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ORIGINAL RESEARCH

Upper Limb Absence: Predictors of Work Participation and Work Productivity

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Abstract

Objectives: To analyze work participation, work productivity, contributing factors, and physical work demands of individuals with upper limb absence (ULA).

Design: Cross-sectional study: postal survey (response rate, 45%).

Setting: Twelve rehabilitation centers and orthopedic workshops.

Participants: Individuals (n=207) with unilateral transverse upper limb reduction deficiency (RD) or acquired amputation (AA), at or proximal to the carpal level, between the ages of 18 and 65 years, and a convenience sample of control subjects (n=90) matched on age and sex.

Interventions: Not applicable.

Main Outcome Measures: Employment status, self-reported work productivity measured with the Quality-Quantity method, and self-reported upper extremity work demands measured with the Upper Extremity Work Demands scale.

Results: Seventy-four percent of the individuals with RD and 57% of the individuals with AA were employed (vs 82% of the control group and 66% of the general population). Male sex, younger age, a medium or higher level of education, prosthesis use, and good general health were predictors of work participation. Work productivity was similar to that of the control group. Higher work productivity was inversely related to musculoskeletal complaint–related pain. When having predominantly mentally demanding work, individuals with ULA perceived higher upper extremity work demands compared with controls.

Conclusions: Work participation of individuals with RD was slightly higher compared with that of the general population, whereas employment rates of individuals with AA were slightly lower. Furthermore, work productivity did not differ between individuals with RD, AA, and controls. Archives of Physical Medicine and Rehabilitation 2016;97:892-9

Individuals with an upper limb reduction deficiency (RD) are born with a deficient limb. Similarly, acquired amputations (AAs) of the upper limb often occur at a young age.[1-3] Therefore, the population with upper limb absence (ULA) is relatively young, which means that they usually have many working years ahead of them.

"Work," defined as engaging in all aspects of work for payment, including self-employment, part-time and full-time employment[4] (hereafter "employment"), is generally beneficial for the individual because it provides economic security, social contacts, a sense of accomplishment, and self-esteem.[5,6] Returning to work is therefore often a goal of rehabilitation. However, only one half to three quarters of people return to work after amputation of an upper limb.[2,7,8] Decreased rates of employment

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have been related to female sex, older age, and residual limb pain.[9] Individuals born with RD seem to have fewer problems gaining employment compared with individuals with AA, as a Swedish study[10] showed similar rates of employment for individuals with RD and for the general population.

Individuals with ULA may face challenges in performing work tasks adequately with only 1 fully functional hand, and consequently, work adjustments are occasionally necessary.[7] In rehabilitation care, it is therefore important to assess not only work participation (eg, having employment) but also the quality and quantity of performed work, as these could be diminished by ULA. The combination of quality and quantity of performed work determines work productivity. Health problems may decrease work productivity because of absence (absenteeism) or because of decreased quality and quantity of the performed work while present (presenteeism).[11] To our knowledge, only 1 study[10] has examined work performance of 1-handed individuals. In that study, one fourth of the employed individuals with RD mentioned decreased work capacity in general; yet, none mentioned reduced work ability in relation to their current work tasks. Musculoskeletal complaints (MSCs) seem to be a frequent problem in individuals with ULA,[2,12-14] and have been found to reduce work productivity in the general population.[11,15] However, knowledge of other factors that could influence work productivity in individuals with ULA is currently lacking. In order to increase the chance of returning to work and helping these individuals to perform at their best, more information is required about facilitating and limiting factors for work participation and productivity of individuals with ULA.

Therefore, this study aims to examine (1) employment rates of individuals with RD and AA in the Netherlands and compare them with the employment rate of a control group; (2) associations of individual characteristics, characteristics of the absent limb, prosthesis use, and health (including MSCs) with work participation; (3) associations of these characteristics with work productivity; and (4) relationships between type of work, physical work demands, and work productivity in this population.

Methods

Participants and procedure

A survey on MSCs and work among individuals with ULA was conducted. Because of the amount of data, it was decided to present the data in 2 articles. The work-related outcome measures are described in this article, and therefore only analyses of individuals aged between 18 and 65 years (official retirement age in the Netherlands) are presented. The outcome measures regarding MSCs and MSC-related disability are not presented here.

List of abbreviations:

AA	**acquired amputation**
CI	**confidence interval**
MSC	**musculoskeletal complaint**
RD	**reduction deficiency**
UEWD	**Upper Extremity Work Demands**
ULA	**upper limb absence**

By using the databases of 12 rehabilitation centers and orthopedic workshops in the Netherlands, the survey was sent to adults (≥18y of age) with ULA (RD or AA) between January and April 2013. Eligibility criteria were having a deficient limb due to unilateral transverse ULA at or proximal to the carpal level (minimally 1y since amputation) and having a sufficient understanding of the written Dutch language.

The same survey, minus questions related to the ULA and prosthesis use, was sent to a control sample. The researchers recruited controls from among their family and acquaintances. This recruitment was based on age and sex in order to have a similar distribution between the groups.

The study was approved by the local medical ethical committee (M12.128984) of the University Medical Center Groningen. In addition, individuals were asked to sign an informed consent form before completing the survey, and all participants received a gift voucher (€10). The returned surveys were checked for duplicates.

Survey

Participants were asked about personal characteristics, the absent upper limb, current prosthetic use (eg, wearing a prosthesis) and, if so, which type of prosthesis they used. To assess work participation, participants were asked whether they had paid work. If they did have paid work, questions concerning what type of work, weekly working hours, and sick leave during the last 4 weeks were asked. Based on the Work Ability Index work content groups,[16] 2 researchers (S.G.P., C.K.vdS) divided the type of work into the following 3 groups: (1) predominantly physically demanding (eg, construction workers, janitors, cleaners); (2) predominantly mentally demanding (eg, teachers, administrative workers); and (3) both mentally and physically demanding (eg, machine operators, nurses).

Work productivity was assessed by using the Quality-Quantity method, which was developed to measure the consequences of illness while at work, and inquires about work quantity and quality related to the participant's usual performance on a 0-to-10 scale (10, normal performance)[17] during the last 4 weeks. Construct validity ranged from moderate to very strong for different measurements of production output.[18] The score is calculated as follows: (Quantity rating/10) × (Quality rating/10) × 100%.

Work demands were assessed by the 7-item self-report measure Upper Extremity Work Demands (UEWD) scale,[19] which measures the perceived physical demands of the upper extremity during work. The UEWD items were selected from the Dutch Musculoskeletal Questionnaire, which has fair psychometric properties.[20] However, the UEWD scale has not yet been validated. Each item is scored on a 4-point Likert scale. Total scores range from 7 (lowest work demand) to 28 (highest work demand).

Furthermore, general and mental health, pain, coping styles, disability, and the presence of MSCs and comorbidity were assessed. The presence of MSCs was assessed by means of 1 question regarding the presence of regular complaints about the muscles, tendons, and bones during the last 4 weeks, which were not caused by an accident, sports injury, infection, or joint disease.

The subscales general health perception and mental health (both 5 items) of the validated RAND-36 were included.[21] The 2-item pain subscale of the RAND-36, assessing the average pain and the bothersomeness of the pain, was administered to those with MSCs. Individuals without MSCs were arbitrarily assigned a