methods in the studies is also the quality of the articles for this review. According to the quality assessment, it was observed that 3 articles had high quality (Winkels et al., 2013; Howcroft et al., 2012; Michiel et al., 2008) and 4 had medium quality (Tarakci et al., 2013; Gordon et al., 2012; Rostami et al., 2012) with one of them ranging between medium and low quality (Buddhadev & Arya, 2012).

The studies with high and medium quality were similar regarding clearly stated aim, descriptions of the participants and how they were recruited, and descriptions of the methods used to collect data related to physical outcomes. In addition, they were similar concerning the description of data analysis, place of study and play method used, as well as reporting limitations. It is worth noting that results from all the studies could not be generalized due to the insufficient number of participants, and that the difference between them that finalized if they have high or medium quality was related to the description of the methods used to collect data regarding emotional outcomes. The one article ranging between medium and low quality was lacking of adequate description of data analysis, did not report limitations, and similar to the other articles the results could not be considered as sufficient for generalization. In addition, there was no mention on methods used to collect data regarding emotional outcomes, since the article did not address at all on emotional related facts.

Play can have several definitions depending on the situation and the individual's child interests. It has been described as the earliest and primary occupation of children. During play the child engages in the activity, becomes aroused and stimulated, and an increase of self-esteem is also observed. Playfulness is related to characteristics that include motivation towards the accomplishment of self-imposed goals and tendencies towards active involvement. Furthermore, it has been reported that when an individual enjoys an activity it is most likely for him/her to have the desire to repeat the activity. In order for someone to fully understand the effects of play on a child though, the context of the play experience should also be considered (Reid, 2004).

Context of the play experience could be related to the method of play (e.g. medical play) used, and to the means used in order to create a play activity (e.g. VR). During this review it was observed that in the 7 articles included, 'play' was not defined in terms of the type of play. It could be that the researchers, which in some cases are physiotherapists as well, are not interested in focusing on a play theme or in actually integrating play in physiotherapy, but only relying on play as a tool in order to achieve the desired physical outcomes. Even in the field of psychology where play was first discussed by Sigmund and Anna Freud (Porter, Hernandez-Reif & Jessee, 2009), play was not used as a therapy but rather than a therapy tool in order to achieve the desired psychological outcomes. Play cannot serve as a single therapy, especially when it comes to physiotherapy; however it is worth noting that in order to 'take advantage' of what play can offer during a rehabilitation program and in order to choose the appropriate

play training, it would probably be more effective to focus on play methods and adjust these methods on the individual child, his/her interests, and of course the changes on how play is defined by children over time.

The articles found for this review were from 2000 and thereafter, meaning that these articles used training methods and games that are compatible to the technology development and the different world that children grow up nowadays. Play is defined in a different way by children over time, and the huge interest in VR and AVGs could be related to this technology evolution. Typical play themes and games could be fun for children but maybe by using technology, up to date gaming and a TV screen, therapists could create even more effective physiotherapy programs by engaging children in a play theme they already are familiar with and is part of their everyday life. Since AVGs and gaming in a VR environment can be considered as a familiar routine for children, and as activities that children might engage in their everyday routines in their home environment for example, AVGs and VR could be related to normative play. They could also be related to directed play, in which the therapist controls the play and its objectives, predetermines the theme, and helps the child to develop new skills by providing the opportunity to the child to be active but not completely spontaneous (Chambers, 1993).

Medical play, which provides to the child the opportunity to play with medical equipment and supplies, in order to cope with medical procedures and medical visits or hospitalization (Burns-Nader & Hernandez-Reif, 2016), could serve as a small part of physical training programs in cases where there a need of preoperative sessions for example. On the other hand, non-directed play in which the therapist selects the environment and materials in order to stimulate a specific play activity and the child plays in a more spontaneous way (Chambers, 1993)., could be also used in a physiotherapy program maybe for less complex cases or as a tool for the first sessions in order to earn the child's trust and build a good relationship.

However, as mentioned above, it seems that researchers regarding this issue do not focus on play methods and not actually integrating play in physiotherapy, but rather they rely on play as a tool in order to achieve the desired physical outcomes. That could also be the case regarding the fact that in most of the articles there was a focus on the physical outcomes. The aim of all the studies was related to physical problems and the effectiveness of a physiotherapy program using play on hand function, balance, or gait for example. Emotional outcomes were not

even measured in some of the articles, and even if they did, the measurement was basically related to feelings of enjoyment and/or motivation rather than in what type of play theme would be appropriate and effective in every case. The fact that a physiotherapist's work is often misunderstood could be a result of this inadequate research and the one-dimensional thinking during research. It could also be a result of the inability of physiotherapists to look beyond of what they have learned during their education or of what they actually think physical therapy is about.

The fact that physical and emotional outcomes seem to have different importance for researchers could also be a result of the measurement tools existed and used. Measurement tools regarding emotional outcomes were used only in 3 out of the 7 articles included (Winkels et al., 2013; Howcroft et al., 2012; Michiel et al., 2008), and tools concerning physical changes were observed in all the articles. Physical outcomes were even assessed with more than one measurement tool. There seems to be distinguishing between physical and emotional characteristics regarding measurement tools. It could be that there is a lack of tools that relate physical and emotional changes. It could also be that the researchers used different tools for each outcome deliberately, because emotional outcomes were not important enough to assess or were assessed as a secondary outcome.

According to the results emotional outcomes such as enjoyment, motivation, and increased self-esteem were reported. In addition, it was observed that VR and AVGs could be a suitable instrument to achieve physical goals during a physiotherapy session and serve as a motive in order for children to feel that they want to repeat the process. As already mentioned, in one article emotional outcomes were not even discussed, in three they were reported but not measured, and in the remaining three they were both measured and reported. This fact indicates a lack of interest on emotional outcomes or maybe it is related to the previous statements regarding the focus of physiotherapists only on physical problems. It could also be that the researchers hypothesize that since games are involved it is certain that positive emotional outcomes will occur. Maybe this hypothesis is based on the theory of play or based only on common sense. However, emotional needs of children are as important as physical outcomes, and should not be hypothesized.

In the same way, during the studies where researchers aim to achieve several physical changes, they usually do not discuss how these physical outcomes could be translated into participa-

tion in daily activities and routines. Only in one article it was mentioned that significant increase of convenience in performance of daily activities was observed during a training program using the Wii Fit device (Winkels et al., 2013). It could be that researchers' hypothesize that when changes occur on activity level, participation will also occur. Participation may come naturally after positive physical changes, but it is considered to be a complex multi-dimensional construct dependent on several factors (in.prep). Since physiotherapy is identified as the mean to achieve physical changes, and thus increase daily function of patients, researchers should probably pay more attention on how changes can be implemented into participation.

According to WHO (2001), participation can be described as the involvement in a life situation. However, few studies focus on the relationship between involvement and 'being there' during an activity (Granlund, 2013). The term 'being there' can be defined as 'presence', and can be described as a complex construct 'formed through interplay of raw (multi-) sensory data and various cognitive processes'. It is reported that VR could serve as a mean to achieve presence, and can be used in different professional fields, ranging from the well-being industry to clinical psychology (Riva et al., 2007). Based on this report, presence could be achieved through VR environments during rehabilitation programs as well, providing to the child an opportunity to engage in the activity and react emotionally during the interaction. An interesting fact regarding the strong relationship between presence and affective responses (emotions) was noted in the study of Riva et al. (2007, p.55) in which the researchers reported that 'if a medium is not able to induce a feeling of presence, the affective responses might be low, independently from the emotional content provided by it'.

Nevertheless, the context of physiotherapy, play and participation could differ for families that are originated from different cultures. For the purpose of this literature review no focus was given on the country from where the studies were conducted, due to the fact that there was a lack of research concerning the integration of play into physiotherapy. However, it is worth noting that the studies were carried out in different parts of the world although there was no mention on the cultural background of the families which participated. Cultural differences may or may not be a barrier for a physiotherapist, but since therapies with children are based on trust and mutual understanding with the individual child and his/her family, adapting interventions and play materials according to cultural issues maybe could make a difference on the outcomes of therapy (Porter, Hernandez-Reif & Jessee, 2009). Additionally, profession-

als need to empower families and allow them to gain control over their situations by allowing their voices to be heard (Björk-Åkesson, Granlund & Olsson, 1996; Dempsey & Dunst, 2004; Dunst & Trivette, 2009).

To make a difference on the outcomes of therapy was the indirect aim of this literature review. The investigation regarding the integration of play into physiotherapy programs and the physical and emotional outcomes of this integration were examined in order to provide information, and to evaluate if play could serve as a developmentally appropriate approach during physiotherapy sessions for children with chronic health conditions. Since the overall results of this review seem to lead to positive changes physically and somewhat emotionally, it could be noted that play as a tool during physical training programs has the potential to promote more effective therapies. However, it was observed that there is a lack of research regarding this particular issue and therefore, there are many factors that have to be taken into consideration. There is a need for extensive research concerning the integration of play into physiotherapy programs for children with chronic health conditions other than CP, and based on the emotional outcomes of therapy as well in order to promote overall positive changes during therapy. ‘The ease of play is a serious thing and is crucial for reflection and change that matters to the participants’ (Foss & Bardsen, 2013, p.121).

6.1 Limitations and methodological issues

This literature review aimed to investigate the physical and emotional outcomes of the integration of play into physiotherapy programs for children with chronic health conditions, and although it can be noted that important factors regarding this issue were reported, there were also limitations and methodological issues that may have hindered gathering of information.

Limitations during the research process are related with the databases and the search words. Only 3 databases were used, number that could not be considered as sufficient. The search words on the other hand, even though seemed to be enough for the purpose of this review, it could be that there was a use of the wrong search words and/or the wrong combination of search words. In addition, articles only written in English were included for review, and abstracts, conference papers, theses, and books were excluded. Additionally, articles written before 2000 were also excluded. Information may or may not have been gathered if articles written also in Greek were included or if for example books related to the purpose of this review were included as well. Furthermore, the articles that were selected to be included in this re-

view were not assessed by a second researcher in order to identify similarities or differences in the selection process.

An important error of the procedure was probably the exclusion of home and school based physiotherapy programs in which there was the integration of play, since there could have been more information gathered. During the research process some home and school based programs, and some laboratory programs as well were found, but were not selected due to the fact that inclusion criteria were hospital and/or rehabilitation programs. The difference might have not be sufficient in order to draw conclusions or generalize even if home and school programs were included, but an article regarding children with cancer for example was found in contrast to the articles included in the review now which refer only to children with CP. In addition, studies conducted in laboratories, even though were focusing on children with CP, it is worth noting that they also focused on emotional outcomes as a primary goal. Motivation, self-efficacy and psychosocial effects of play along with physiotherapy treatment were investigated in 3 articles that were not selected due to the place of study. Furthermore, as mentioned before, due to the lack of research and adequate evidence to support this review a lot of the information was based on the experience and reflections of the author. This fact may have led to bias issues, and information based on the pre-understanding of the author regarding the subject of this review.

6.2 Future research

This study provides information and theoretical background regarding play and the use of play as a therapeutic tool, in addition to the integration of play into conventional physiotherapy techniques for children with chronic health conditions. The aim of the study was to investigate this integration and examine the assessed physical and emotional outcomes during the integration. However, future work is needed to outline if and how play can be adapted in physical therapy programs, since the results of this literature review cannot be generalized due to the low number of participants in the studies. Even though it was observed that studies have been conducted for children with CP regarding this issue, there is still a lack of evidence especially concerning emotional outcomes. In addition, there is a lack of evidence regarding children with chronic health conditions apart from CP. Nevertheless, despite the fact that studies regarding children with CP have been conducted, as mentioned above the number of participants cannot be considered as sufficient. Generalization of results is an important issue for future research in order to draw conclusions and discuss if the integration of play into physio-

therapy programs can serve as an appropriate approach for children with chronic health conditions. Research should be conducted also regarding the way physiotherapists work with children, meaning that there is a need for professionals to adjust their therapy programs according to children's needs and include play methods in their sessions. In addition, research regarding collaboration between physiotherapists, the family of the child, and other professionals related to the child is also essential. As mentioned, physical therapists, occupational therapists, speech therapists, teachers and other professionals working with children can use therapeutic play to achieve treatment goals concerning their own disciplines, and additionally collaborate together in order to empower families and plan therapies according to the child's needs. Furthermore, it is worth noting that the fact that there is a focus on modern games (technology) can be considered as a way to adapt to children's interests nowadays, and research should probably continue to follow this development of technology in order to adapt on characteristics of the future.

7 Conclusion

The purpose of this literature review was initially to provide information regarding play, and to highlight the importance of play in a child's life. Development and growth occur through playing activities for children, as well as physical and emotional changes. For children with chronic health conditions who attend physiotherapy sessions, play could serve as a mediate and an appropriate developmental approach in order to achieve these changes. Physiotherapy programs which often can last for a long period of time, can be boring and tiring, and thus, lead to situations where no motivation or interest can be found by children. However, there is chance that by integrating play into conventional physiotherapy programs, sessions could become less boring and children would be more likely to engage in them.

Furthermore, emotional needs and outcomes were also addressed during this review, in order to highlight the significance of emotions during a physical therapy program for children who suffer from chronic health conditions. There is a need for physiotherapists to equilibrate physical and emotional needs, and have a more 'human' relationship, rather than a 'bodily' - strict professional relationship.

The results of this review cannot be generalized since the evidence found was insufficient due to the quantity of articles included, and due to the fact that only children with CP were included in these articles. Although the evidence could not be considered as sufficient to draw con-

clusions, it is worth noting that the integration of play into physiotherapy sessions could be viewed in a positive way. Especially, regarding up to date video games and technology in which the future is probably relying on. Nevertheless, the evidence reported could serve as a first step for researchers to study this integration in greater depth, and to focus on children with conditions other than CP.

7.1 Reflections of the author

It is worth noting the change of thinking regarding the concept of play during this research. In the beginning of the procedure for this literature review, 'play' in the mind of the author referred to 'traditional' play methods and techniques, since the author had already conducted a literature review in the past regarding alternative types of physiotherapy for children with CP, which included VR. During the research process when it was observed that studies were mainly focused on technology (VR and AVG's) a sense of disappointment raised. However, while conducting this research it became clear to the author that technology is the future, technology is the key element to engage most children nowadays, and these games seemed to become more and more interesting. Although, as mentioned, the results of this review cannot be considered sufficient enough to draw conclusions, VR and AVG's are becoming more popular over time and it seems that positive physical and emotional outcomes can be observed while using these games. For a physiotherapist one of the main obstacles during treatment can be the engagement and participation of the child during the process, as well as the feeling of enjoyment and motivation. There is a possibility that VR and video games could combine these factors, and thus, make a difference in the area of pediatric physiotherapy. The different point of view concerning play therapy methods might serve as a positive change in the author's professional field while working with children with special health care needs.

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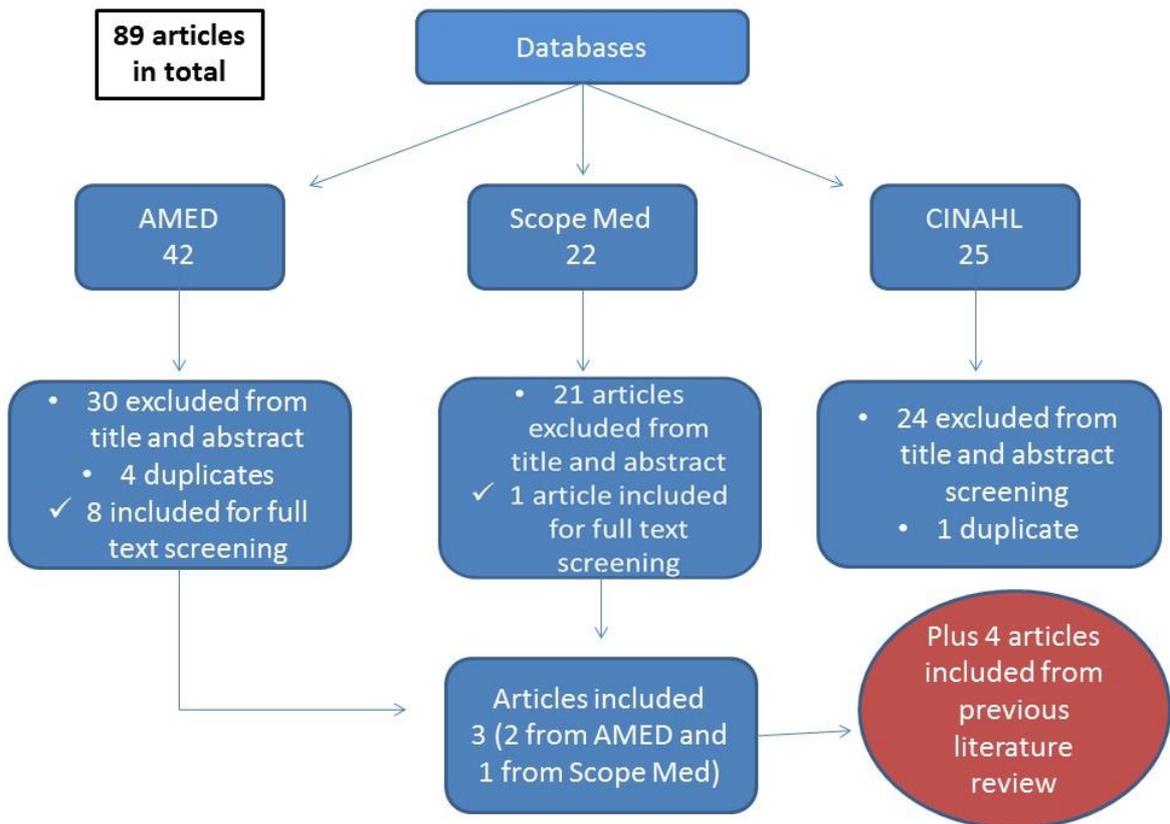
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Appendix A

Flow chart of the article searching procedure



Appendix B

Question/Criteria of the protocol for abstract and full-text screening of the articles

1. Author
2. Title
3. Year
4. Aim
5. Place of study
6. Participants
7. Physiotherapy based sessions
8. Play therapy method
9. Duration/Frequency of sessions
10. Chronic health condition
11. Characteristics of diagnosis/Co-morbidities
12. Other groups of children
13. Body movement/Part assessed
14. Measurement tools for physical outcomes
15. Results of physical outcomes
16. Emotions assessed
17. Measurement tools for emotional outcomes
18. Results of emotional outcomes
19. Conclusions

Appendix C

Quality assessment

Quality: 7 or 8 Yes → Quality high (H)

5 or 6 Yes → Quality medium (M)

Less than 4 Yes → Quality low (L)

<u>Quality Assessment</u>	Is the aim clearly stated?	Adequate description of the sample and how it was recruited?	Adequate descriptions of the methods used to collect data regarding physical outcomes?	Adequate descriptions of the methods used to collect data regarding emotional outcomes?	Adequate description of the data analysis?	Is the place of study and play method clearly described?	Do the authors report limitations?	Can the results be generalized?	Quality
	Yes (Y) or No (N)	Yes (Y) or No (N)	Yes (Y) or No (N)	Yes (Y) or No (N)	Yes (Y) or No (N)	Yes (Y) or No (N)	Yes (Y) or No (N)	Yes (Y) or No (N)	
Tarakci et al., 2013	Y	Y	Y	N	Y	Y	Y	N	M
Winkels et al., 2013	Y	Y	Y	Y	Y	Y	Y	N	H
Gordon et al., 2012	Y	Y	Y	N	Y	Y	Y	N	M
Rostami et al., 2012	Y	Y	Y	N	Y	Y	Y	N	M

