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Positive Effects of Surfing on Psychological Wellbeing for Children with Developmental Difficulties

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working as a clinical psychologist and head trainer at GGZ NHN in The Netherlands. She published serval articles on child psychotherapy and on EMDR. *Andreas Lamerz,* followed his medical training in Germany, Italy, the UK and the USA and graduated in 1996. His dissertation focused on research into visual phenomena in focal epilepsy at the department of Neurology at the Charité, Humboldt University Berlin. He enrolled in the Program of Forced Migration and Health at the Columbia University in NYC, USA and graduated in 2000 with a Master of Public Health. He also enrolled in the International Trauma Studies Program of New York University, USA and successfully completed the training in 2000. Andreas Lamerz is a registered psychiatrist and child and adolescent psychiatrist in The Netherlands. He is also registered with The Netherlands Register of Court Experts (NRGD) and momentarily working as chief psychiatrist at GGZ-NHN in The Netherlands. His particular interests are international aspects of psychiatry, e-health and digital psychiatry as well as tic disorders and trauma therapy. *Suzanne van den Broek-Dietz*, ended up working as a project manager in Amsterdam, despite being a graduate of psychology. Ten years in, she asked herself whether this was what she really wanted to do with her life. As she chatted with a boy from the care farm where she volunteered, telling him about her surf trips, he asked her the important question that opened her eyes: "Can't you teach us how to surf?" In 2014, the answer (YES) became reality, as Suzanne founded Surf Project, an organisation that provides structured surfing lessons for children with Down syndrome, autism, and ADHD. Since then many of these children found a new sense of belonging through surfing.

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Abstract

Children with developmental disorders or disabilities often experience a wide range of difficulties and reduced quality of life. Surfing is gaining popularity as a sport that can promote psychological well-being, but research is still scarce. The current study aimed to investigate the effects of surfing on the quality of life of children with developmental difficulties. Participants were 84 children with Down syndrome, autism spectrum disorder (ASD) or attention-deficit/hyperactivity disorder (ADHD). Quality of life was measured by a parent-rated questionnaire (KIDSCREEN-27) before and after a series of three adapted surfing lessons. Additionally, responses on an evaluation questionnaire were qualitatively analysed to gain more insight into the experiences of children and parents. Results of the KIDSCREEN showed a significant increase in the children's quality of life after 3 surfing lessons for the Total score, as well as subscale scores for Psychological well-being, Social support & peers and School. A trend towards significance was found for the subscale Autonomy & parent relation. Qualitative analysis of evaluation data showed consistent positive experiences by children as well as parents. According to parents, surfing improved the child's mood, self-confidence, self-esteem and social-emotional functioning. They saw their child enjoy the lessons, conquering their fears, feeling safe and free. According to many parents, effects transferred into their child's daily life. Surfing in a safe, structured and positive environment holds promise to improve the quality of life for children with developmental difficulties. Findings provide valuable insights into the scope of these effects and possible working mechanisms underlying the effects.

Introduction

The prevalence of childhood disorders and disabilities is high. Overall prevalence rates for developmental disorders or difficulties have been estimated to range between 7% and 20% worldwide (Boyle et al., 2011; Houtrow, Larson, Olson, Newacheck, & Halfon, 2014; Kieling et al., 2011) and appear to be increasing over time (Houtrow et al., 2014). Children with developmental difficulties often experience a wide range of challenges, not only as a direct result of the symptoms of their disorder or disability, but also secondary difficulties resulting from disadvantages and barriers they experience in daily life. Often described difficulties include lower self-esteem, poor social and emotional functioning, and lower overall quality of life (Harpin, Mazzone, Raynaud, Kahle, & Hodgkins, 2016; Sawyer et al., 2002; van Gameren-Oosterom et al., 2011; van Heijst & Geurts, 2015).

Physical exercise is known to be highly beneficial for children, not only for their physical health (Janssen & LeBlanc, 2010) but also for their cognitive and psychological well-being (Biddle & Asare, 2011; Spruit, 2017). Despite the known benefits, the majority of children and adolescents is insufficiently physically active (Colley et al.,

2011; Griffiths et al., 2013; Hallal et al., 2012) and activity levels are even lower for children with developmental difficulties or disabilities (Levinson & Reid, 1991; Rimmer & Rowland, 2008). Although a variety of (adapted) sports programmes is available, the options for youths with special needs are typically more restricted and parents and children often experience barriers to participate due to various reasons. Often-reported barriers include the child's physical or social limitations, high costs, unsafe environments or fear, lack of programmes with adequate facilities and a lack of staff or volunteers that are trained for - or experienced with - working with children with disabilities (King et al., 2003; Murphy & Carbone, 2008; Shields, Synnot, & Barr, 2012). Due to such barriers, children with developmental difficulties often do not participate in (adapted) sports programmes or are limited to individual sports due to cognitive or social limitations that prevent them from playing in a team. Thereby, they are missing out on the positive effects of social interactions on mental health (Umberson & Karas Montez, 2010) and the development of relationships with peers that are developed during sports programmes.

Surfing is up- and- coming as a sport that can positively influence mental health. Programmes that use surfing to improve psychological well-being (*surf therapy* programmes) are quickly gaining popularity and publicity. While surfing can be beneficial to children and adults like any other type of physical activity, it is different from other sports in several ways: it is practiced outside in a natural environment, the athlete is dependent on uncontrollable factors such as waves, wind and the tide, it is perceived as a risky sport and it is often perceived by children as 'cool' and adventurous. Importantly, recent research indicates that doing sports in a natural environment may yield greater psychological benefits compared to doing sports indoors, including a greater reduction of stress, tension and depression (Thompson Coon et al., 2011), increased energy (Thompson Coon et al., 2011) and increased feelings of well-being and vitality (Griffiths et al., 2013; Ryan et al., 2010). There is a growing body of literature describing the positive effects of activities or interventions in a 'blue space' setting (a natural water setting; Völker & Kistemann, 2011). A recent systematic review reported overall improvement among a wide variety of blue space interventions. Most often reported effects included self-esteem, self-confidence, resilience and psychological indicators such as stress and mood (Britton, Kindermann, Domegan, & Carlin, 2018). This suggests that water sports such as surfing may be especially suitable for stimulating psychological well-being in those who struggle with mental health problems or developmental difficulties. At the same time surfing is perceived as a risky or extreme sport and is therefore typically not available for individuals, especially children, with special needs. Children with developmental difficulties are often excluded from regular surfing lessons due to safety issues (e.g. due to limited self-reliance or physical limitations) and the lack of professional guidance (e.g., instructions are not appropriate for all cognitive levels). Moreover, groups are often quite big which can lead to distraction, difficulties with information processing, and social difficulties for children with developmental problems or disability. Adapted surfing programmes may offer unique opportunities for these children to increase their psychosocial well-being by doing a risky sport in a natural setting.

The number of adapted surfing programmes around the world is quickly rising, and an international network has been created to exchange experiences and expertise (International Surf Therapy Organisation; www.intlsurftherapy.org). Programmes are

offered to a wide range of populations, and preliminary evaluations and research into such programmes show beneficial effects of surfing on a variety of outcome measures. For example, surf programmes for war veterans, often struggling with post-traumatic stress disorder (PTSD), have been reported to be able to reduce symptoms of PTSD, depression and anxiety (Caddick, Smith, & Phoenix, 2015; Rogers, Mallinson, & Peppers, 2014; Walter et al., 2019). A large UK-based surf programme for children facing mental health issues or social isolation reported increases in general well-being in a sample of 84 children, which were sustained over time (Godfrey, Devine-Wright, & Taylor, 2015). Other programmes for children are generally described as surf or summer camps, during which the children receive surfing lessons combined with other activities or lessons. For example, a 2-day surf camp combined with a social skills curriculum in the USA showed improved assertion, responsibility and engagement in 11 children with autism (Cavanaugh & Rademacher, 2014). Parents of 15 children with a wide range of disabilities, who evaluated an 8-week USA-based summer camp programme that included surfing twice a week, reported a positive physical, social and behavioural impact on their children (Moore, Clapham, & Deeney, 2018). Another study investigated the effects of a surf camp with 8 surfing sessions on institutionalized youths in Portugal (N=48) and showed improvement in behavioural problems as well as improved skills such as perseverance, social competencies and social-emotional functioning (Matos, Santos, Fauvelet, Marta, & Evangelista, 2017).

In sum, despite the large variety between programmes and targeted populations, adapted surfing programmes appear to have great potential to improve quality of life of individuals struggling with mental health difficulties or special needs. However, most reports concern preliminary studies or evaluation reports in small samples, and systematic scientific research is still scarce. Furthermore, due to large differences between programmes and targeted populations, it is difficult to draw robust conclusions regarding the effects of surfing on individuals with a disability or disorder.

The Surf Project provides adapted surfing lessons for children and adolescents with Down syndrome, Autism spectrum disorder (ASD) or Attention-deficit-Hyperactivity disorder (ADHD) in the Netherlands. Surfing lessons are given in a safe environment with an adapted programme and professional guidance by trained volunteers. The current study aims to investigate the effects of surfing on several aspects of the quality of life of youths with Down syndrome, ASD or ADHD. Furthermore, programme evaluation and satisfaction are systematically evaluated and described.

Methods

Programme description

The Surf Project (www.surfproject.nl) provides adapted surfing lessons in the Netherlands for children with Down syndrome, ASD and ADHD, aged 8-18. Compared to regular surfing lessons, several adaptations are made to create a safe, predictable and structured environment and to stimulate a positive experience in the participating children. The programme eliminates often-reported barriers towards adapted sports programmes such as high costs, unsafe environments, required physical or social skills, lack of adequate facilities, or a lack of experienced, trained staff or volunteers (King et al., 2003; Murphy & Carbone, 2008; Shields et al., 2012). Therefore, the Surf Project provides unique adaptive sports opportunities for children with developmental difficulties in the Netherlands.

First, the *structure of the curriculum* is adapted to facilitate a safe and structured experience for the children. Children surf in small teams, which allows them to benefit from the social environment of a team while they surf individually and therefore do not have to play together to win. Teams typically consist of 4 participants (maximum of 6), assisted by 4 personal mentors (volunteers), 2 additional volunteers, and 1 surfing instructor. Teams have their own colour, reflected in their shirts and the beach flag where they assemble. Surfing lessons have a fixed structure: changing, assembly, warming up, feeling the water, surf instruction, surfing lying down, surfing standing up, assembly, drinks, changing, cleaning up. The sequence is presented at the beginning of each lesson, using a surfboard with wooden pictograms, each representing a specific part of the surf lesson. Personal mentors assist the children in the water with catching waves, while the additional volunteers catch the children after they have ridden a wave with positive feedback and high fives. Photographers (also volunteers) capture everything on camera, and photos are made available through the website. All volunteers are 18 years or older, and are required to hand in a certificate of good conduct (issued by the Dutch government) before attending. In 2018, the average age of the volunteers was 34 years (ranging from 18 to 68), with 65% being female and 35% male. Although volunteers are not required to have experience with surfing or children with developmental difficulties, many of them do.

Second, protocolled *preparation* is of the utmost importance for children with special needs. The Surf Project schedules an intake with each participant and their parents one to two months before the start of the programme. The goal of the intake is two-fold: to gather the child and parents with the Surf Project, and to gather relevant information about the child. To familiarize the family with the project, the intake is held at the beach at the same location as the surfing lessons. The programme is explained to the children with the use of a photo book with pictograms. Information is gathered about the child's difficulties, preferences, hobbies and goals, all of which is later written up in a 'child description' for their mentor. Before the lessons start, the participants will receive the name and a photo of their mentor. At the start of the lessons, before the children arrive, their wetsuits are placed in the changing room accompanied by the children's photo and name.

Third, a *personalized approach* is a crucial theme. Each child's personal mentor will supervise and help them during the surfing lessons. Children and their mentors are carefully matched, based on factors such as personality, experience with special needs, and experience with surfing. Mentors are required to attend at least 3 lessons in a row, to give the children the chance to become familiar and feel safe with their mentor. Volunteers are required to attend a one-day training programme, run by the Surf Project, before participation. The training programme includes information about the programme, children with special needs, tasks and responsibilities of volunteers, and a practical session in the water during which they are taught how to assist the children with surfing. Before the surfing lessons start volunteers receive a description of each child in their team to facilitate easy acquaintance and to inform them on how to handle difficult situations with each specific child. Volunteers are instructed to adapt the pacing and level of instructions and activities to the child's individual needs, to ensure a successful experience. For example, catching a wave lying down on the board is celebrated the same way as making turns on an unbroken wave.

The Surf Project runs at four locations along the Dutch coastline. The duration of each surfing lesson is typically 2 hours. Parents pay a small fee for the lessons to secure commitment, but the fee is kept low to avoid financial barriers to participate. Two types of lessons are distinguished: The *Surf Academy* provides three surfing lessons in three consecutive weekends for children who are new to the Surf Project. These lessons end with a 'finals day', during which they receive a surfing diploma and medal, and their surfing skills are celebrated during a BBQ with all children, parents and volunteers. This celebration is crucial for the overall feeling of success. Children who would like to continue surfing can subsequently subscribe to the *Surf Club*, providing 3-6 additional surfing lessons throughout the season. Children can keep participating in the Surf Club until the age of 18, and each Surf Club season is also concluded with a finals day with a small BBQ. By continuously collecting feedback from parents and volunteers through evaluation questionnaires, the programme structure and content is further developed and improved each year.

The Surf Project is a non-profit organisation, which is run by volunteers and funded by grants, donations and sponsorships.

Participants

Participants of this study are children who participated in the Surf Project (Surf Academy or Surf Club) between 2016 and 2019, on four different locations. Participants were between 8 and 18 years old, and suffered from Down Syndrome, ASD, and/or ADHD or another disorder with similar needs (mainly intellectual disability).

Materials

Two questionnaires have been used to measure the effects of the surfing programme on the children and to evaluate programme satisfaction:

KIDSCREEN. The KIDSCREEN-27 questionnaire (Ravens-Sieberer et al., 2007) is a shortened version of the KIDSCREEN-52 (Ravens-Sieberer et al., 2008) and measures quality of life in five domains: Physical well-being (exploring the level of physical activity, energy and fitness), Psychological well-being (exploring positive emotions, satisfaction with life and the absence of feelings such as loneliness or sadness), Autonomy & parent relation (exploring the quality of interaction between child and parent and feeling loved and supported by family, as well as the child's perceived level of autonomy), Social support & peers (exploring social relations with friends and peers as well as the quality of the interactions), and School (exploring the child's perception of their cognitive capacity, and feelings about school and teachers) (TKG Europe, 2006). The shortened KIDSCREEN-27 shows strong correlations with corresponding scales of the KIDSCREEN-52 ($0.63 \geq r \leq 0.96$) and can therefore also be seen as a valid measure for health-related quality of life in children and adolescents (Ravens-Sieberer et al., 2007). A study in a large European sample extensively described the psychometric properties of the KIDSCREEN-27 which were overall described as adequate to good (Ravens-Sieberer, 2006). Raw scores were calculated for each of the five domains as well as a Total score for quality of life.

Evaluation questionnaire. A customized questionnaire was developed by the Surf Project to measure programme satisfaction in participating children and their parents. Open-ended questions were focused at a) evaluating how parents and children had experienced the surfing lessons, b) the effects parents saw in their child (during lessons as well as afterwards, at home), c) their opinion on the supervision and mentoring of

volunteers, and d) space for extra feedback or comments. A categorical question was used to evaluate the desire to continue the surfing lessons ('Yes', 'No' or 'Maybe').

Procedure

From 2016 onwards, parents of all children participating in the Surf Project have received one or two questionnaires to fill out, depending on the type of programme they were enrolled in. Parents of Surf Academy surfers were asked to fill out questionnaires twice. The pre-measurement (T1) consisted of the KIDSCREEN and was filled in during intake, which was typically planned 1-2 months before surfing lessons commenced. The post-measurement (T2) consisted of the KIDSCREEN as well as the evaluation questionnaire and was filled in within two weeks after the last surfing lesson was completed. Parents Surf Club surfers only received the evaluation questionnaire at T2 in each year they participated, within two weeks after the last surfing lesson. In all cases, the questionnaires were sent out digitally. Parents received an e-mail with a link through which they could fill out the questionnaire online on their computer, tablet or smartphone. Parents participated in this study on a voluntary basis and did not receive a monetary reward for participation. Data were collected and processed in conformity to Dutch ethical and privacy guidelines and regulations.

Analyses

KIDSCREEN. Data were analysed using Repeated Measure ANOVA's for all outcome variables: The total score, as well as the five subscales (raw scores). Before analyses were run, assumptions were checked and the dataset was checked for outliers. Descriptive variables that were significantly associated with an outcome variable were added to the analysis as a covariate.

Evaluation questionnaire. To systematically evaluate data gathered from the open-ended questions from the evaluation questionnaire filled in by parents, thematic analysis was applied based on open coding of the questions.

Results

KIDSCREEN

The initial dataset consisted of 128 participants. The T2 measurement was missing for 17 participants, who were excluded from the analyses. Furthermore, data was incomplete or deemed unreliable for 27 participants, due to several reasons: if the period between the last lesson and T2 measurement was too long, if the parent had made a comment about the measurement being unreliable (e.g. because of a recent medication change with behavioural side-effects), or when the T2 measurement was filled out by a different parent than at T1. The resulting dataset contained 84 participants and contained no outliers. All outcome variables were normally distributed. Sample characteristics are summarized in Table 1.

Table 1
Sample characteristics

	N	%
Total sample	84	
Age (M, SD)	12.8	2.52
Sex		
Male	64	76%
Female	20	24%
Disability or disorder		
Down Syndrome	35	42%
ADHD	12	14%
ASD	13	16%
Other	9	11%
Mixed	15	18%
Location		
Zandvoort	53	63%
Ouddorp	10	12%

Camperduin	13	15%
Ter Heijde	8	10%
Lesson type		
Surf Academy	75	89%
Surf Club	9	11%
Month		
May	12	14%
June	45	54%
July	14	17%
Sept	13	16%
Follow-up period in days (M, SD)*	11.14	10.54

*= Time between last day of surfing and the T2 measurement.

Age was significantly associated with the Total score and Psychological well-being subscale of the KIDSCREEN. Therefore, age was added as a covariate in these analyses. Results of the repeated measures analyses showed a significant increase in the Total score as well as in the subscales Psychological well-being, Social support & peers and School, with medium to large effect sizes. A trend towards significance was found for the subscale Autonomy & parent relation. No significant pre-post differences were found for Physical well-being. Results are shown in Figure 1 and Table 2.

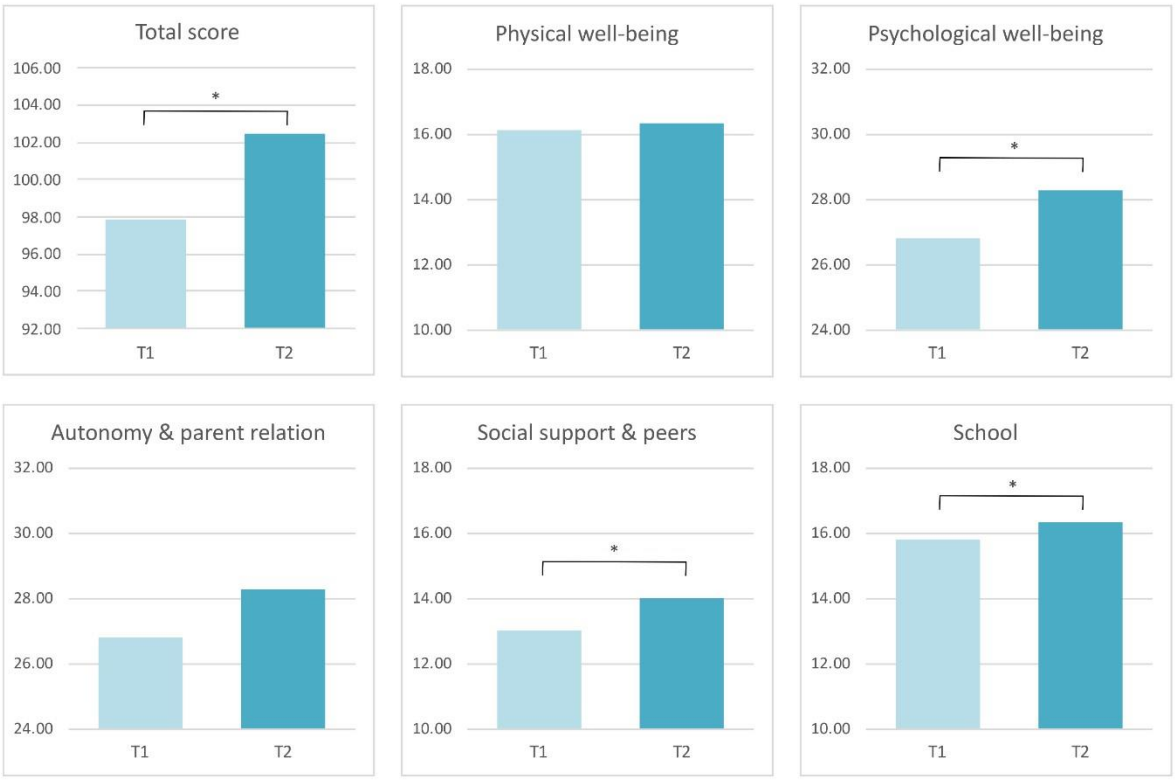

Figure 1. Mean scores on the Total score and five subscale scores of the KIDSCREEN.
* = significant difference at $p<.05$.

Table 2
Pre-post comparison on quality of life

	N	T1 (M, SD)	T2 (M, SD)	F(df)	p	η^2
Total score	84	97.89 (12.69)	102.51 (11.23)	F(1,83)=12.38	0.001	0.130
Physical well-being	84	16.11 (3.06)	16.33 (2.8)	F(1,83)=0.733	0.394	0.009
Psychological well-being	84	26.77 (4.32)	28.25 (3.44)	F(1,1)=7.58	0.007	0.085
Autonomy & parent relation	84	26.96 (4.79)	27.89 (4.17)	F(1,83)=3.364	0.070	0.039
Social support & peers	81	13.06 (3.84)	14.07 (4.06)	F(1,80)=4.31	0.041	0.051
School	61	15.67 (2.76)	16.36 (2.21)	F(1,60)=6.002	0.017	0.091

Note. Age was added included as a covariate for the Total score and the Psychological well-being subscale.

Evaluation questionnaire

A total of 149 evaluation questionnaires were available for analysis, of which 80 for Surf Academy participants and 69 for Surf Club participants. No differences were identified between the evaluations of children in the Academy versus Surf Club lessons, or between children participating in different years.

General programme experience. The *general experience* was consistently described as "awesome", "fantastic" and "beautiful". Parents greatly enjoyed seeing their child enjoying the surfing lessons and feeling free. They felt safe leaving their child with capable volunteers who adapted their approach to each individual child and its needs and capacities, and provided the children with undivided personal attention. They consistently mentioned the good organisation and programme structure and the warm, positive and enthusiastic vibe.

Parents frequently referred to positive aspects of the *design of the surfing programme*, such as the structure, the setting (beach and ocean) and the relaxed and fun atmosphere. Several parents indicated that the good relationship between their child and their child's mentor helped their child to achieve goals that contributed to positive effects of the surfing lessons.

Challenging aspects were also mentioned by a minority of parents. Several parents reported their child to be nervous beforehand, especially before their first lesson, but also reported their child overcoming their fears after - or even during - the first lesson. A few parents mentioned their child having difficulties with the cold water, putting on their wetsuit or the changing circumstances of the sea (waves, tide, wind). Despite these challenging aspects, their general experience was very positive.

> *"It was super fun and well-organised. A lot of room for the kids to be themselves and be able to succeed. There was a clear structure, and tranquillity." (Parent, 2017)*

Effects of surfing lessons. Positive effects on the children were consistently mentioned. Parents reported to see their child happy and cheerful after surfing, saw increased self-esteem and self-confidence (feeling proud or 'cool') and indicated

that their child had felt safe and that they had conquered their fears. After the surfing lessons, most children were tired, but relaxed: they appeared satisfied, peaceful and slept well. At the social-emotional level, parents often reported that their children were better able and more prone to express emotions, they felt included, got positive reactions from peers or were more inclined to engage in social behaviours or relationships. Many parents saw effects of the surfing lessons on their child's daily life (e.g., their child would push through to overcome their fears, undertake new activities and become more independent or self-reliant). Some parents mentioned that their child seemed to be free of their everyday struggles or disability during surfing, they learned something new, and found a new hobby or talent.

> *"A boost for his confidence. He is not a fast learner at school. Surfing made him realize that he can have other talents." (Parent, 2018)*

> *"At home he was less stressed, took things as they came, was focused but at the same time relaxed. Also, he started talking more, took more initiative in conversations." (Parent, 2018)*

Mentoring by volunteers. Parents' opinions about the mentoring were exclusively positive. Volunteers were consistently described as enthusiastic, kind, a good match with their child, and able to recognize what their child needed, which contributed to positive effects of the surfing lessons. Another theme that was identified was the respect and gratefulness of parents towards the volunteers, for devoting their time and energy to the project. Parents felt comfortable and safe leaving their child with the volunteer and were impressed by what they witnessed at the beach.

> *"The volunteers were open, enthusiastic and driven. They knew what the children needed. They were there for the children 100%!" (Parent, 2018)*

Continuation and general feedback. When asked whether the child desired to continue the surfing lessons, 88% answered "yes", 9% "I don't know (yet)", and 3% "no". Reasons for not continuing included the fact that their child had outgrown the Surf Project or was planning to continue in a regular surf club or individually with a parent. When asked for general feedback or tips most replies consisted of compliments, grateful messages, the desire to continue and the advice to continue the project the same way. Tips were mainly focused on the desire for more (frequent) lessons during the season and opportunities for continuation for children who outgrew the project (either because they were older than 18 or were capable of more).

Discussion

This study evaluated the effects of surfing in an adapted surfing programme for children with developmental difficulties. A positive effect of surfing was found on the quality of life of children participating in the Surf Project. Significant improvement was seen in overall quality of life as well as three specific domains: Psychological well-being, Social support and peers, and School. These findings indicate that after three surfing lessons the children were more satisfied with life and experienced more positive feelings (such as happiness) and fewer negative feelings (such as loneliness or sadness). Their social

relations were stronger and they felt more supported by their peers. They had a more positive perception of their own cognitive abilities, learning and concentration, and they had more positive feelings about school and their teachers. A trend towards significance for the domain Autonomy & parent relation suggests that children may feel more autonomous and more supported by their family. No improvement in Physical well-being was found. This may be due to the fact that three surfing lessons could be insufficient to cause changes in overall physical well-being. Future research could provide more insight whether more surfing sessions can in fact improve physically well-being in children with developmental difficulties. Qualitative analysis of evaluation questionnaires highlighted positive effects on mood, self-confidence, self-esteem and social-emotional functioning. Effects often transferred to the children's daily life where they appeared to be more prone to take on new activities or tasks, more engaged in social interactions, and better able to overcome insecurities or fears. These findings give more in-depth insight into the beneficial effects of surfing.

Although systematic research into adapted surfing programmes is scarce, findings are consistent with previous studies and evaluation reports, which show improvement in general well-being and mental health problems in children and adults with a variety of mental health difficulties (Caddick et al., 2015; Cavanaugh & Rademacher, 2014; Godfrey et al., 2015; Matos et al., 2017; Moore et al., 2018; Rogers et al., 2014; Walter et al., 2019). An important difference with previous studies is that many studies evaluated a six- or eight-week therapeutic programme that included surfing lessons (e.g., Moore et al., 2018; Walter et al., 2019). In contrast, the current study shows that a programme without explicit therapeutic elements can produce similar beneficial effects on the children's development and psychosocial well-being. Moreover, current findings show that a series of three surfing lessons is already sufficient to reach such effects.

In interpreting these findings, it is important to note that the Surf Project provides surfing lessons under specific conditions, including thorough preparation, a strongly personalised approach, and several adaptations to facilitate a safe and positive experience. It is likely that such programme elements play an important role in the positive effects. Although this study was not intended to investigate working mechanisms underlying the beneficial effects of surfing, important insights were gained from the evaluation questionnaires that give rise to several hypotheses.

For example, several factors appear to contribute to the warm, personal and positive atmosphere: Volunteers are explicitly trained to adopt an individual approach, focus on possibilities instead of limitations and receive information about each child, in order to be able to adapt their communication and expectations to each child's capacities and needs. This presumably contributes to the children feeling safe, seen, appreciated and empowered, which is an important basis for a child to be able to learn and grow. The fact that the project works with volunteers who dedicate their time and energy to help others is likely to contribute to the enthusiastic and positive vibe. The fixed structure, pictograms and thorough preparation ensure that possible stressors, such as uncertainties or last-minute changes, are minimized. All these factors contribute to a stable, safe and positive environment in which the children can optimally enjoy themselves, grow and achieve new goals.

"The volunteers were amazing. So well attuned, the mentors follow the children.

Therefore the children experience no limitation." (Parent, 2018)

Another theme that stands out is the growth in self-esteem, self-confidence and autonomy that is consistently found in this group of children. There are several factors that are likely to contribute to these effects. During the lesson, children and parents are physically separated from each other by the coastline which forces the children to trust new people and learn and grow without their parents on their side. Parents frequently reported their child to be nervous beforehand, but overcoming their fears during the first lesson. Both these factors are likely to contribute to increases in self-confidence and autonomy. The fact that the children can participate in a sport with a cool and adventurous image, combined with the Surf Project's warm, personal atmosphere in which any achievement is celebrated as a success, is presumably a strong contributor to the increase in self-esteem.

"She was excited and a little nervous. Had to get used to something new. But was very proud when she progressed and succeeded." (Parent, 2018)

Progress and growth in social-emotional functioning may be explained by the fact that children surfed individually, but were still part of a team. Therefore, possible social-emotional or cognitive limitations were not a hindrance to be part of a team and to build on social relationships, which is a unique combination in adapted sports. Teams consisted of children with different disorders, allowing them to learn from each other, and gain respect for each other. The undivided positive attention from their mentors made them feel appreciated and important, which may have had an indirect effect by giving the children the confidence to engage in social interactions with their peers. Furthermore, children were able to show photos to their family and classmates, further stimulating their social relations without having to rely on their language skills to tell their story.

Effects often seemed to transfer into the children's daily lives. It is likely that improvement in mood, self-esteem, self-confidence, and social-emotional functioning stimulates the children to take on new challenges in daily life. Additionally, positive effects on the parents were also reported: they had felt safe to leave their child with the volunteers and felt grateful, cheerful, and were impressed. They were touched by the fact that their child was welcomed in such a positive way, which is something they do not often experience. It is highly possible that the positive effects on children and their parents reinforced each other, especially after the surfing programme had ended. Parents frequently reported looking back at the photos together with their child or making large-scale prints to put in their room, which may have stimulated the formation and recollection of positive memories. Some parents mentioned that they actively reminded their child to the lessons they had learned during surfing, encouraging their child to overcome their fears or insecurities in daily life the same way they did during surfing. Such factors are likely to play an important role in the transfer to - or reinforcement of - positive effects in daily life.

Several strengths and limitations of this study are important to consider. Strengths of this study include the use of quantitative methods with a validated questionnaire, supplemented with qualitative analyses from evaluation questionnaires, to gain more in-depth insight into the effects of surfing. The fact that the data was collected in a relatively large sample of children with a variety of developmental difficulties, over multiple years and locations, contributes to the robustness and generalizability of findings. However, given

that the study lacked a control condition, it cannot be ruled out that other factors may have caused, or at least contributed to, the effects. The fact that the evaluation questionnaire was administered by the Surf Project may have created a bias towards positive responses by parents, although the questionnaire also explicitly asked parents to fill in suggestions for improving the programme. Other possible limitations include the use of a parent-rated questionnaire (in contrast to self-report), and the lack of a long-term follow-up prevents us from drawing conclusions about long-term effects.

Results discussed in this article give rise to several suggestions for further improving the programme. For example, parents consistently expressed a desire for more (frequent) surfing lessons. Therefore, the Surf Project will focus on creating more (frequent) lessons and look into surf-related activities during the winter. By reminding the children of surfing and its effects during winter time, it may be possible to lower the chance of positive effects tapering off during the winter when the children cannot surf. The Surf Project will also create possibilities for participants to continue the programme after they turn 19 years of age.

Current results also give rise to several suggestions for future research. Gaining insight into the experiences or feelings of children with developmental difficulties remains a challenge, because self-report questionnaires or interviews are not always feasible. Future studies could look into more individualised and qualitative ways of evaluating the child's experience, for example using pictograms or creative art-based methods (e.g., Crivello, Camfield, & Woodhead, 2009; Gillies & Robinson, 2012). Another important topic is investigating short-term versus long-term effects, to distinguish whether surfing mainly elicits short-term effects or effects remain stable after a longer period without surfing (e.g. during winter). Future studies could also provide more insight into the effective elements of surfing or surf therapy programmes. Pooling research from different programmes will provide insight whether the effective elements and effects are universal, or may (partly) differ between programmes, countries or populations.

In conclusion, surfing in an adapted environment is a promising tool to boost the quality of life of children with Down syndrome, ADHD or ASD particularly in the areas of psychological well-being, social support and peers, and the school environment. Parents consistently report seeing their child happier and more relaxed after surfing and with improved self-confidence, self-esteem and social-emotional functioning. According to many parents, effects transferred into their child's daily life in which they were more prone to undertake new activities, overcome their insecurities, and become more independent and self-reliant. Several hypothesis are discussed that may underlie these positive effects which provide important avenues for further research. Given the promising results, it is important to continue research to gain more in-depth insight into the underlying working mechanisms and to investigate possibilities for structural funding of the project.

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