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# The outcomes of a vocational rehabilitation and mentorship program in unemployed young adults with acquired brain injury

Frederike van Markus-Doornbosch<sup>a,\*</sup>, Jorit J. Meesters<sup>a,b,c</sup>, Gerard Volker<sup>a</sup>, Wil A. Ijzereef<sup>b</sup>, Wilbert B. van den Hout<sup>d</sup>, Thea P. Vliet Vlieland<sup>a,c</sup> and Arend J. de Kloet<sup>a</sup>

<sup>a</sup>*Department of Innovation, Quality and Research, Basalt Rehabilitation, The Hague, The Netherlands*

<sup>b</sup>*Faculty of Health, Nutrition and Sports, The Hague University of Applied Sciences, The Hague, The Netherlands*

<sup>c</sup>*Department of Orthopaedics, Rehabilitation and Physical Therapy, Leiden University Medical Center, Leiden, The Netherlands*

<sup>d</sup>*Department of Biomedical Data Sciences – Medical Decision Making, Leiden University Medical Center, Leiden, The Netherlands*

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## Abstract.

**BACKGROUND:** Persons with disabilities are at risk for unemployment with negative long-term consequences.

**OBJECTIVE:** This study aimed to explore the process and outcomes of a novel vocational rehabilitation (VR) program based on the concept of mentorship.

**METHODS:** Observational, retrospective study including unemployed young adults with acquired brain injury (ABI) taking part in a VR program including assessment, training, individual counselling and mentor support from volunteering professionals. Adherence to the program and work status were registered and at follow-up all patients were invited to complete a general questionnaire and EuroQol 5D.

**RESULTS:** 49 patients started the program, with 41 completing the follow-up. Median age was 31 years and 19 were male. Median duration of the program was 8 months. At follow-up, 9 patients had acquired paid employment, 7 with the support of a mentor; 6 of whom were bothered by health problems at work. Nine patients left the program prematurely, with insufficient financial support for continuation being the primary reason for withdrawal ( $n=6$ ).

**CONCLUSIONS:** A VR program including a mentor may be a promising program for patients who are unemployed at onset of ABI. Lack of financial support to complete the program and concurrent health problems were found to hamper the process and outcomes of the program, respectively.

Keywords: VR program, rehabilitation, traumatic brain injury, young adults, coaching, quality of life, vocational rehabilitation, counselling, school to work transition

## 1. Introduction

Acquired brain injury (ABI) is a common condition, including both traumatic brain injury (TBI) and non-traumatic brain injury (NTBI) such as stroke, meningitis, encephalitis or anoxia. The consequences of ABI are considerable for many patients, and may include, apart from physical, cognitive, and

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\*Address for correspondence: Dr. F. van Markus-Doornbosch, Department of Innovation, Quality and Research, Basalt Rehabilitation, The Hague, The Netherlands. E-mail: f.vanmarkus@basaltrevalidatie.nl.

emotional impairments, also restrictions in societal participation such as employment [1]. A survey study in the USA found that 32% of people with disabilities were employed, versus 81% of people without disabilities. No specific data were reported regarding youth and young adults with ABI [2]. Successful transition to employment is a critical component to establishing independence for individuals with disabilities [3].

Those returning to work after brain injury have been the focus of many studies while little attention has been paid to those unemployed at the time of injury. Although the rates vary per condition, for many working patients, returning to work after ABI is difficult [1] with return to work (RTW) reported success percentages between 30 and 65%, without substantial differences between a traumatic or non-traumatic cause of ABI [4]. The large variety in RTW percentages was probably due to different definitions of RTW, variation in severity of injury and time since onset of ABI.

Although there are studies on disability-causing diseases and return-to-work factors among adults [5], young disabled starters at the beginning of their vocational career may face other external or personal barriers. The factors found for disabled employed adults may not be the same as those for disabled starters. However, there is little written about factors influencing the work participation of young disabled starters entering the labor market. One review was found on factors reported to promote or hinder work participation of young disabled people. The 10 studies included in 2009, with one regarding ABI (brain tumors), found that promoting factors were male sex, high educational level, lower age at survey, low depression scores, high dispositional optimism and high psychosocial functioning. High odds of unemployment were related to inpatient treatment during follow up, epilepsy, motor impairment, wheelchair dependency, functional limitations, co-morbidity, physical disability and chronic health conditions [6]. Furthermore, readiness to work as well as the ability to advocate disability awareness are important facilitators in acquiring work for youth with disabilities [7]. For “at risk” youth, including those with disabilities improving emotional and social competencies was found to improve chances of successful employment [8].

Strauser and colleagues developed a conceptual framework encompassing personal and environmental aspects as well as the context of brain injury (physical, cognitive, communicative and emotional

deficits) as well as participation in different domains of society to operationalize the factors and domains that may contribute to career development and labor market participation of individuals with TBI. The use of this framework will increase individual needs and uses of vocational services [9].

Vocational rehabilitation (VR) programs are instituted to enable persons with disabilities to overcome barriers in acquiring, maintaining or returning to work with a primary aim to optimize work participation [10]. Their effectiveness has been demonstrated in multiple studies of patients with ABI [5, 11–19].

A study by Tur-Sinai found that patterns of disability among Israeli residents fluctuate over time and that improvement of functioning does not improve employment or lead to employment for those not employed. He concludes his study with advice to promote rehabilitation for persons with disabilities accounting for individual personal traits, capabilities and ability to participate in paid employment [20].

The majority of the studies on VR in patients with ABI were so far aimed at patients who were working at the time of injury, with regaining employment as the main outcome measure [21] with limited evidence on interventions that specifically target vocational outcomes in adults with childhood onset neurological disabilities including ABI [22]. The literature on VR programs (mainly) including patients who were not working at the time of the injury, with attainment of employment being the main outcome measure, are limited. The expected outcomes in this patient group would probably be less favorable, as it has been demonstrated in one study that unemployment at the onset of brain injury may be a negative predictor for VR outcomes [11]. In the broad group of youth with disabilities it has been found that youth do not have the necessary job readiness skills (resume writing, interviewing skills), job competence skills [23], or advocacy to obtain employment [24]. Furthermore, if patients are not working they lack e.g. the support of the employer and colleagues, available occupational health services and a professional network.

Interventions, including receiving job placement assistance, on-the-job training, on-the-job supports, counselling/guidance, maintenance, and supported employment services that specifically target vocational outcomes in adults with childhood onset neurological disabilities including may predict successful employment outcomes [22]. Regarding the optimal composition of the intervention program, from the literature on VR in patients with ABI in general it can be concluded that tailored approach, early

intervention, work practice and training of social and work-related skills and cognitive rehabilitation have been identified as active components of interventions [11, 25, 26]. Several studies showed that the success rates of interventions for working patients with ABI significantly increase when employers are directly involved and committed [21, 27]. Indeed, a VR program for working patients with ABI provided by our own research group that specifically included the employer and a co-worker, resulted in 86% of the patients returning to work [21].

The use of mentorship in acquiring employment is a widespread concept including the provision of ongoing guidance, instruction, and encouragement to promote competences and necessary skills [28] and has been used in several patient groups of unemployed youth [24] but lacking specifically for the ABI group. Mentorship has been prominently school-based, community-based or peer-based [24] with professional-based mentorship only being used for RTW for employed individuals. As involvement of the employer cannot be accomplished in patients who were unemployed at the time of brain injury or thereafter the use of a professional mentor can provide specific support and skills not otherwise available to unemployed individuals.

Putting efforts in the attainment of paid employment in this particular population may, however, be worthwhile. From the perspective of the individual, work is important for one's overall well-being and self-esteem [6]. From the societal perspective, the achievement of financial independence of every unemployed patient implies considerable savings of costs associated with long-lasting disability pensions or unemployment benefits.

The aim of the present study was to explore the process and outcomes of a novel vocational rehabilitation program based on the concept of professional mentorship in unemployed young adults in the chronic phase of acquired brain injury. We hypothesized, based on previous literature, that an individualized program based on capacity, competencies and mentorship, would lead to employment in unemployed young adults with ABI.

## 2. Methods

### 2.1. Study design

This observational, retrospective cohort study evaluated the process and outcomes of a VR program

by means of chart review and a follow-up questionnaire. It was carried out in a rehabilitation center, i.e. Basalt Rehabilitation, The Hague, The Netherlands. The study was judged to fall outside the remit of the Medical Research Involving Human Subjects Act according to the Medical Ethical Review Board of the Leiden University Medical Center, Leiden, The Netherlands (P14.006). The study was performed in accordance with the ethical standards laid down in the 2013 World Medical Association Declaration of Helsinki amendment [29].

### 2.2. Participants

All patients were recruited at the rehabilitation center between September 2012 and February 2017 and considered eligible for the program if they: were diagnosed with ABI; aged 18–50 years; were unemployed; were motivated to attain paid employment; and had a perspective on financial support for the program from the local authority. Patients who were employed and could return to their previous work or of whom their physical, cognitive or emotional condition would prohibit the possibility to take part in the program, perform work and/or travel were excluded. Patients who were considered eligible for the program were invited to participate by their treating physiatrist to participate in the VR program. The patients were approached at time of follow-up in 2017 to fill in questionnaires.

### 2.3. Program

The novel program, called Brains4You, was developed on the basis of training employment readiness including the ability to advocate own potential and abilities, ask for accommodations, and disclose disabilities to a potential employer [24]. It was executed by a team including the following professionals: a rehabilitation physiatrist, psychologist, occupational therapist and social worker within the rehabilitation center, in cooperation with job coaches who were supervised by the office manager (an occupational therapist) of a commercial labor integration company (Weustink & Partners, The Hague, The Netherlands) and a professional mentor. The mentor was a volunteering manager ( $n = 23$ ) from the commercial or public sector, initially recruited in the social network of rehabilitation professionals involved in the study and later on by 'the word of mouth' by the mentors themselves.

The program consisted of 4 steps:

1. The physiatrist considered the eligibility of the patients for referral to the program using the abovementioned inclusion and exclusion criteria. After referral, during a comprehensive and standardized assessment at the rehabilitation center, the rehabilitation psychologist and occupational therapist identified the patient's opportunities and goals related to the attainment of work. Based on the patient's health status, education, preferences and other personal factors, a profile regarding potentially suitable work and specific requirements was composed. Specifically regarding the assessment of the consequences of ABI, a comprehensive neuropsychological assessment was done if not recently performed. For work ability, an instrument assessing the energy costs and benefits of the performance of daily tasks was used (Activiteitenweger; <https://revalidatieapps.nl/activiteitenweger.html>). On average, the duration of the complete assessment was 2–4 hours. Based on its results, if deemed necessary, rehabilitation interventions such as occupational therapy or speech-language therapy were initiated, before starting step 2.
  2. A second assessment was performed by a professional from the commercial labor integration company specialized in ABI focusing on the goals and interests of the patient and acquiring the necessary financial support for the VR program. The assessment took place at the labor integration company, with an average duration of 1 hour. Financial support was obtained from the agreed legal compensation after injury or the municipal or national disability pension bodies, where appropriate.
  3. A vocational training led by a job coach (individual or group, depending on capacities) was instituted, tailored to the patient's individual needs. The job coach was an ABI-trained professional from the labor integration company. Empowerment, social skills and application training were the key topics, with the number of sessions being flexible. The vocational training was not offered to patients considered to have adequate competencies to acquire employment, as judged by the assessing professional in step 2. The maximum number of patients in a training group was 6, the maximum number of sessions was 8, and all sessions took place at the labor integration company office.
  4. After the (group) training sessions, the patients were offered the services of a mentor. If the support of a mentor was not deemed necessary by the job coach (e.g. suitable employment was already available), the service was not offered. Mentors were professionals working in the region, having a managerial position and with a strong professional network in the creative, commercial, healthcare or education sector. They were recruited by the project coordinators and their professional network contacts. The director of the labor integration company screened and selected the potential mentors on vision, motivation and competence to promote inclusivity and all had a strong professional network. The mentors themselves determined their approach (agenda, steps, knowledge) in getting to know a candidate, their wishes and possibilities and developed an action plan for a maximal duration of 6 months. The expected additional value in the trajectory was a manager's business and result orientated approach, as well as role modelling coupled with the mentors ability to mobilize their network and advocate for disability awareness for employers regarding accommodation of people with disabilities and the added potential they offer in the workplace.
- An introductory meeting with all of the mentors with the director of the labor integration company took place, and subsequently patients were matched with a mentor; each individual mentor was matched with only one patient. Mentor tasks included judging and enhancing the readiness for work, e.g. by giving individual coaching with respect to the demands of paid employment (e.g. appearance and attitude, conduct of a job interview, promptness). They could offer internships in their own companies. Mentors acted as mediators between the patient and potential employers within their own professional networks.
- If the patients acquired paid employment, further individual job coaching was provided by the labor integration company. The length of the follow-up in the program, either or not including individual coaching on the job, was dependent on the amount of financial support acquired and the patient's needs, up to a maximum of 12 months. All patients were contacted at least once by the job coach after start at work. Job coaching at the workplace included exploring and implementing adaptations such as an adapted workspace, rest moments and adjusted work hours. In exceptional cases, where patients had recently taken

part in the assessment (step 1) or in a program similar to the vocational training (step 3), or were judged to likely have adequate competences to enter the workforce (step 3), elements of the program could be omitted.

In the Netherlands, labor integration trajectories are paid by the UWV (Employee Insurance Agency), the employer, the municipality, or through legal personal injury trajectories. The UWV is an autonomous administrative authority, commissioned by the Ministry of Social Affairs and Employment (SZW) to implement employee insurances and provide labor market and data services. The Dutch employee insurances are provided for via laws such as the WIA (Work and Income according to Labor Capacity Act). The available budget for a trajectory varies, ranging from approximately €1875–3000 for UWV trajectories to approximately €3500–10.000 for legal personal injury trajectories.

#### 2.4. Assessments

Patient sociodemographic and disease characteristics were extracted from the medical records by the treating physiatrist and from the records of the VR program by one of the researchers (AJK). A set of questionnaires for follow-up was administered personally during a group meeting in June 2017 or sent by mail that same month.

##### 2.4.1. Sociodemographic and disease characteristics

Sociodemographic and injury characteristics were extracted from the medical records. Sociodemographic characteristics included: age (years); sex; educational level (categorized into: primary school/occupational training; high school/professional training; or higher education/university); time since start of VR (months), and having past paid employment (yes/no). Disease characteristics comprised of: ABI characteristics (traumatic/non-traumatic) and time since injury. In addition, time since onset of ABI at start of VR (months) was recorded.

##### 2.4.2. Adherence with the VR program

The patient's participation in all activities related to the VR program was recorded: initial assessments (yes/no); vocational training (yes/no, number of session(s) < 4 or 4–8); contact with job coach (yes/no) and duration of program (in months); contacts with mentor (yes/no) and number of contacts with mentor < 4, 4–8 or > 8, and, if employment was acquired, fol-

low up support of the job coach in 4–6 appointments during 12 months after starting work. Patients were considered to be completers of the VR program if they had participated until they acquired paid or non-paid employment or (re)started education. If patients left the program prematurely, the reason was registered (lack of energy; lack of motivation or satisfaction; financial support for the program rejected; or switch to another labor integration organization).

##### 2.4.3. Work status, costs and quality of life

The program was classified as successful if the patient obtained gainful employment. The patient's work status was recorded at follow-up by means of a number of questions on work status (having (un)paid employment, yes/no), absence from work in the past month, and health problems encountered while at work in the past month.

Productivity was valued at €35 per fully productive hour, in accordance with the Dutch guidelines for economic evaluations in healthcare [30]. The verbal questions on absenteeism were converted to 0%, 50% and 100% absenteeism (for no, up to one month, and more than one month absenteeism, respectively). The verbal questions on bother at work were converted to 0%, 25% and 50% bother (for not at all, slightly, and very much bothered, respectively). The productivity value per month was calculated for each patient as €35 times the working hours per month, decreased by the percentages absenteeism and bother at work.

Valuation of patients' quality of life was measured using the EuroQol 5-Dimensions 5-Levels (EQ-5D-5L), comprising five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression [31, 32]. Each dimension has 5 levels: no problems, slight problems, moderate problems, severe problems and extreme problems. The 5 dimensions together describe the respondent's health status, and can be converted into a single valuation index anchored at 1 (perfect health) and 0 (as bad as dead), specifically for The Netherlands [33]. As the usual activities domain includes having employment, we also assessed the EQ-5D-5L index with the usual activities domain excluded (by setting the level to no problems for everyone).

##### 2.4.4. Analysis

All statistical analyses were performed using SPSS 22.0 software package [34]. Descriptive statistics were used for both categorical (numbers and percentages) and continuous data (median, range). The

Table 1  
 Characteristics of patients who were unemployed at the time of acquired brain injury (ABI) taking part in a vocational rehabilitation program

	Total, n = 41	Employed after program, n = 9	Not employed after program, n = 32	p-value
Age, years; Median (range)	31 (20–49)	32 (27–35)	30 (24–38)	0.94 <sup>MW</sup>
Age, categories; No. (%)				
18–25 years	11 (27%)	1 (11%)	10 (31%)	
26–35 years	16 (39%)	7 (78%)	9 (28%)	
36–50 years	14 (34%)	1 (11%)	13 (41%)	
Sex, male; No (%)	19 (46%)	3 (33%)	16 (50%)	0.47 <sup>F</sup>
Highest educational level; No. (%)				
Primary School/Occupational training	8 (20%)	0	8 (25%)	0.21 <sup>MW</sup>
High School/Professional training	23 (56%)	6 (67%)	17 (53%)	
Higher education /University	10 (24%)	3 (33%)	7 (22%)	
Type of injury; No. (%)				
Traumatic (TBI)	21 (51%)	4 (44%)	17 (53%)	0.72 <sup>F</sup>
Non-Traumatic (NTBI)	20 (49%)	5 (56%)	15 (47%)	
Time since onset of injury; No (%)				1.00 <sup>F</sup>
<24 months	1 (2%)	0	1 (3%)	
≥24 months	40 (98%)	9 (100%)	21 (97%)	
Previously having paid employment; No. (%)	19 (46%)	4 (44%)	15 (47%)	1.00 <sup>F</sup>
Time since start vocational program; No. (%)				
6–18 months	6 (15%)			
18–42 months	23 (56%)			
42–58 months	12 (29%)			
EuroQol EQ-5D-5L; Median (range)	0.73 (0.65–0.79)	0.84 (0.79–0.90)	0.69 (0.61–0.77)	0.01 <sup>B</sup>

Statistics performed between the group employed after the program and those not employed with the Mann-Whitney *U* test (MW); Fischer's Exact Test (F) or Bootstrapping (B).  $P < 0.05$  is considered significant.

characteristics of patients who had paid employment and patients who had not acquired paid employment at the time of follow-up (sex, age, educational level, type of ABI, time since onset of ABI, and having or not having previous paid employment) were compared using Bootstrap statistics, Mann-Whitney *U* tests or Fisher's Exact tests, where appropriate.

### 3. Results

#### 3.1. Participants

Between 2012 and 2017, 49 patients were considered eligible by their treating rehabilitation specialist, referred to the VR program and able to take part in the program after financial resources were acquired. Of these patients, 41 (84%) took part in the follow-up in 2017 and were included in the present analysis. At the follow-up evaluation, the time since the start of the program ranged from 6 to 58 months.

The characteristics of the patients are shown in Table 1. Median age was 31 years (range 20–49 years), 46% were male, and 80% had a medium or high educational level. Fifty-one percent of the patients had a TBI, with time since onset being more

than two years in all but one patient. Nearly half of the patients had previously had paid employment.

#### 3.2. Comparison of patients who did and who did not acquire paid employment

The 9 patients who had acquired paid employment did not differ from the 32 patients who did not acquire paid employment regarding sex, age, educational level, type of ABI, time since ABI and or whether or not they previously had paid employment (Table 1). However, at follow-up, the EQ-5D-5L index score of those with paid employment was significantly higher than for patients without paid employment (0.84 versus 0.69,  $p = 0.01$ ). The difference remained statistically significant when the usual activities domain was excluded from the EQ-5D-5L (0.88 versus 0.76,  $p = 0.02$ ).

#### 3.3. Participation in the components of the VR program

Table 2 describes the participation in the various components of the VR program. After the initial assessments, two-thirds of the patients took part in the training sessions, whereas 23 (56%) patients used

Table 2  
Use of the various components of a vocational rehabilitation program in 41 patients who were unemployed at time of acquired brain injury (ABI)

Duration of participation in the program, months; Median (range)					8 (5-12)
Number of patients still in the program at follow-up, No. (%)					4 (10%)
<i>Participation in the different program phases, No. (%)</i>					
Step 1 Work related assessment	Step 2 Assessment labor integration company	Step 3 Training sessions with job coach	Step 4 Services of a mentor	Individual coaching on the job	
37 (90%)	41 (100%)	31 (76%)	23 (56%)	19 (46%)	
		Number of sessions		Number of contacts	
		< 4	15 (48%)	< 4	7 (30%)
		4-8	16 (52%)	4-8	4 (17%)
				> 8	12 (52%)

the services of a mentor (in total 23 different mentors were involved between 2012 and 2017). The duration of a manager's involvement varied from 2 to 5 months, with 4 to 20 contacts during that period. One manager offered the candidate an internship. In one case a manager asked to be replaced due to a mismatch with the candidate. In total 9 (22%) patients ended their participation in the program prematurely, because financial support for the program ceased ( $n = 6$ ), the patient did not have enough energy ( $n = 1$ ) or other reasons ( $n = 2$ ). Four patients were still in the program at the time of follow-up.

### 3.4. Work status at follow-up and costs

Table 3 shows the work status of the 9 patients (22% of the total group; 24% if the 4 patients who were still in the program were not taken into account) who had acquired paid employment. The other 32 patients designated their main occupation as follows: not able to work ( $n = 17$ ; 41%), student ( $n = 3$ ; 7%), unpaid work ( $n = 10$ , 27%) and other ( $n = 2$ ; 5%). Of the 32 patients who did not have paid employment, 10 designated their usual activities as satisfying.

Seven out of the 9 patients (78%) who acquired a job used a mentor during the program, while 2 patients did not need the services of a mentor due to past work experience. Sixteen of the 32 (50%) patients not acquiring work did not have a mentor. As shown in Table 3, of the 9 patients with paid employment, 3 had work for 8–16 hours, 3 for 17–24 hours and 3 for more than 25 hours per week. In the month preceding the evaluation, six of the working patients had been absent from work or were bothered at work by health problems. Three patients reported cognitive problems with concentration and/or working at

Table 3  
Work status of patients ( $n = 9$ ) with acquired brain injury (ABI) with paid employment after participation in a vocational rehabilitation program

Number of working hours per week; No. of patients	
8-16	3
17-24	3
25-32	3
Absence from work due to health problems in past month; No. of patients	6
Absence from work for longer than 1 month; No. of patients	2
Bothered by health problems in the past month; No. of patients	
No, not at all	3
Yes, slightly	5
Yes, very much	1
Type of health problems often or always bothering work in the past month; No. of patients reporting symptom*	
Concentration problems	4
Work at a slower pace	5
Work in seclusion	3
Difficulty making decisions	1
Postpone work	1
Others having to take over work	1
Other	0

\*Patients were able to report more than 1 health problem.

a slower pace. These problems were addressed in the on-the-job coaching, if applicable, yet the contents of the on-the-job coaching or number of sessions were not recorded.

With the observed weekly working hours, absenteeism and bother by health problems in our study (averages 24 hours, 44%, and 22%, respectively), the productivity value for our patients with paid employment was about €2000 per month. In the general Dutch population, the productivity value is about €6000 per month.

Costs for vocational rehabilitation programs in the Netherlands are typically around €5000 per tra-

jectory including the job coach [35], so the total program costs for all 41 patients in our study are about €205,000. As 9 patients found paid employment, these costs come down to €23,000 per patient that successfully finds paid employment. Thus, for a productivity value of €2000 per month, the intervention costs are more than recovered if patients that find employment on average maintain their employment for at least a year.

#### 4. Discussion

A vocational rehabilitation program including a mentor from the professional community proved to be a promising program for patients with ABI who were not gainfully employed at the time of injury. The majority of patients completed the program, with a success rate of 22% in paid employment. Ensuring sufficient financial support to complete the program is necessary, as this was the main reason for premature termination of the program. In addition, if paid employment was acquired, health problems hindering work ability were relatively common among working patients, constituting a risk of permanent work disability.

The success rate in finding new employment after ABI is relatively low in comparison with overall return to work (RTW) rates after vocational rehabilitation programs in patients with ABI of 41–80% [5, 16–19]. However, given the fact that not having paid employment at the time of ABI is a risk factor for acquiring employment after injury [9], the results observed in the present study with 22% acquiring employment we consider favorable. In a study by Kotalowsky [3] 54% of community-mentor relationships were considered successful (31% of individuals gained employment) supporting our results where the majority of patients finding employment had a mentor.

Because the study population concerned relatively young people who could potentially benefit from the intervention for many years the long-term effects of the intervention can be considerable. Unfortunately, we could not observe how long our patients actually maintained their employment. Costs for vocational rehabilitation programs in the Netherlands are typically around €5000 per trajectory, which would be more than recovered if patients are able to maintain their employment for at least a year, what we consider to be a plausible period of employment for this

group.

Factors related to work participation have been studied in unemployed individuals [6, 22] as well as those returning to work after ABI [1, 9]. In our study there were no significant differences in patient characteristics for those employed versus not employed. Male sex has been found to be a promoting factor in youth with a disability [6] but not those returning to work after ABI [1]. In unemployed youth as well as those returning to work higher education level was found to promote employment [4, 6], while in our study this was not the case. Other factors related to employment include depression, anxiety, severity of TBI, localisation of NTBI, physical disabilities and chronic health conditions as well as depression and anxiety [1, 6]. Although the EQ-5D-5L includes domains on these factors, specific scales and validated questionnaires should be used to explore these factors in future research.

Lack of significant differences in characteristics between the groups with and without success in our study prevents us from making assumptions about determinants of success or risk factors. Previous paid employment before ABI did not appear to increase the chance of acquiring paid employment, but it must be noted that our sample size was very small. It remains to be established whether the observed significantly better EQ-5D-5L health index in the 9 persons with paid employment as compared to the unemployed patients is a result or a cause of acquired work and/or is influenced by other factors such as a better EQ-5D-5L score before the start of the intervention.

Six out of the 9 patients who acquired paid employment indicated that they had been absent from work due to health problems in the past month, and/or were bothered by health problems. They experienced deficits in speed of information processing, not being able to cope with work demands and a lack of understanding and support of employer and/or colleagues as major obstacle, in line with Dutch RTW studies in adults after ABI: in 96% working tasks were adjusted [21], condition-related factors like fatigue, and external factors such as sensory overload at the workplace and lack of guidance and support were present [11]. These findings give an indication that patients may need extra guidance or support in order to maintain their work. As the VR program had a limited duration, it needs to be established how and by whom these patients can best be helped, e.g. by specific and repeated education and support, mentors at work or empowerment of working young people with ABI during the VR program.

The assignment of a mentor from the professional community (managers deploying their business network) constituted a distinctive element in our VR program compared to adult RTW interventions for individuals with ABI as well as programs with unemployed youth with disabilities. Mentorship has been found to work as a catalyst in efficient and effective job-finding, with a more positive mind set of managers and their network regarding working capacity of young people with a disability as positive side effect [24]. Mentors from the professional community can further diminish the barriers between the unemployed youth and the workplace with the development of necessary skills as well as awareness within the professional community [7].

Limitations of this study were that the sample size of the study was relatively small limiting generalizability. Moreover, there was no control group, the number of assessments was limited, time since start of the VR program varied, and the VR program was highly individualized with varying duration and intensity. The assessments focussed mainly on the VR program and the acquisition of paid employment, whereas participation in unpaid (volunteer) work was not used as a primary outcome measure. This is arbitrary, as being satisfied with participation in unpaid labor and community integration can be a successful result of a VR program, as well [36].

It remains to be established to what extent our results are generalizable to other countries. However, as the composition of the program was based on elements that were proven effective in multiple studies on VR in ABI in general [11], it is likely that the results are applicable across countries worldwide. Regarding the financial aspects of VR, there may be large differences among countries, due to variation of health care and social security systems.

Strengths of this study are that it is unique in the sense that so far no studies have been performed in this age group of patients with ABI, in particular among those who had no paid employment at the time of ABI, thus having a relatively high risk of not finding work post-injury. The varying duration and intensity of the VR program makes the program more difficult to evaluate but better supports the needs of the individuals and the variation in consequences of ABI. Moreover, as our data were collected as part of usual care, the results are likely to be generalizable to daily practice.

An important element of the program, concerned the inclusion of volunteering mentors from the pro-

fessional community. More research is needed in order to determine their added value, but given the relatively high use of mentor services in our program, it is imaginable that their efforts contributed to the results observed with the evaluation of the VR program, with tailored provision of the various elements of the program.

Given the results, the program will be further improved. More attention must be paid to ensure sufficient financial support to complete the program. In addition, if paid employment is acquired, attention must be paid to health problems hindering work ability.

In a next step, the program must be evaluated by means of an appropriate study design, taking into account the effectiveness, the costs and the satisfaction of patients as well as employers' viewpoint. In a future study, more attention will be paid to the evaluation of the effectiveness regarding unpaid employment.

## 5. Conclusion

The VR program including a professional mentor as one of the elements in the program for a subgroup of patients is promising, and may increase the chances to acquire paid employment. We expect such a program to positively affect employers' viewpoint on people with an occupational disability.

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## Conflict of interest

The authors report no conflict of interests.

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