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ORIGINAL ARTICLE

Managing to learn bimanual activities – experiences from children and adolescents with cerebral palsy – a qualitative analysis

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ABSTRACT

Purpose: Children and adolescents with cerebral palsy often have impaired hand function. This makes it difficult for them to deal with everyday activities. The aim of the study was to explore the experiences of children and adolescents with unilateral spastic cerebral palsy when it comes to learning and dealing with activities requiring bimanual use.

Method: Ten participants, attending mainstream schools, with unilateral spastic cerebral palsy (10–18 years, MACS-level I-III) took part in semi-structured interviews. Qualitative analysis with verbatim transcripts were analysed using a Grounded Theory approach.

Results: The learning of bimanual activities was described as a process taking place in interaction with the dynamics of everyday situations. Five categories describing the participants experiences emerged: "Reaching a point where you want to learn", "Awareness and acceptance of your own abilities", "Dealing with the boundaries of the disability", "Dealing with the impact of people around you" and "Strategies for learning". A multi-dimensional theory was derived, summarising how the participants learned bimanual activities in daily life.

Conclusions: Children and adolescents with unilateral spastic cerebral palsy express that the process of learning bimanual activities can only take place when it fits in with life as it unfolds. Thus, they have to adapt to a changing context and their own developing skills.

➤ **IMPLICATIONS FOR REHABILITATION**

- This study support a person-centred perspective in the process of learning bimanual activities.
- Interventions need to be tailored to life situations and embedding in child's and adolescents everyday lives.
- The therapist must be compliant with the child's and adolescents desire for learning.

Introduction

The everyday life of any child requires a variety of complex activities to be performed. As children grow, they gradually learn daily activities in a dynamic interaction between their own skills, their environment and the nature of the activity [1]. They will progressively increase their cognitive skills and strengthen their problem-solving, reasoning and thinking abilities, such that they will eventually be able to perform more complex activities [2,3]. Learning is stimulated by children's observation of others, by their own attempts and by internal and external motivation deriving from other people's responses [4,5]. Many activities pose additional challenges to children with a neurological dysfunction.

Unilateral spastic cerebral palsy (USCP) is a sub-type of cerebral palsy affecting one side of the body [6]. This often causes spasticity, muscle weakness, slowness, mirror movements and impaired co-ordination in one hand [7]. The degree of the motor impairment can vary, from being very mild to exerting a significant

impact on fine-motor abilities. In addition to physical impairments, children and adolescents with USCP may have problems relating to sensation, attention deficits and cognitive impairment [8,9]. As a result, their ability to perform activities is limited, particularly where co-ordination of both hands is required. This subsequently affects their learning of such bimanual activities in everyday situations [10,11].

There is a large number of studies on the learning of bimanual activities in children with USCP. These are typically intervention studies based on motor learning theories and also report on various types of goal-directed training [12,13]. In a previous study from our group [14] the parents of children with USCP were asked about their experience of what was crucial for their children's learning of activities that required both hands with the purpose to improve existing interventions. There is a general scarcity of studies focusing on the children's own perspectives which may differ from those of their parents or professionals [15]. Such studies are of great importance, as it is emphasised in Articles 12–13

This article has been corrected with minor changes. These changes do not impact the academic content of the article.

of the United Nations Convention on the Rights of the Child [16] and in Swedish law, which lays down that children should exert an influence over their care, as far as possible and in accordance with their age [17]. Obtaining information about the experience of children and adolescents with USCP will make it possible to draw upon their views on what should be given priority and how the learning process should be planned. The aim of the present study was to explore the experiences of children and adolescents with USCP when it comes to their learning and dealing with activities that require both hands, in order to deepen our understanding and discover new perspectives and knowledge.

Materials and methods

Semi-structured interviews with children and adolescents with USCP was performed. Qualitative analysis of the material obtained was employed using a Grounded Theory approach [18], a method appropriate for this purpose. The aim of the Grounded Theory is to generate theories explaining the phenomena under study. It is a form of empirical research where interviews can be used as a method for collecting observations of reality. In brief, it allows an extensive material to be structured and organised in a systematic way.

Participants

A total of ten children and adolescents with USCP (four males, six females) participated in the study. Their median age at the time of the interview were 13.4 years (range: 10.2–18). They all attended mainstream schools and their classification according to the Manual Ability Classification System [19] ranged from level I to level III. The Manual Ability Classification System encompasses five levels describing the typical manual performance of children with cerebral palsy in the handling of objects in everyday life; from level I (handles objects easily and successfully) to level V (does not handle objects).

Data collection and procedures

The participants were recruited from the Regional Rehabilitation Centre in Western Sweden. The inclusion criteria were a diagnosis of USCP, age 10–18 years, resident in the county of Västra Götaland, and sufficient cognitive and communicative ability to discuss themselves and their activities. A strategic selection of participants was made in terms of age, gender and degree of disability (the Manual Ability Classification System level from I to III) to achieve breadth and variation. Four of the participants took part in an earlier study [20] and thereby known to the first author.

The interviews were performed by the first author, a registered occupational therapist, who had experience both with the target group and with the interview process. A pilot interview was conducted and the material from this interview was rich in content and a decision was taken to use those results in the study. The recruitment stopped when saturation was achieved. The interviews were semi-structured, conducted face to face and lasted between 30 and 60 min. They took place in the participant's home or at the clinic. Except in three cases, no parent was present. The interviews were audio-recorded and then transcribed verbatim by the first author. In addition, detailed memos were taken during each interview. The questions were adapted after each interview so that new approaches to the phenomenon studied could be utilised, in accordance with the Grounded Theory method [18]; the interview protocol is included as an appendix. At the end of each interview, the participant was asked to present his or her own management suggestions for others with the same diagnosis.

Data analysis

The interview transcripts were read and analysed separately by the first author and the last author. This was done in accordance with the Grounded Theory approach, starting after the third interview had been carried out. There was high level of agreement between the two researchers, and all disagreements on the interpretation of the material were resolved by consensus. The first step of the analysis – "open coding" – involved coding the data line by using the NVivo 10 software [21]. Mapping and identification of similarities and differences between codes then yielded various groups based on the properties and dimensions of the codes, which are referred to as "concepts". The analysis was continuous and included constant comparison, moving back and forth between the analysis and the data, including the memos. In the next step, the codes were grouped into potential categories and subcategories, where each category included codes that represented a similar concept which defined the characteristics of that category. Then the analysis was taken to a higher level of abstraction, with axial coding together with validation of the connections among the subcategories and categories. In the final step of the Grounded Theory analysis, a central concept emerged into which all categories were integrated. That core category was identified, which made it possible to create an overarching theory [18].

Establishing trustworthiness

Strategies designed to ensure trustworthiness were integrated throughout the research process. A comparison with the literature was made only after the categories had been identified. This sequence is important in Grounded Theory, as the researcher should approach the research area with as few preconceptions as possible [18]. Memos were taken throughout the analysis; these included thoughts about codes, categories and concepts, and they were used in addition to the actual interview data. The second author scrutinised the interview material and analysis process on three occasions, and took part in discussions about additional possible interpretations. All of the authors had long experience of working with children with USCP. Finally, an adult living with USCP (46 years old) was interviewed to verify the interpretations and deepen the data analysis; as the participants in the study were children or adolescents, it was decided that they could not themselves be asked to confirm the results of the analysis, as is otherwise recommended in Grounded Theory [22].

Ethical considerations

The study was approved by the Regional Ethical Review Board of the University of Gothenburg, Sweden (Reg. No. 1020-15). Written consent was obtained from the parents and the adolescents (18 years). Information letters were sent for the children (10–17 years), adapted to age.

Results

The interview material showed that the everyday life of the children and adolescents involved a wide variety of activities requiring the use of both hands. Even so, the analysis of the material showed that all of the challenges identified could be subsumed under the core category of "Learning of bimanual activities only take place when it fits in with life as it unfolds", meaning that the

LEARNING BIMANUAL ACTIVITIES CAN ONLY TAKE PLACE WHEN IT FITS IN WITH LIFE AS IT UNFOLDS

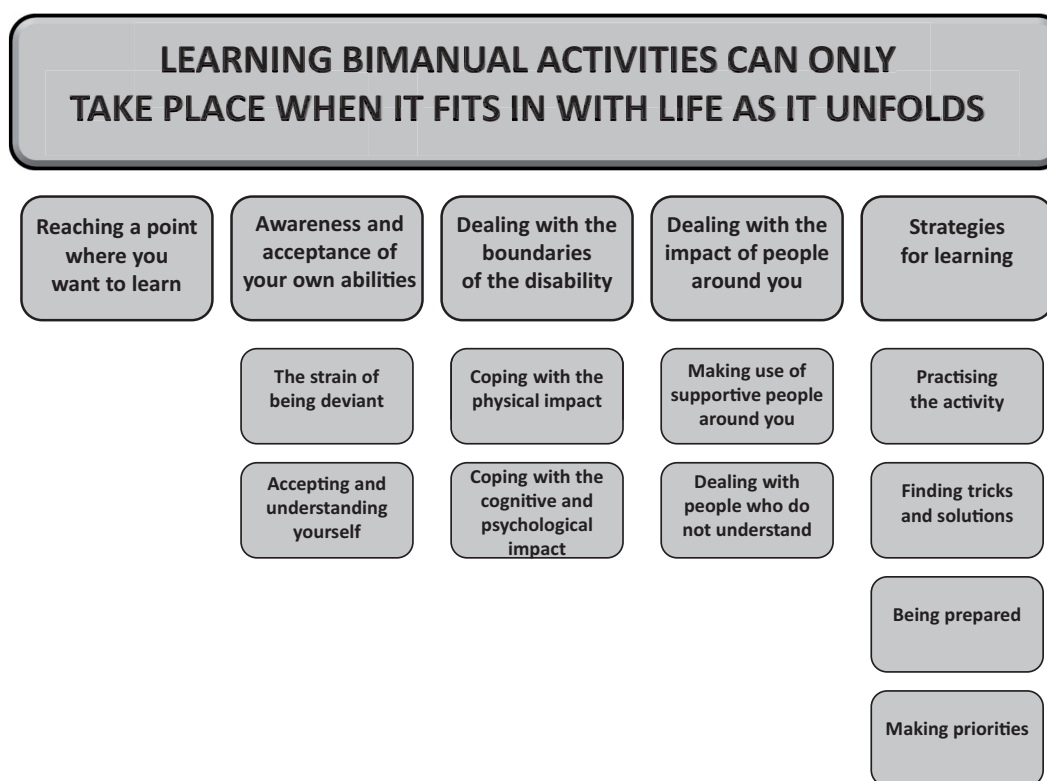| Reaching a point where you want to learn	Awareness and acceptance of your own abilities	Dealing with the boundaries of the disability	Dealing with the impact of people around you	Strategies for learning
	The strain of being deviant	Coping with the physical impact	Making use of supportive people around you	Practising the activity
	Accepting and understanding yourself	Coping with the cognitive and psychological impact	Dealing with people who do not understand	Finding tricks and solutions
				Being prepared
				Making priorities

Figure 1. Schematic representation of the main heading, the categories and the subcategories.

learning was not done separately, but took place in interaction with the other demands imposed by everyday life. Further, the older and more mature participants wanted greater independence and needed to be able to perform more complex activities. The analysis of the interviews revealed that the participants' learning could be broken down into a total of five categories describing their approach to learning (Figure 1). The sections below present the various categories with associated subcategories. The quotations given have been translated from Swedish to English by a professional translator.

Reaching a point where you want to learn

The participants described specific times in their lives when they had reached a point where they had made a decision to learn. They explained that they had found it important to fit in or to be able to perform the activities that others performed and how this was a trigger that could make them put in greater effort and perform activities like other people. Some of the participants described how they had reached a decisive point where they had resolved to put in some more effort in order to learn:

> No, now I'm going to learn it … so I just painted and painted my nails, removed it, did it again, and finally I was able to do it. (Meg, 14 years)

They had such a strong determination to master an activity that they tried many times and over a lengthy period, and eventually they were able to perform it on their own:

> Then I wanted to practise using the videogame controller … So, I tried and I tried for six months … and then I was able to do it. (Beatrice, 10 years)

They also described situations where there had been nobody else to help them or where there had been no other choice, meaning that they had decided to do it on their own:

> I suppose it was something I had to do … sure, you can ride with one hand, but it's really hard and the horses aren't used to it, they're used to two hands, so … (Wilmer, 18 years)

These situations had become a trigger causing the participants to learn something new. Also, as the participants grew older, they wanted to learn activities that they had previously experienced as difficult or received help to perform. It was taxing on them to be the person who would avoid activities and they felt that they could not go on like that indefinitely:

> It's hard to avoid everything that doesn't work … When I was younger I thought taking a shower was a real pain because I found it hard to pour shampoo into my hair. But I mean, you can't not shower just because you think it's hard, you know. (Margret, 14 years)

Increasing age was often accompanied by greater determination – the participants no longer wanted to simply give up:

> Yes, it's been an ongoing story for quite a few years now, so … I tended to give up quite easily, when I was younger, so I suppose I often just gave up. (Peter, 17 years)

Instead, they would prefer to try to cope with tasks on their own, which they felt would be good for them in the future.

Awareness and acceptance of your own abilities

The process of awareness and eventually accepting yourself and your abilities lasted throughout childhood and adolescence. The participants described this process from different perspectives. Some of them had progressed far while others were in the midst of the process and strongly affected by the strain of being "deviant". The older participants had come furthest on the way towards finding an identity where their disability was an integral part. There are two subcategories that relate to awareness and acceptance of your own abilities:

The strain of being "deviant"

Some of the older participants described how as little children they were not aware that they had a disability. Only when they started school and began to compare themselves with their peers:

> "When you're a kid, everybody's more or less as clumsy as the next kid and you don't think. Most of the time you just play, but as I grew older I became more and more aware." (Wilmer, 18 years)

The participants described how they had progressed through different stages of the process of increased awareness of themselves and their disability – a process that went on to a varying extent throughout childhood and adolescence.

They found it distressing to show their difficulties to others, and this could make them feel that they were worse than other people, which affected the learning process:

> Same thing when we're going to swim, because I don't want to swim with the others, because I don't know how to swim. Then I don't feel too good about myself. (Ronnie, 12 years)

They did not want to deviate or be seen as clumsy or odd, and so they made an effort to hide any different patterns of movements:

> I can't see myself from the outside, but when I watch photos or films I look clumsy. (Wilmer, 18 years)

Some participants expressed sadness and disappointment that they had not been given the same opportunities in life as other people because of their disability:

> I keep thinking about what I could have done if I hadn't had my left arm[1] … but then I think anyone who has a problem feels like that, too – if only I had been normal, then I would … (Meg, 14 years)

Fitting in and performing activities like all the others was something that the participants characterised as important to them, especially in a school context. In addition, some participants wanted to perform activities in exactly the same way as their friends, and they did so even though it required them to make a greater effort. They pushed themselves to learn a way that could be accepted by others:

> I try to think about how it looks … really trying to hold all fingers in the same way in my right and left hand, or not overstretching … but trying to get everything the same as the others do it. (Margret, 14 years)

Accepting and understanding yourself

The participants described how, as they were growing up, they had progressively learnt to understand their difficulties and also, to some extent, adjust to them. They had felt increasingly comfortable with the idea of performing activities in their own way, accepting that the result could be different. In addition, they were also able to accept that the result could be a little worse than what they perceived other people's results to be, putting a positive spin on this:

> I could study one [musical] instrument further, but I wouldn't become very good at it … because I can't manage to move my fingers in that way … I prefer playing a lot of different instruments reasonably well to playing one instrument really well. (Meg, 14 years)

Some participants could even take a humorous approach to their disabilities:

> Meeting other people with disabilities is great fun and you tell some funny stories … like shaking hands with your left hand instead … you really should do it with your right, but mine's so weak and then I

wouldn't convey that I'm a strong independent person[2] but make this teensy-weensy "ant-shake" instead.[3] (Wilmer, 18 years)

In fact, they sometimes felt that they had an extra strength that others lacked, and some of them expressed pride that they were able to beat the odds and cope with things "anyway":

> After all, you have to keep in mind that you've become a bit different from all the others, you're a bit unique … this doesn't have to be all bad … you'll always have this extra go in you that makes you reach a little further than anyone else, because you want a little more, because you have this disability. (Meg, 14 years)

The participants were able to allow themselves to be who they were, without worrying about what other people might think.

Dealing with the boundaries of the disability

Coping with the physical impact

The participants described the physical impact on their arm and hand, including different sensory perception, reduced strength, muscular contractions, slowness and difficulty controlling muscles. These reported physical impairments resulted in certain activities taking longer to perform and being more difficult to learn. In the participants' own words, their hand "had a life of its own" and "was not to be trusted". Because of their reduced sensitivity, they could not feel the movements of their arm, and this made them feel insecure. Sometimes they also felt fear of hurting themselves, as their arm might suddenly make an involuntary movement:

> I often burn myself on the frying-pan when I'm cooking. Because my hand goes up and moves a little in ways that I don't intend. (Wilmer 18 years)

Small muscle contractions could also appear without warning, and then the participants were unable to control the movements involved in the activity they were performing. As a result, the participants had to put in more effort in order to deal with their physical impairments, and sometimes that extra effort would cause a deterioration of performance in and of itself:

> When I'm getting out of the boat … it really goes in slow motion when I'm going to grab hold of it, and the more effort I make, the worse it goes. (Wilmer 18 years)

Coping with the cognitive and psychological impact

Certain activities requiring a high level of focus and effort could put more strain on the participants than they were able to handle:

> So everything from doing fiddly things, it gets harder, because you … then the hands must work together and the brain must be focused and it takes a bit more effort. (Meg, 14 years)

As a result of making all this effort, they sometimes had a greater need for rest after the end of the school day. The participants described situations that were difficult to handle, where they did not attain the results they wanted. This could cause them to feel frustration, insecurity, anger and sometimes anxiety, thus making the learning process more difficult and affecting motivation to learn. Indeed, they sometimes felt bad even before certain situations; in the case of school, mainly lessons in practical subjects:

> It's a real pain, I never ever look forward to a handicraft lesson. I'm just hoping they won't be there.[4] (Ronnie, 12 years)

Dealing with the impact of people around you

Having people around them who were supportive was characterised by the participants as crucial to the successful learning of new activities, but some people around them placed demands on them that were unreasonable given their difficulties. The participants' ways of dealing with people around them can be broken down into two subcategories.

Making use of supportive people around you

The participants emphasised the importance of receiving support from people around them, for example when they helped the participants solving problems or challenged them to try new activities. The participants appreciated the understanding from other people about the fact that things would take longer and when they got help to adjust materials to suit their needs. One important aspect of this support consisted in allowing the participants to be themselves and respecting them. Being treated like anyone else was experienced as supportive:

> When I got a boyfriend, I was obviously worried that he would think I was weird, but he's probably the only person who hasn't really reacted in any way whatsoever to me having this condition, so … (Margret, 14 years)

The participants also stressed that they remained dependent on help in some contexts and in these situations they preferred receiving some help, but not to fully rely on their helper:

> My sister, she helps me a bit. She will hold and I will pull up the zip. (Carl, 12 years)

Another way of helping and thus supporting the learning process was to reduce the demands that an activity placed on a participant. For example, a parent might have bought trousers with an elasticated waist, or someone might have provided a clever aid.

Dealing with people who do not understand

The participants pointed out that some of the people around them did not understand their difficulties. Those people sometimes acted in ways that prevented the participants from learning, either by giving the participants too much help or by helping them in the wrong way. Such a lack of understanding made learning more difficult, and sometimes they felt that people who tried to help them really achieved the opposite of what they intended:

> If I'd been allowed to take showers on my own more often … I'd probably have become better at it sooner … you know, I'm sure many people think they're helping me … but still it really is a disservice, because I'm going to have to learn those things when I'm older anyway. (Margret, 14 years)

Further, the participants described how some people placed too high demands on them or criticised the way they performed activities without taking account of their disability:

> [My teacher will say,] "Come on, you really have to be a bit quicker now, you must change chords more often!" – but I have to change, like, two seconds before all the others, otherwise I don't have enough time to put my fingers on the right guitar strings. (Meg, 14 years)

Many people tried to help, but their proposed solutions were not always appropriate:

> Then I don't always think other people's solutions are all that good, they think they know how to help, but that's not really how it works. It's not that easy, you know. (Wilmer, 18 years)

Strategies for learning

The participants described a range of strategies for learning an activity in different contexts. These strategies can be grouped into four subcategories. The participants practised a great deal and often invented their own tricks for performing activities. In addition, they stressed that unforeseen events could occur in everyday life, explaining that one strategy to deal with this was to try to be prepared and take control over whatever happened. Another strategy was to make priorities, which included refraining from difficult or challenging activities.

Practising the activity

According to the participants, when it came to learning or improving the performance of bimanual activities, practice and repetition paid off. Tireless practice often caused them to learn something:

> When I shot baskets for the first time at school, then I realised I wasn't very good, I was the first one to be knocked out of the competition, but then I went home and practised, and three days later we did it again, and then I noticed that I was among the best. (Beatrice, 10 years)

In some cases, the participants set long-term goals for activities that they could not learn straight away.

Finding tricks and solutions

The participants described how they had found their own tricks and solutions to cope with different activities. These were special methods that worked well given their specific difficulties. As a rule, they would let their better hand do most of the work and they would try to relax to be able to control the movements of the other hand:

> Tying my shoelaces is something I do almost exclusively with my right hand … I just hold … my left arm is just there to give a teeny bit of help, then my right arm does almost all the work. (Meg, 14 years)

The participants tried to find methods by imitating other people or by breaking down and simplifying an activity: In some situations they had to make priorities in a way that forced them to accept a shoddy or inadequate solution:

> Then I tuck my shoelaces into my shoes and try to act normal … (Ronnie, 12 years)

Being prepared

The participants explained that they had developed a kind of preparedness for unforeseen situations. They made an effort by staying in control and planning activities ahead of time, as there might be a risk of involuntary muscular contractions or a risk that they might lose their grip on an object and drop it. Always being "on guard" in this way could be quite taxing:

> I may have to strike the hammer away because a finger [on the hand holding the nail] is twitching [to avoid hitting that finger with the hammer] … so this, too, becomes something that you really have to focus a lot on. (Margret, 14 years)

Making priorities

The participants sometimes had to make priorities, choosing which activities they would perform and which were too demanding. They explained that if an activity was too difficult or took too long, their affected hand could be overstrained. Previous experience of failure could make the participants refrain from certain activities, and so could their desire not to let others see them perform a complicated activity. The participants mentioned activities that they chose not to perform because they provoked negative feelings such as anger, sadness and frustration:
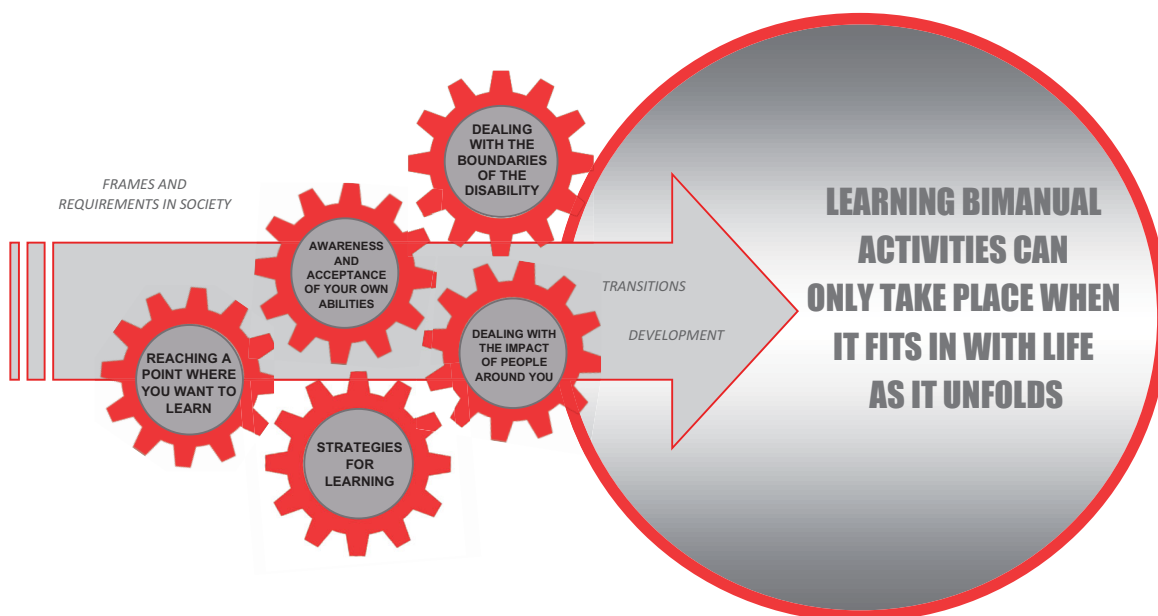
Figure 2. The multi-dimensional theory summarising how young people with unilateral spastic cerebral palsy learn bimanual activities.

I've given up playing the cello, it became so tough. I kind of cried every day because I had to practise so much and it was pretty hard on my left hand as well. (Meg, 14 years)

In extreme cases, certain activities could even give rise to feelings of panic:

Well, I know how to swim, but the distance mustn't be too long, because then I've sometimes panicked a bit. (Peter, 17 years)

This shows that the participants could not always do the activities they wanted.

Core category and summary of results

The analysis revealed that the five categories presented above, interacted with each other in the participants' learning of bimanual activities. Successful learning required an appropriate balance to be struck among all of these five categories, but the relative importance and main focus of each category varied among the participants, as they differed in their degree of disability, age and overall circumstances. Further, the participants' learning could be broken down into a total of ten subcategories. The participants had to adapt to different learning situations in everyday life, and also to changes in demands as they grew older. These findings showed that all of the challenges identified could be subsumed under the core category: "*Learning bimanual activities can only take place when it fits in with life as it unfolds*" and finally there emerged a multi-dimensional theory summarising how young people with USCP learning of bimanual performance take place in their everyday lives (Figure 2).

Discussion

The present study describes the experiences of children and adolescents with USCP and the ways in which they learn and deal with everyday activities that require both hands. As the participants were interviewed they were free to express their own thoughts and ideas in their own words in this subject. Analysis of the data from the interviews yielded one overall core category: "*Learning bimanual activities can only take place when it fits in*

with life as it unfolds". Learning was not strongly related to any one individual factor, but rather involved a complex interaction between the five categories identified by the analysis. These categories relate to the participants' own point when they wanted to learn and their efforts to find different strategies for learning. This emphasised also their ways of dealing with the limited abilities that they have as a result of their disabilities, as well as to their need to understand and accept these limitations themselves and to have others understand and accept them. This is encompassed in the multi-dimensional theory proposed, which provides a basis for a theoretical understanding of the factors affecting the learning of bimanual activities in children and adolescents with USCP (Figure 2). This finding is also consistent with the description given by Davis et al. [1] of how the individual learns and becomes competent in occupational performance during the course of life.

There were certain approaches that the participants used when learning activities. They explained how they practised and repeated the activity many times, which fits well with the principles of motor learning; a learning process where activity is in focus and where progress occurs gradually as the child begins to try to understand and execute the movement several times [23,24]. Eventually, performance becomes automatic and the child becomes independent in the activity concerned [25]. The participants also mentioned that they needed to find their own ways of solving different tasks, suited to their conditions. This way of learning process is recognized by the Cognitive Orientation to daily Occupational Performance approach [26]. The maturation of mental processes that develop gradually and provide improved learning conditions has furthermore been described previously [3,4]. This is often a result of the process of transition towards adulthood [27]. The participants in the present study reflected how learning is a process and how their own maturity affected their thinking about learning. They also pointed out that their general setting was more similar to the adult world once they reached their teens, which enabled them to think about the future and to develop a readiness to meet the specific and changing needs involved. Somehow, people's relationship to their values and goals when thinking and acting in different situations

creates meaning and well-being in their present life situation [28–30]. This means that activities can be perceived as meaningful to a different extent during different developmental phases, which resembles the participants' ways of thinking [1].

An activity that strengthens the inner drive has been described previously [14] and is related to the subcategory "reaching a point where you want to learn", describing an internal motivation when the person evokes a strong interest in the activity. This is something that the participants highlighted as crucial when deciding to become better at something that they had earlier found difficult to deal with. Internal motivation is also the key factor in the Self Determination Theory [5], which also emphasises that people want to be able to decide for themselves and to have control over their situation. Issues of competence, the desire to control and master the environment and the outcome of actions, including issues of autonomy, free will and letting your actions be based on interest and values are other factors in this theory [5]. A last component concerns the need for relatedness, the need to interact and be connected and to experience caring for other people. Behaviours meeting these needs will cause a person to develop in a positive direction and create well-being – and if these needs are not met, the opposite will happen [5,31]. These descriptions are reflected in the present study, where the participants stressed their desire to have control over the activities that they performed and pointed out that this could cause them to assign less priority to activities that were complicated. Further, the participants gave examples on their own ability to find tricks and solutions that worked for them when other people's suggestions were not suitable. They explained the importance of fitting in with others in various contexts – of not "deviating". The issue of being different, or of not having the opportunity to show behaviours and skills in the way that others consider ideal, can be difficult to confront [15,32]. The participants' statements add understanding of the various factors that influence the behaviour of young people with USCP in learning situations.

The present study sheds light on how the participants deal with the boundaries that their disability imposes. They described both physical and psychological constraints that affected their learning, in terms of sudden muscle spasms or difficulty controlling their muscles, which required them to put in more effort and to concentrate more. Hence it is logical that this may occasionally affect their belief in their own ability to perform activities. The term "self-efficacy belief" or "perceived self-efficacy" as used by Bandura [4] is useful here in that it emphasises how trust in your own ability can make a difference in a situation and can be crucial to performance. There are various ways to develop or increase self-efficacy: progressively learning increasingly difficult tasks, spending time with other people who can provide models for the performance of activities, and creating safe and secure environments characterised by encouragement from and involvement by other people [4]. Several points of similarity can be identified across the narratives of the various participants, who sometimes had a strong belief in their ability to perform activities but sometimes, in other situations, did not. Their confidence grew as they became better at performing activities as well as when they received appropriate support from others. However, when they were in an insecure environment, such as a handicraft classroom or a public swimming pool, several of them saw their perceived self-efficacy plummet. Other people's positive or negative attitudes towards them could both strengthen and weaken their beliefs in their own ability. Generally speaking, the most favourable learning situation was when they were able to be themselves

and were respected for this, without having to worry about other people's negative reactions.

The findings described above yielded a theoretical understanding of factors that could exert a positive or negative effect on the probability of successful learning of bimanual activities in children and adolescents with USCP. The theory presented encompasses several interacting factors that had an impact on learning (Figure 2). The in-depth perspective used means that the findings and the theory are based on the participants' subjective experiences. Such a perspective could identify factors of importance when it comes to creating what is characterised by Erlandsson et al. [33] as a good daily life with meaningful and functioning activities for each unique individual in his or her unique context, despite the disability – which should indeed be the ultimate goal of any occupational therapy intervention. Such factors of importance for a good daily life may include supporting the development of strategies for problem-solving, providing training in meaningful activities and providing young people with information about their disabilities throughout their childhood and adolescence in order to help them find their identity. Highlighting and understanding the experiences of children and adolescents – and of their parents [14] – when it comes to learning bimanual activities can make a valuable contribution to the existing body of knowledge and identify the needs that children and adolescents with USCP themselves consider important. Moreover, an important switch to a person-centred perspective. The children's and the adolescents' own strategies for learning should be strengthened through support for their problem-solving ability, through training in activities that they consider to be meaningful and important, and through guidance of how the performance of various activities can be mastered. Further, it is important to raise awareness of the inconveniences of having cerebral palsy and to provide learning possibilities throughout the period of growing up in order to support children's and adolescents' ability to eventually find their own identity.

Limitations of the study

This study provides an important contribution to the current research by focusing on the children and adolescents own perspectives, which is necessary to comprehend when designing interventions. The Grounded Theory approach made it possible to present a theory describing the process for learning bimanual performance based on the experiences of children's and adolescents' with USCP. However, the analysis is based on a small number of interviews and needs to be verified and tested clinically in occupational therapy interventions. Further, "triangulation" is seen as an important aspect of Grounded Theory in that it is preferable for analysis findings to be checked with the participants. However, in this study the participants were considered too young to be able to discuss the outcome of the analysis and so an adult individual living with USCP was used for triangulation purposes instead.

Conclusion

The children and adolescents in the present study described the learning of bimanual activities as a process taking place in interaction with any other circumstances that arise – and change – over the course of a dynamic everyday life and during an unfolding life. Learning occurred when the children and adolescents were ready and wanted themselves to learn and they developed various strategies for this. This emphasizes both the "timeliness"

for learning and readiness for intervention, including the issue of context and the importance of embedding learning in life situations more than in distinct clinical therapeutic sessions. Furthermore, the importance of the process of the child and adolescent's own acceptance and awareness of their disability and struggle to adapt in learning situations to both the external demands and to the prevailing societal norms. These findings, were summarised in a multi-dimensional theory on how young people with USCP deal with bimanual performance in their everyday lives.

Notes

1. I.e.,"the participant is wondering about what she could have done if she was able to use both arms".
2. This participant actually said "independent person" in English, which could be seen as increasing the humorous effect.
3. A light handshake, i.e., lacking the physical strength to perform a powerful handshake.
4. At Swedish schools, handicraft (including mainly woodworking and sewing) is a compulsory subject for all children.

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