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Development and Evaluation of Validity and Utility of the Instrument Assessment of Work Performance (AWP)

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To Annika & Nellie

*“While you and I have lips and voices
which are for kissing and to sing with
who cares if some one-eyed son for a bitch
invents an instrument to measure Spring with”*

e.e. cummings

**Development and Evaluation of Validity and Utility of the Instrument
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ABSTRACT

The last decades have shown a great need for vocational rehabilitation due to high levels of absenteeism due to sickness and disability pension. An essential part of the vocational rehabilitation process is assessment of persons with reduced work functioning. Adequate and reliable methods for assessment of clients with work disabilities are crucial for both the individuals who are assessed and for society as a whole. Sound and precise work assessments are needed to guide clients to suitable interventions using a minimum of rehabilitation resources. However, work function assessments are complex and there is confusion over work assessment concepts. Therefore, further development and evaluation of adequate concepts and theoretical models within the area of work assessment is needed. Furthermore, vocational rehabilitation lacks adequate and reliable assessment instruments, especially instruments used to observe clients.

This dissertation thesis focuses specifically on the following:

- Development of a conceptual framework for assessment of work functioning [Study I]
- Development and evaluation of validity and utility of the observation instrument Assessment of Work Performance (AWP) [Study II-IV]

Study I proposes a conceptual framework for different dimensions of work functioning and highlights important factors for work assessment. The study also creates a framework to define the purpose, delimitation, and possible assessment outcomes of the assessment instrument AWP.

Study II develops an observation instrument for assessment of work performance, the Assessment of Work Performance (AWP) and conducts an initial evaluation of face validity and utility for the instrument. The initial evaluation in study II was made within a group of 21 assessors in Sweden, and the result indicated face validity and utility for the AWP, a result that supported further development and evaluation of the instrument.

Study III investigates the content validity and utility of the AWP. A questionnaire was answered by 67 respondents who used the AWP in various vocational rehabilitation settings in Sweden. The result indicated content validity and utility for the AWP.

Study IV investigates the construct validity of the instrument AWP. This study is based on 364 assessments with the AWP (version 1.1). The clients had various work-related problems and went through an insurance medicine investigation at a Social Insurance Office in Sweden between 2004 and 2005. The major findings in this study indicated that the AWP has construct validity, sensitivity, and the ability to discriminate between clients. It is also gender neutral.

The future evaluation of AWP will comprise testing of predictive validity, inter-rater reliability and internal consistency reliability as well as an evaluation of how and with what results the instrument can be combined with other work-related assessment instruments.

Key words: ability, capacity, development, measurement, MOHO, occupational therapy, rehabilitation, skills, vocational, work.

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ORIGINAL PAPERS

This dissertation thesis is based on the following studies, which will be referred to in the text by their Roman numerals.

- I.** Sandqvist, J., Henriksson, C.:
Work functioning – a conceptual framework.
Work 23 (2004), 147-157.
- II.** Sandqvist, J., Törnquist, K., Henriksson, C.:
Assessment of Work Performance – Development of an Instrument.
Work 26 (2006), 379-387.
- III.** Sandqvist, J., Henriksson, C., Gullberg, M., Gerdle, B.:
Content Validity and Utility of the Assessment of Work Performance (AWP).
Accepted for publication in the journal Work.
- IV.** Sandqvist, J., Björk, M., Gullberg, M., Henriksson, C., Gerdle, B.:
Construct validity of the Assessment of Work Performance (AWP).
Submitted.

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ABBREVIATIONS

AWC:

Assessment of Work Characteristics. A new instrument based on the AWP. The purpose of the AWC is to describe the extent to which a client have to use different working skills to be able to perform a work task in an efficient and appropriate way.

AWF:

Assessment of Work Functioning. The abbreviation AWF is sometimes used when referring to the conceptual framework presented in Study I of this dissertation thesis.

AWP:

The instrument Assessment of Work Performance. The development and initial evaluation of the AWP is described in Study II-IV in this dissertation thesis. The Swedish name of the AWP is BaFiA (Bedömning av Färdigheter i Arbete).

ICF:

International Classification of Functioning Disability and Health (WHO).

MOHO:

The Model of Human Occupation is a theoretical framework that explains the meaning and importance of activities for human beings and offers a common conceptual framework for the description of human occupation. The MOHO seeks to explain how human occupation is motivated, patterned, and performed. The instrument AWP is based on the MOHO.

DEFINITIONS

Assessment

Assessment involves the collection, appraisal, and classification of gathered information, usually in an organized manner using an assessment instrument (formal assessment).

Assessment instrument

The written device that an assessor uses to collect data and in some cases interpret data (e.g., questionnaires, tests, observation schedules, etc.). Assessment instruments are developed and tested to ensure that they can be applied consistently and gather valid and reliable information.

Conceptual framework

A conceptual framework is a classification of related concepts, usually in a specific area such as work functioning (Study I). The framework often contains graphic illustrations offering a visual picture of the included concepts in relation to each other. A conceptual framework differs from a theoretical model as a theoretical model should not only present the included concepts in relation to each other, but also should offer information about causal relationships between included concepts: how a change in one concept affects another concept in the model and so on.

Formal assessment

A formal assessment is a structured and organized assessment using an assessment instrument such as the AWC, AWP, DOA, WEIS or WRI.

Informal assessment

An informal assessment is an unorganized assessment where no assessment instrument is used, for example, an unstructured interview with a client.

Objective assessment

An objective assessment means that someone, such as an occupational therapist, assesses the client's work functioning and interprets the results. This is an observer reported assessment.

Screening instrument

A screening instrument is used in order to identify persons with particular characteristics.

Subjective assessment

A subjective assessment means that the client assesses his or her own work functioning. This is a self reported assessment.

Vocational rehabilitation

Vocational rehabilitation provides medical, psychological, social and/or vocational interventions to help persons with functional impairment. This type of rehabilitation addresses the specific needs of the individual concerned, to recover the best possible functional capacity and to sustain it, as well as to create the prerequisites for the individual to find, obtain and/or retain a job. The aim of “obtaining and retaining a job” must be viewed in relation to the job market situation.

Work

In this thesis, the concept “work” is mainly used to mean paid employment.

Work functioning

In this dissertation thesis, work functioning is an umbrella term for all forms of work-related functioning and includes functioning in different dimensions and on different levels – body, individual and society levels.

Work performance

Work performance is the ability to satisfactorily handle and carry out different work activities and tasks; that is, it is the ability of a person to do “work”. The environment in which persons work makes the doing possible; that is, work performance requires a context.

Working skills

Working skills are elements of action that can be observed during the execution of work. The concepts of the 14 working skills in AWP provide a conceptual framework for reasoning about and describing observable elements of work performance. There are three types of working skills in AWP: motor skills, performance skills, and communication and interaction skills.

INTRODUCTION

VOCATIONAL REHABILITATION

The last decades have shown a great need for vocational rehabilitation when persons work functioning¹ has been reduced by injury or illness, resulting in high levels of sickness absence and disability pension [1,43,44,93,118,129,154,160]. Between 2000 and 2003, 14% of the Swedish population between the ages 20 and 64 received either sickness cash benefits or sickness compensation due to some functional impairment. In 2003, the total annual cost for this was 110 milliard Swedish crowns. After 2004, however, absence rates have decreased, but the problem is still substantial and the rates are very high compared to most European countries [63]. When an individual's ability to work is reduced, there are social and economic consequences for both the individual and society. Therefore, reduced work functioning is not only a medical problem but also a socio-economic problem [3,44,72,73,84,93,97].

Vocational rehabilitation provides medical, psychological, social, and/or vocational interventions for people with functional impairment to help them recover the best possible functional capacity and to sustain it. This type of rehabilitation also creates the circumstances so a person can find, obtain, and/or retain a job. The aim of "obtaining and retaining a job" must be viewed in relation to the job market situation. Because the functional impairment varies according to the capabilities of the individual, services and competencies need to be tailored to the varying needs of the clients [54,156]. Vocational rehabilitation is a complex process and often involves, apart from the client, various professionals and rehabilitation actors. For the employed, the rehabilitation actors who usually participate in the vocational rehabilitation process include the employer, medical professionals and officers from a social insurance office. For unemployed persons, the previously named actors, as well as representatives from the public employment services office and sometimes social workers from the social services, participate in the vocational rehabilitation process [62].

¹ In this dissertation thesis, work functioning is an umbrella term for all forms of work-related functioning and includes functioning in different dimensions and on different levels – body, individual and society levels.

OCCUPATIONAL THERAPY AND WORK

Daily life consists of engaging in performance of activities required by various occupations [45]. A person's ability to perform different kinds of activities in life is central in occupational therapy [82,124], and one of these activities is work [9,75].

What is "work"? The term "work" is usually used, as in this thesis, to mean paid employment. The opposite is then play, rest, free time, and recreation [157]. However, to have only one definition of work is not necessary or desirable. Various definitions of work can be used for different purposes and situations [68]. A broader definition of work is presented by Karlsson [68, p 119]: "*Work is the doing in the sphere of necessity*". Thus, this broader definition includes the work done outside a paid employment such as household duties.

There is no doubt that paid work has a central role in our lives since it is the activity that consumes the second most time per day [45,69]. The only activity that takes up more time in a person's life is sleep. The third largest consumer of daily time for both males and females in western society of today is in fact watching television [45].

The concept of work has been fundamental to occupational therapy theory and practice ever since the birth of the profession in the beginning of the 20th century [9,46,53,61,90,97,98,116]. Furthermore, the term occupational therapy indicates that the profession works with the rehabilitation of disabled workers [9]. Karen Jacobs [61] states that:

"Work is at the heart of the philosophy and practice of occupational therapy. In its broadest sense, work, as productive activity, is the concern in almost all therapy." [p XI]

Occupational therapists can play a major role in the vocational rehabilitation process through assessment and rehabilitation of persons with reduced work functioning [17,34,53,65,70, 92,161].

ASSESSMENT OF WORK FUNCTIONING

To sufficiently understand an individual's work functioning, it is not enough to assess the efficiency and appropriateness of an individual's work performance. It is also necessary to find out *why* the person functions in a certain way. To find the answers to these questions, there are several factors that must be considered. These factors could be *personal*, *environmental* or *temporal* [111].

Personal factors can be both physical and psychological, and research has identified the impact of a number of personal factors. In addition, a number of *environmental factors* affect an individual's work functioning [15]. They can be divided into two groups: environmental factors related to working life and environmental factors related to private life (Table 1). By assessing personal and environmental factors, an assessor may gain a better understanding of the individual's present work situation. However, an individual's ability to work may also be affected by *temporal factors* (Table 1). The client's past experiences and expectations about the future could also influence the client's current work conditions. His or her earlier work experience, work history, education, and other life experiences could greatly affect his or her present ability to work [76,77,132]. When assessing personnel, it is important for an assessor to consider the individual's hopes and expectations for his or her future work situation and his or her larger life goals and beliefs about his or her own work functioning in the future. The constant changing demands of some work places or the general condition of the labour market [78,151] also influence an individual's future work prospects (Table 1).

Table 1: Factors influencing work functioning [111]

Personal factors	Environmental factors	Temporal factors
<ul style="list-style-type: none"> • age [69,122,129,152] • sex and gender [8,13,28] • basic functions, such as muscle strength and endurance or memory (human capital), impairments or biomedical diagnosis [8,33,48,132, 138] • values, activity choices, occupational choices, vocational interests, work commitment, work satisfaction [11,33,35,50,51,79, 131] • personality and identity [51,139] • career attainment, worker role and other roles in the person's life [42, 142] • habits, geographic mobility (individual), vocational adjustment and coping ability [132] • balance between work and leisure [107] • education [132] 	<p>Environmental factors related to <i>working life</i>:</p> <ul style="list-style-type: none"> • values in society, labour market, physical work environment [78, 100] • work adjustability or adaptability, demands of the work tasks or duties [48,132] • workload, geographical barriers [42] • organizational variables [4,108, 133] • attitudes and support in the workplace and social support from fellow workers [2,120,151,153] • salary [19,38] • prestige or status of the occupation in society [8,35] <p>Environmental factors related to <i>private life</i>:</p> <ul style="list-style-type: none"> • social support from family and friends outside the workplace [151] • family influences, crossover effects of work and family i.e. work-family interface [22,135] • expectations and demands, the person's social class [10] • the person's economy (economic situation), and culture [8] 	<ul style="list-style-type: none"> • Past situation • Present situation • Future situation

An assessment of work functioning can affect an individual on many levels and his or her whole life situation. [73,84]. Gary Kielhofner [73] explains why a reliable assessment of work functioning is important:

“...functional assessment is often used to determine what freedoms a person will and will not have, what roles he or she may take on, what activities he or she may do, and what benefits or resources he or she will receive.” [p. 248]

There are several reasons why gaining an understanding of work functioning may be problematic as it is a multidimensional concept that concerns a relationship between several

elements. Sandqvist and Henriksson [111] identify various elements of work functioning. One of these elements is the different dimensions of work functioning: 1) work participation that pertains to society, 2) work performance that pertains to the individual, and 3) individual capacity that pertains to physical and psychological functioning. The dimensions of functioning were also related to the International Classification of Functioning, Disability and Health (ICF) [155] (Table 2). The ICF provides a unified language and framework for the description of human functioning and disability as an important component of health. It classifies functioning and disability according to an individual's life circumstances. The ICF organizes information into two dimensions: body functions and structures and activities and participation. The body functions and structures dimension refers to the physiological or psychological functions of body systems and the anatomical parts of the body such as organs, limbs, and their components. The activity and participation dimension refers to the performance of tasks or actions by an individual and to the individual's ability to function in various life areas [36,123,125,155].

Table 2: Proposed conceptual framework for work functioning in comparison with the ICF [111]

Proposed conceptual framework		ICF [155]
<p>Work participation: The person's ability and possibility to fulfil a worker role and acquire or maintain/retain a work position in society.</p>	<p>W O R K</p>	<p>Participation (society level)</p> <p>&</p>
<p>Work performance: (including Working skills) The ability to satisfactorily handle and carry out different work activities and tasks.</p>	<p>F U N C T I O N</p>	<p>Activities (individual level)</p>
<p>Individual capacity: Different physical and psychological attributes that enable the person to perform work tasks and activities, e.g. muscle strength, joint motion, sensibility, memory and cardio-pulmonary functions.</p>	<p>I N G</p>	<p>Body functions and structures (body level)</p>

Furthermore, the authors discuss similarities between various conceptual frameworks, an overview that outline different dimensions of functioning in the following areas: *a)* the top-down approach [141], *b)* work-related assessments [55], *c)* Lohman and Peyton's conceptual

models of practice (i.e., the medical model, the pre-vocational model and the biopsychosocial model) [90], *d*) WHO's ICF [155], *e*) A Model of Human Occupation [75], and *f*) specified rehabilitation areas (Table 3).

Table 3: Comparison of concepts in different conceptual frameworks [111].

<i>a)</i> "Top-down approach" [141]	<i>b)</i> "Work related assessments, individual factors" [55]	<i>c)</i> "Conceptual models of practice" [90]	<i>d)</i> ICF [155]	<i>e)</i> Model Of Human Occupation [75]	<i>f)</i> Rehabilitation areas
Sense of efficacy and Self-Esteem, Satisfaction with life roles, Competency in task or life roles	Role	The biopsychosocial model	Participation (society level)	Participation	Vocational rehabilitation
Activities, Abilities (and skills)	Activity, Task, Skill	The pre-vocational model	& Activities (individual level)	Performance (incl. Skills)	Pre-vocational rehabilitation
Developed capacities, First-level capacities, Cognitive-neuromusculoskeletal substrate	Body system	The medical model	Body functions and structures (body level)	Performance capacity	Medical rehabilitation

A REVISED CONCEPTUAL FRAMEWORK FOR ASSESSMENT OF WORK FUNCTIONING

Because work assessments are complex, there is confusion over work assessment concepts. One of the concepts causing confusion is *work ability* [31,49,55,56,91,126]. In an analysis of the concept of work ability, mainly from a health perspective, Tengland [134] suggests that work ability could be divided into *general work ability* and *specific work ability*. The *general work ability* refers to a person's ability to perform any kind of work, work that any person at the same age and of the same sex could manage in an acceptable work environment. The *specific work ability* refers to a person's ability to manage the demands of a specific work in an acceptable work environment. Furthermore, Tengland points out that work ability could be seen as connected to the individual in relation to an acceptable environment. According to Tengland [134], it is reasonable to understand work ability as something placed within the individual, as the work ability determines whether a person is entitled to compensation from the sickness insurance system. The work environment is considered to be something outside the individual and creates a platform for work-related actions.

Another concept worth to consider in a conceptual framework of work functioning is *employability*. Employability is conceptualized as a form of work-specific active adaptability that enables a person to identify and realize career opportunities [32]. Having employability does not assure actual employment for the individual, but the concept focuses on the individual's likelihood of gaining employment. An individual is employable to the extent that he or she can effectively handle personal factors and manage environmental demands. The authors Fugate et al. [32] attach great importance to the influence of individual characteristics in the person's adaptation to a work situation. According to Fugate et al. [32], three component dimensions constitute employability: *career identity*, *personal adaptability*, and *social and human capital*.

Career identity represents a person's career experiences and aspirations and may include the following aspects: goals, hopes, and fears; values, beliefs, and norms; and interaction styles. Career identity refers to how people define themselves in a particular work context.

Personal adaptability refers to the individual's ability to adapt to changing demands in a work situation.

Social and human capital refers to the goodwill inherent in social networks (e.g., at a workplace) and employees' ability to make use of their unique resources to realize

opportunities in the workplace. Human capital factors include age and education, work experience and training, and cognitive ability.

In resemblance with Tengland [134], Fugate et al. [32] claim that the concept of employability is closely connected to individual characteristics. However, it is reasonable to argue that an individual's work ability as well as employability to a great extent is affected by the contextual circumstances that exist at the time of an assessment.

Is it possible to arrange the concepts general work ability, specific work ability and employability in relation to each other and in relation to other conceptual frameworks and concepts? In an attempt to do so Table 4 was constructed to serve as a foundation for further discussion about the concepts and their relation to the conceptual framework for assessment of work functioning [111].

Table 4: The concepts *general work ability*, *specific work ability* and *employability* in relation to some conceptual frameworks

Conceptual framework for assessment of work functioning [111]	Proposed concepts	Context	Financial compensation from society due to loss of earnings	ICF [155]
<p>Work participation: The person's ability and possibility to fulfil a worker role and acquire or maintain/retain a work position in society.</p>	Employability	Regular labour market	Unemployment compensation	Participation (society level) &
<p>Work performance: (including Working skills) The ability to satisfactorily handle and carry out different work activities and tasks.</p>	Specific work ability ----- General work ability	Actual/realistic workplace ----- Artificial work context	Sickness compensation	Activities (individual level)
<p>Individual capacity: Different physical and psychological attributes that enable the person to perform work tasks and activities, e.g. muscle strength, joint motion, sensibility, memory and cardio-pulmonary functions.</p>	Work capacity	Clinic (medical rehabilitation)	Sickness compensation	Body functions and structures (body level)

ASSESSMENT IN VOCATIONAL REHABILITATION

Assessment is everywhere in vocational rehabilitation. In fact, many interventions for clients are based on information yielded by some kind of assessment instrument [94,106,128]. Assessment involves the collection, appraisal, and classification of gathered information, usually in an organized manner using an assessment instrument (formal assessment). Such methods or tools for collecting information include observation, interview, and self-report [83]. What is an assessment instrument? The term “instrument” can have many meanings such as musical instruments or instruments used by a surgeon when performing an operation. However, in this application one can define an instrument as the device that an assessor uses to collect data and in some cases interpret data [83,104]. Assessment instruments are developed and tested to ensure that they can be applied consistently and gather valid and reliable information [83].

Assessment instruments in vocational rehabilitation inform us about a wide range of things – from a person’s beliefs and expectations about work and how an individual performs a work task to the demands of a work setting on a client [15,25,79,89,112,148]. Often this information is expressed as numbers, giving it an air of objectivity and trustworthiness. Converting concepts to numbers also generates a need for expert interpretation, giving the information a certain authority. These qualities have led assessors to rely on assessment instruments for credible and useful information.

Although vocational rehabilitation professionals use assessment instruments to develop a course of intervention for clients [94,106], evidence suggests that inconsistent assessment practice can arise from problems associated with the design, administration, and interpretation of work-related assessments [140]. Accurate assessment helps disabled workers return to suitable employment or receive other adequate interventions. Unreliable and inadequate assessment instruments may complicate the rehabilitation process and result in immediate and latent health issues and socio-economic consequences for workers, their employers, and society [84,94,140]. To improve consistency in the assessment process and accuracy assessment outcomes, rehabilitation professionals should use valid, reliable, and useful assessment instruments [57,58,106,117,140].

DEVELOPMENT AND EVALUATION OF ASSESSMENT INSTRUMENTS

Development of a new assessment instrument is often conducted “step by step” in a number of phases. In summary, the development process contains three phases: *planning*, *construction*, and *evaluation* [5].

The *phase of planning* begins with a formulation of the purpose of the instrument, what the instrument is designed to measure, and definition of the target group for the instrument. It also contains a review to ensure that no similar valid and reliable instruments exist on the market.

The *construction phase* is mainly concerned with writing of operational definitions of assessment items and construction of a rating scale for the new instrument. It also includes an initial evaluation of the instrument’s validity, and it is normally the face validity that is established at this early stage of development.

The *evaluation phase* focuses on further testing of the instrument’s qualities [5]. When evaluating a new instrument, the creator has to consider a number of criteria. Essential attributes of excellence in work-related assessment instruments are *validity*, *reliability*, and *utility* [60]. To be able to claim with acceptable certainty that an instrument is valid or reliable, it is necessary to examine several different forms of validity and reliability [57,58].

Validity is the degree to which an instrument measures what it is intended to measure [18,37,57,99,104], and, in general terms, it refers to the extent to which assessments lead to correct and meaningful interpretations [18]. Validity refers to the results of an assessment and how they are interpreted, not to the instrument itself [57,121]. Successfully determining a disabled worker’s ability to return to work performing suitable tasks is based on a valid interpretation of assessment results [57]. Validity is considered the most important characteristic of an assessment instrument [6,14,18]. Furthermore, a single study is not sufficient to determine an assessment’s validity. This implies that multiple studies of various forms of validity are required [6,57,99]. Validation is considered a continual process. Thus, for an instrument to remain valid over time, its validity must be re-established periodically [6].

All forms of validity are appropriate for work-related assessments [57]. However, of the various forms of validity, *face*, *content*, *construct*, and *criterion-related* (*predictive* and *concurrent*) have been judged most relevant [37,57,147].

Face validity is evident when an assessment appears to measure what it intends to measure [57,104,105] and can be seen as the general relevance of an instrument to the overall purpose

of an assessment [57]. Face validity can be established by a panel or group of experts who examine the assessment and reach a consensus that it does or does not represent a particular assessment domain [16]. In addition, face validity can also be established by clients, therapists and consumers of test results, such as an employer [57]. Face validity is considered the most basic and least rigorous form of validity and there are no statistical measures or standards for determining whether an instrument has sufficient face validity [20,105]. However, some qualitative interpretation can be made indicating whether good, moderate or poor face validity exists [57]. Therefore, it is not sufficient to only have evidence of an instrument's face validity. Other forms of validity must also be established to determine the validity of an instrument. However, it is important to establish face validity for an assessment instrument. If not, users of the instrument may consider the instrument irrelevant and inadequate [57,105].

Content validity is the degree to which assessment items represent the assessment domain the instrument is intended to measure. Content validity is usually established by a panel of experts who examine the relationship between the purpose of the instrument and its content - the assessment items [64,136]. Content validity is not usually indicated by a statistical measure; rather it is inferred from judgements from experts [20]. It considers whether the test incorporates a sample of assessment items representing the assessment domain in question [57], such as how well the 14 assessment items in AWP represents the domain of observable working skills. The level of content validity can be considered in the same way as face validity, with good, moderate and poor levels of face validity according to agreement by content experts reviewing the specific items in relation to the instrument's assessment domain. Content validity is considered a prerequisite for construct and criterion-related validity and should generally be established before either of these [136].

Construct validity refers to the extent that the items of an instrument accurately measure a theoretical construct [57,99,104]. There is no single method to determine construct validity, and often numerous studies are needed to provide an accumulation of evidence [57,99]. Several methods are used to collect evidence for construct validity: *Factor Analysis* (FA) [14, 57,99,104] and *Principal Component Analysis* (PCA) [47], and the *Rasch Measurement Model* [6,29,149,158,159]. Demonstrating good construct validity enables greater generalisation over various populations and situations [57].

Criterion-related validity is comprised of *concurrent* and *predictive validity*. It is the extent to which assessment results from a new assessment instrument is related to 1) assessment results yielded by some other valued instrument ("gold standard") (i.e., *concurrent validity*) or to 2) an external criterion such as return-to-work (i.e., *predictive validity*). Results from the new

assessment instrument being evaluated are compared and correlated with those from the selected criterion. It is considered to be the most practical approach to validity testing and the most objective [57].

Although validity is considered the most important characteristic of an assessment instrument that allows correct and meaningful interpretations, the instrument must also be accurate and consistent (i.e., reliable) [18]. Reliability is the degree of consistency or dependability with which an instrument measures the attribute it is designed to measure [37,58,99,104,127,137]. The reliability of an assessment instrument is crucial to clinicians when assessing clients, evaluating the efficacy of an intervention and planning future intervention. If an assessment is reliable, then changes noted in a client's performance over time are likely to be due to real improvement or deterioration, and not just due to measurement error [58].

There are several forms of reliability, and the most common forms associated with work-related assessments are *test-retest reliability* and *inter-rater reliability* [58]. *Test-retest reliability* determines the consistency of an assessment instrument from one assessment occasion to another. It assumes that the characteristic being assessed does not change over the time between the assessment occasions. *Inter-rater reliability* examines the variation between several raters assessing the same phenomenon e.g., a client [37,58].

Furthermore, in assessment of performance a very important characteristic of an instrument is its *utility* (usefulness) [95]. *Utility* represents the overall value of the instrument for the users in terms of its relevance, usefulness, efficiency, practicality, ease of administration, and flexibility [7,60,95].

ASSESSMENT INSTRUMENTS IN VOCATIONAL REHABILITATION

Adequate and reliable methods for evaluation of clients with work disabilities are crucial for both the individuals who are assessed and for society as a whole. Sound and precise work assessments are needed to guide clients to suitable interventions using a minimum of rehabilitation resources [56,84,96,138]. However, there is a lack of adequate and reliable instruments for use in vocational rehabilitation [37,52,57,58,66,91,94,106,115,130]. Nationwide surveys in Sweden indicate that several assessment instruments are used within work rehabilitation settings in Sweden, usually designed and constructed within the local

assessment settings and of the “check–list” type. However, the instruments have seldom been exposed to adequate testing of their specific qualities, such as validity and reliability, and are usually not based on a model or theory. In general, the instruments lack operational definitions of their assessment items [39,101,130]. However, recently there has been an increased use of formal assessment instruments such as the Worker Role Interview (WRI), A Dialogue About Ability Related To Work (DOA) and VALPAR Component Work Samples (CWS).

The WRI is an interview instrument that focuses on how psychosocial and environmental factors influence a person’s ability to return to work after injury or illness [24,25,41,148].

DOA is an instrument particularly focused on individuals’ own active participation in goal setting and in the rehabilitation process. DOA is directed toward clients with psychiatric or psychosocial problems, and the instrument has been tested in psychiatric work rehabilitation [89,101].

Another frequently used observation instrument in Sweden is VALPAR Component Work Samples (CWS) [102,103,145,146]. The VALPAR CWS consists of a number of different “artificial” work tasks (samples), and each work sample is aimed to assess various parts of a client’s work functioning. A work sample can be used separate or together with other CWS, or in combination with other assessment instruments [103]. All the VALPAR CWS have been analyzed according to The Revised Handbook for Analyzing Jobs (RHAIJ) [143] and can thereby be matched with various jobs in The Dictionary of Occupational Titles (DOT) [71,144].

AIMS OF THE THESIS

This dissertation thesis focuses primarily on these issues:

- Development of a conceptual framework for assessment of work functioning [Study I]
- Development and evaluation of validity and utility of the observation instrument Assessment of Work Performance (AWP) [Study II-IV]

The specific aims of the four studies constituting the present work are listed below:

Study I

- to create a conceptual framework for different dimensions of work functioning and to point out important factors for work assessment

Study II

- to develop and conduct an initial evaluation (face validity and utility) of an observation instrument for assessment of work performance, the Assessment of Work Performance (AWP)

Study III

- to evaluate the content validity and utility of the instrument AWP

Study IV

- to evaluate the construct validity of the instrument AWP

SUBJECTS, METHODS, PROCEDURES AND STATISTICS

The four studies were conducted in a specific order. Study I provides the theoretical foundation for the instrument AWP. The development and evaluation of the AWP is presented in study II-IV. A graphic overview of the four studies in the thesis is presented in Figure 1.

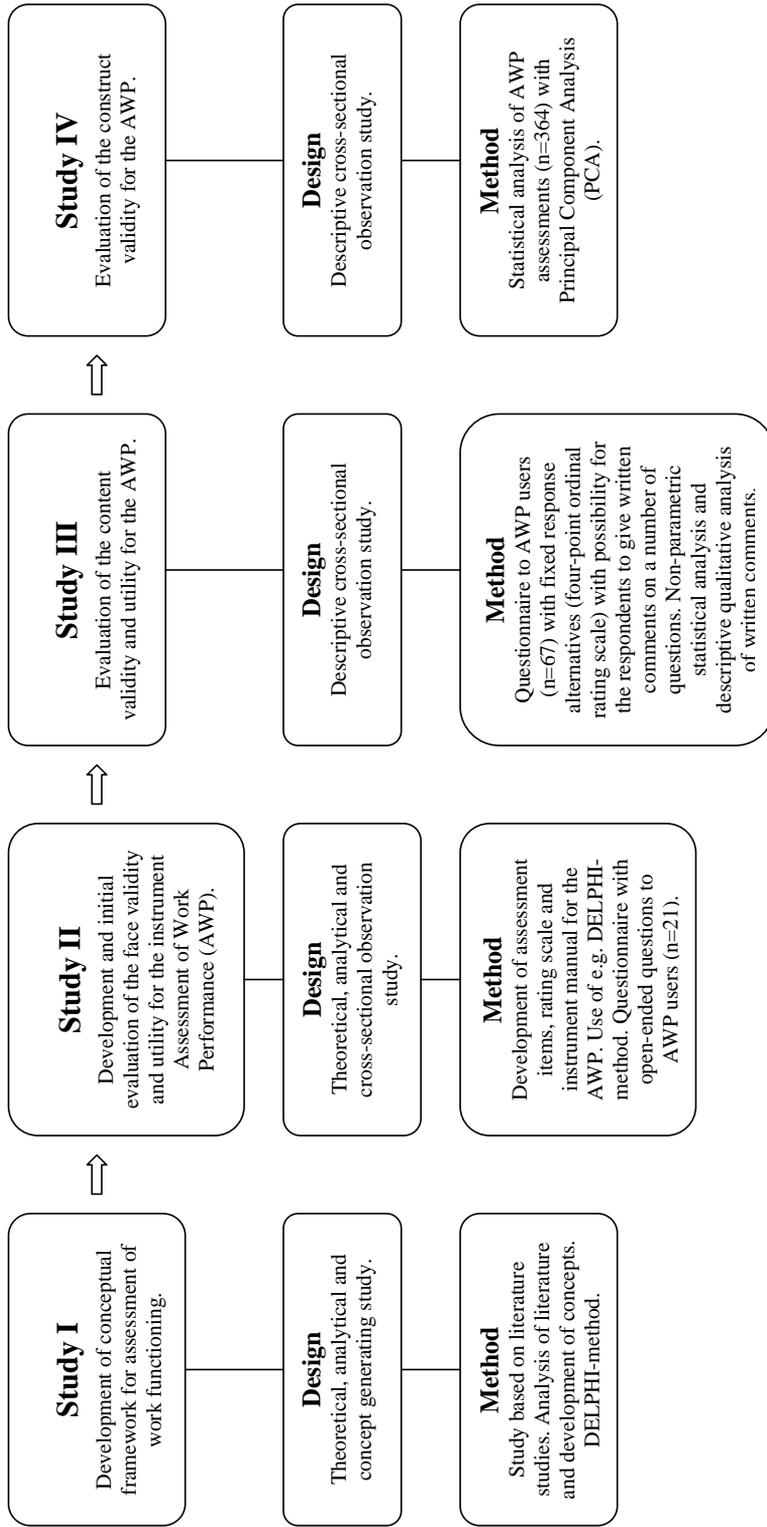


Figure 1: Study I-IV in this dissertation thesis

STUDY I

Study I develops a conceptual framework for different dimensions of work functioning and identifies important factors for work assessment. Study I also creates a conceptual framework to define the purpose, delimitation, and possible assessment outcomes of the assessment instrument AWP.

Study I is a theoretical study based on literature review and contains a concept analysis and argument for the proposed content and graphical illustrations in the conceptual framework, the Assessment of Work Functioning (AWF).

STUDY II

Study II develops and conducts an initial evaluation (face validity and utility) of an observation instrument for assessment of work performance, the AWP (Assessment of Work Performance). Study II is a theoretical, analytical, and cross-sectional observation study.

The development of the AWP started by formulating the purpose of the instrument and defining its target group – people with work related-problems. Next, vocational rehabilitation and work assessment were reviewed to ensure that there were no similar instruments on the market. The results of the review motivated the development of a new instrument because the lack of adequate, valid, and reliable observation instruments in Sweden for assessing work performance [112].

After deciding to base the new instrument on the MOHO, a more profound analysis of the concepts and items that describe occupational performance skills was carried out [30]. Relevant items in the area of work were then selected and translated from the MOHO [30], and when necessary, they were modified by the authors. If an item in the model was not relevant to the area of work, the item was excluded from the AWP. Some items in the AWP have no counterparts in the model, but were constructed by the authors under the inspiration of the concepts in the model [30].

Different prototype versions of the instrument were developed and discussed among the authors before the present content and design of the instrument were established. A method called DELPHI [12] was used, where the authors and an external expert panel individually reviewed the different versions of the instrument before discussing them with each other. The external expert panel, composed of persons with significant experience from assessment within vocational rehabilitation, gave the authors instant feedback from persons representing

the intended user group of the instrument. After each review, the authors discussed their findings and opinions and reached consensus about necessary changes to the instrument. This phase of the development process went on for about six months, after which preliminary testing of the instrument was initiated. In addition, a user manual for the instrument was constructed during this phase.

The preliminary evaluation of the AWP focused on the aspects face validity and utility. Face validity is the extent to which an instrument appears to measure what it purports to measure [104]. Utility represents the overall value of the instrument to the users in terms of its relevance, usefulness, efficiency, practicality, ease of administration, and flexibility [60]. The testing was made within a group of 21 assessors in Sweden with a varying amount of assessment experience: 13 occupational therapist working with work assessment with social insurance issues and 5 occupational therapists and 3 work counsellors working within work rehabilitation (n=21). The respondents were selected through convenience sampling. The respondents filled in a questionnaire with open-ended questions.

STUDY III

Study III study evaluates the content validity and utility of the instrument Assessment of Work Performance (AWP). The study is a descriptive cross-sectional observation study.

A questionnaire was used to collect information about the content validity and utility of the AWP. The questionnaire contained 29 questions in total; questions 1-5 were aimed to collect demographic data, and questions 6-29 focused on the instruments content validity and utility. The majority of the questions had fixed response alternatives and were rated on a four-point ordinal rating scale, but it was also possible for the respondents to give written comments on a number of questions.

The questionnaire was sent to all expected users of the AWP in Sweden at the time of the study (n=151). All these users had previously committed to participating in the testing and evaluation of the AWP as a part of a national project in Sweden with the aim to test and evaluate the AWP. The national project is funded by the Swedish National Labour Market Board (AMS).

The inclusion criterion for participation required the respondents to have some practical experience using the AWP to assess people with work-related problems (in their work rehabilitation setting). Of the 151 expected users, 54 had not used the AWP because of

reorganization of their workplace, lack of time, change of work tasks, or change of place of work. The study sample eventually consisted of 97 people.

Three reminders were sent to the 97 users of the AWP. Out of these 97 users, 30 did not answer the questionnaire and gave no reason for not answering; i.e., they initially constituted a group of unexplained external dropouts. To follow-up the external dropouts, the first author contacted a random sample ($n=10$) of the non-responders ($n=30$) and asked them why they had decided not to participate in the study. The reasons given for dropout were similar to the reasons for not complying with the inclusion criterion: reorganization of the workplace, lack of time, change of work tasks, or change of place of work. The questionnaire was completed by 67 respondents (a response rate of 69%). Because some respondents did not answer some questions (the internal drop-outs), sometimes less than 67 respondents are represented in the presentation of the results. The respondents answered the questionnaire anonymously and confirmed when they had filled in the questionnaire by sending the first author an e-mail.

The computer programme used for statistical analysis was SPSS version 12.5. Descriptive statistics (frequencies and percentages) were used to present the results of the questions with fixed response alternatives. Written comments made by the respondents on the open-ended questions in the questionnaire were analysed qualitatively.

Spearman's rho correlation coefficients calculated analysis of correlations. To analyze differences between groups, Fisher's Exact Test, Mann-Whitney U-test (with Bonferroni correction for multiple significance), and Kruskal-Wallis Test were used. The result was considered statistically significant when $P<0.05$. Because the majority of the respondents were occupational therapists, in the results three groupings – "Work counsellor", "Physiotherapist", and "Other profession" – were combined to form one group, "Mixed professions". This group was analysed in relation to the group "Occupational therapist" in the analysis of the variable profession.

STUDY IV

Study IV study evaluates the construct validity of the AWP. The study is a descriptive cross-sectional observation study based on 364 AWP (version 1.1) assessments of clients with various work-related problems that went through an insurance medicine investigation at a Social Insurance Office in Sweden during the years 2004-2005. Initially, the study was based on 419 assessments, but assessments where more than 43% of the items (>6 items of 14) were

not rated on the four point ordinal rating scale in the AWP were excluded from the study (n=55). There were two criteria for inclusion in the study:

- The AWP assessments included in the study were performed during the years 2004-2005.
- The clients should be in the age interval 23-56 years.

The 364 AWP assessments were performed by six occupational therapists working at a Social Insurance Office in Sweden (mean 61 assessments, range 24-81 assessments). One of the occupational therapists assisted the authors by entering de-identified client data into an AWP computer application (specially designed for this study) before the data was provided to the authors. By using this procedure, the authors only had access to de-identified client data. In addition to the AWP assessments, there was information about the client's age, sex, and work-related problems.

The clients were classified into three groups of work-related problems based on the diagnoses of the clients at the completion of the insurance medicine investigation at the Social Insurance Office. The classification into three groups was inspired by a framework for classification presented in a study made by the Swedish Social Insurance Administration [114]:

- 1) Musculoskeletal problems such as problems (i.e., mainly chronic pain conditions) with the neck, shoulders, arms and/or legs, back, joints, and fibromyalgia.
- 2) Psychological disorders such as psychotic problems, depression, anxiety, stress, burn out syndrome, and abuse of drugs or alcohol.
- 3) Other problems such as symptoms or diseases related to the heart, lungs, stomach and/or intestines, skin, allergies, migraine, ears, and eyes and problems related to pregnancy.

When classifying a client's work-related problem, the alternative that reflected the client's primary work-related problem was chosen. For example, if a client's primary problem was back pain, the client was classified into the first group (musculoskeletal problems). A client could only be classified into one of the three groups.

Before the study was conducted, it was presented to the regional ethical review board in Linköping. The board concluded that it was not necessary to review the study according to the Swedish Ethical Review Act. The study was approved by the Social Insurance Office before it was carried out.

Data analysis and statistics

Pre-processing of data

The 14 working skills are rated on a Likert-type [85,88] four-point ordinal rating scale (1 = deficient performance; 2 = inefficient performance; 3 = uncertain performance; and 4 = competent performance). The alternative “EA” (not applicable) was coded as missing in the dataset.

Principal Component Analysis

In study IV, the multivariate method Principal Component Analysis (PCA) [27] was used to evaluate the construct validity for AWP. PCA is a multivariate correlation analysis, which was performed using the software SIMCA-P (version 11.0; Umetrics Inc. Umeå, Sweden). PCA can be used to detect if a number of variables reflect a smaller number of underlying components. In the present study, the analysis revealed whether all the items in AWP were reflected by a uni-dimensional pattern and whether there were any non-contributing items in the instrument.

In the analysis, the variables (in this study the 14 assessment items in AWP) are projected onto a minimum of significant information bearing dimensions (components). A component consists of a vector of numerical values between -1 and 1 , referred to as loadings. The loading expresses the degree of correlation between the item and the component. A loading is obtained for each item in AWP included in the PCA model. Items that have high loadings (with positive or negative sign) on the same component are inter-correlated. Two items with high loadings but opposite signs are negatively inter-correlated. Items with a high loading and a confidence interval that does not include “0” were considered to be of interest for the component.

Two types of plots are used to graphically explain the components in the model; the score plot is an optimal projection showing the relation between the different subjects (the clients enrolled in the study). Subjects close to each other in the score plot have similar variable characteristics. The corresponding plot of the variables, the loading plot, shows how the items are related to each other and how they influence the different components in the model. The loadings including 95% CI are shown in bar diagrams. Outliers were identified using the two methods available in SIMCA-P: 1) score plots in combination with Hotelling’s T² (identifies strong outliers) and 2) distance to model in X-space (identifies moderate outliers).

To determine the number of components in the PCA-model, two concepts were used. The goodness of fit is given by the R^2 value, which expresses the explained variation in the X-matrix. The R^2 varies between 0 and 1, where 1 means a perfectly fitting model and 0 no fit at all. The number of components also depends on the predictive ability of the model. To test how valid the model was for a predictive purpose (in this case to predict the work performance of another data set from their results in AWP), a cross-validation method in SIMCA was used. The method keeps part of the data out from the model development and develops a number of parallel models from the reduced data and predicts the omitted data by the different models. This procedure is repeated several times until all cases in the data set have been used for predictions. Finally, the method compares the predicted values with the actual ones and the results in a value called goodness of prediction (Q^2), which also varies between 0 and 1. The Q^2 value is related to the R^2 value. For example, it is impossible to get a high Q^2 without a high R^2 . The difference between R^2 and Q^2 should not exceed 0.2-0.3 [27,47].

RESULTS WITH COMMENTS

STUDY I

Literature contains evidence that work function assessments are complex and that there is confusion over work assessment concepts [55,56]. Therefore, further development and evaluation of adequate concepts and theoretical models within the area of work assessment is needed [138,147]. This article proposes a conceptual framework for different dimensions of work functioning and identifies important factors for work assessment. The concepts proposed and defined in the article are work functioning, work participation, work performance, and individual capacity. The conceptual framework also focuses on the influence of personal and environmental factors as well as the temporal factor. The conceptual framework can be summarized and visualized in a figure where different factors influence the work functioning in different dimensions (Figure 2).

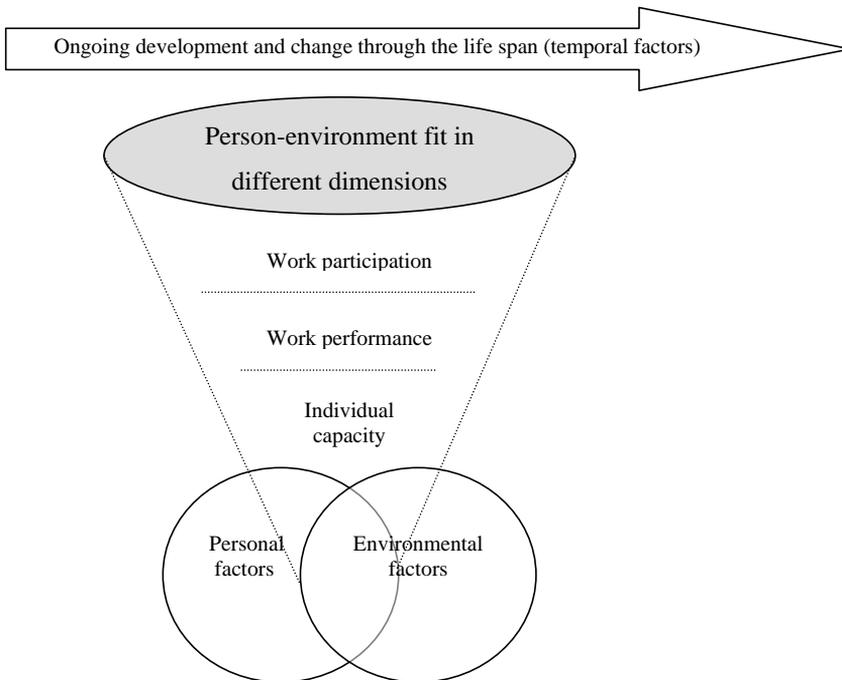


Figure 2: Work functioning in different dimensions [111]

The framework might be used as a screening tool that could make it easier for assessing personnel to clarify their client's problem area. This could indirectly lead to more adequate

and well-founded interventions. The framework could also be used in the assessment process when the personnel select one or more instruments to be used for a particular client. Nationwide studies in Sweden [39,130] indicate that a number of different assessment instruments are used within work rehabilitation settings. However, a conceptual framework that could help the personnel to choose suitable instruments for various situations or the needs of different clients is not routinely used. Study I [111] was also conducted to create a conceptual framework for assessment of work functioning to define the purpose, delimitation and possible assessment outcomes of the AWP [112].

STUDY II

The development process conducted in study II resulted in the instrument Assessment of Work Performance (AWP). The AWP (Appendix 1) assesses an individual's observable (working) skills during work performance. That is, it assesses how efficient and appropriate the client performs a work activity. The AWP assesses the client's observable working skills in three domains: motor skills, process skills, and communication and interaction skills. These three domains contain 14 skills: five in the domain of motor skills, five in the domain of process skills, and four in the domain of communication and interaction skills (Table 5). The 14 working skills are numerically and individually rated on a Likert-type [85,88] four-point ordinal rating scale (1 = deficient performance; 2 = inefficient performance; 3 = uncertain performance; and 4 = competent performance) [109,112-114].

Table 5: Assessment domains (n=3) and skills (n=14) in AWP 1.1 [114]

Motor skills (n=5)		Process skills (n=5)		Communication and interaction skills (n=4)	
1	Posture	6	Mental energy	11	Physical communication and interaction
2	Mobility	7	Knowledge	12	Language
3	Coordination	8	Temporal organization	13	Social contacts
4	Strength and handling of objects	9	Organization of workplace	14	Information exchange
5	Physical energy	10	Adaptation		

The 14 skills mentioned in Table 5 were translated from Swedish solely for the use in this thesis to give the reader an understanding of the content of the various skills in the AWP; i.e., at the moment there is no English version of the instrument. If and when the AWP is translated into English, the process of translation will be presented in future studies.

The AWP can be used to assess the working skills of individuals with various kinds of work-related problems, but the instrument is not designed for any particular diagnosis or deficits. The AWP does not target any special tasks or contexts and can be used in various work assessment settings and with work activities performed in realistic or real life work situations or in more constructed or artificial environments [110,112].

Theoretical foundation for the AWP

The AWP is based on a theoretical model, the Model of Human Occupation (MOHO) [74]. The MOHO is a theoretical framework that explains the meaning and importance of activities for human beings and offers a common conceptual framework for the description of human occupation [74,75]. The model describes humans as open systems that constantly interact and change in the interplay with the physical and social environment surrounding them [74]. The MOHO seeks to explain how human occupation is motivated, patterned, and performed [74,75].

The instrument manual recommends that any user of the AWP should know the model (MOHO) as it will be easier for the assessor to understand the content of the assessment items and to interpret the results in relation to the model. An assessment based on a model or theory creates conditions that are conducive to a valid interpretation of assessment results. In the case of the AWP, the model may be very useful in helping the assessor to better explain or communicate assessment results to the client, a skill that is an important part of the assessment process [112].

In conclusion, the initial evaluation of the AWP indicated face validity and utility for the AWP that supported further development and evaluation of the instrument.

STUDY III

The majority of the respondents (n=67) of the questionnaire used in study III were female (82.1%) and the mean age was 44.7 years, ranging from 25-64 years (Table 6).

Table 6: The respondents' profession and employer (n=67) [113]

	<i>n</i>	%
Profession		
Occupational therapist	56	83.6
Work counsellor	7	10.4
Physio-therapist	1	1.5
Other profession ¹	3	4.5
Employer		
Public Employment Services Office	43	64.2
Social Insurance Office	9	13.4
Other ²	15	22.4

¹ Other professions stated by the respondents were for example work instructor and project leader.

² Examples of other employers were private companies, community based rehabilitation, public health care, and government service.

In this study, the respondents had performed a total of 7,498 assessments, and the median number of assessments was 20 assessments per person. Of the respondents, 50% had used the instrument for more than 12 months. Over half of the respondents (54.8%) had used the AWP 1-3 times a month, and 22.6 % used it several times a week. The median time to make an observation of a client using the AWP (data collection) was 2.5 hours (range 1-40 hours), and the median time to fill in the AWP assessment forms was 30 minutes (range 10-90 minutes). The AWP was most frequently used in a simulated work context (85.1%), but 13.4% of the respondents used the instrument in real work contexts. When the AWP was used, the clients worked in a variety of occupations: wood work, metal work, textile work, computer work, administrative task, and manufacturing/production tasks.

The results in study III indicated that the AWP

- has content validity,
- is comprehensible and clear regarding the assessment items and rating scale,
- is relevant, useful and efficient, and
- is flexible, practical and easy to administer.

Based on the constructive criticism provided by the respondents' comments in the questionnaire, several aspects were identified as worthy of further consideration for future development and application of the AWP:

- Respondents suggested that the AWP be complemented by other assessment instruments, such as interview instruments, to provide more deep and rich information about a client's work functioning.
- A few respondents found it confusing that the item "Energy" appeared in two skill areas – motor skills and process skills. It was suggested that one of the items should be renamed to avoid confusion.
- The respondents noted difficulties related to the use of the rating scale. Some found it hard to see any difference between steps in the AWP rating scale, and some had problems with different steps in the scale. It was also suggested that the instrument manual should have concrete examples of client performance related to the four steps in the rating scale.
- It was suggested that some guiding instructions should be included in the manual on how to inform the client about the purpose and use of the instrument and how to give feedback on the assessment results.
- Most of the respondents found the instructions in the assessment manual to offer enough guidance to use the instrument. Nevertheless, almost 70% of the respondents stated that some form of introduction of the instrument is desirable. Today, there are no formal courses or certifications offered for people using the AWP because the instrument is intended to be designed so that someone who knows the underlying model, the MOHO [74,75], should be able to learn how to use the instrument by reading the manual. Nevertheless, the results of this study indicate that there seems to be a need for an introduction to the instrument as a supplement to the instructions in the AWP manual.

In summary, the result indicated content validity and utility for the AWP, but the respondents concluded that there are things that can be improved.

STUDY IV

The major findings in study IV are listed below:

- The results indicate construct validity for the AWP because
 - all the 14 items in AWP have positive loadings (Figure 3) and contribute to component 1 (Figure 4); and

- the items in the three domains are relatively well clustered but still separated from each other (Figure 3), indicating that every item contributes with relatively unique information;
- Nevertheless, the results (Figure 3) indicate that the AWP may consist of two dimensions: one dimension with motor skills and one dimension with a combination of process skills and communication and interaction skills. This finding indicates that the process skills and the communication and interaction skills are inter-correlated and interwoven with each other. However, Figure 4 indicates that all 14 items in the AWP are relevant and contribute to component 1. This implies that all assessment items are needed as they each contribute with relatively unique information.
- The fact that there are no evident subgroups of clients indicates that AWP is sensitive and has the ability to discriminate between clients.
- Since there is no evident pattern or groupings of women and men in the score plot, the AWP does not seem to be affected by the client's sex. This agrees with the intentions of the AWP: the instrument is designed for assessing both male and female clients.
- The six raters seem to vary in their assessments; for example, one assessor tends to rate clients higher on the AWP rating scale. Perhaps it is not enough to learn how to use the instrument from the instructions in the instrument manual [110]. Nevertheless, there may be other reasons that explain why one rater differentiates somewhat in the AWP-ratings. This rater may have assessed clients with work-related problems that were different from the clients assessed by the other five raters. However, for the clients assessed by this rater, there are no evident patterns in the diagnoses that support the hypothesis that this rater may have worked with a client group with specific problems.

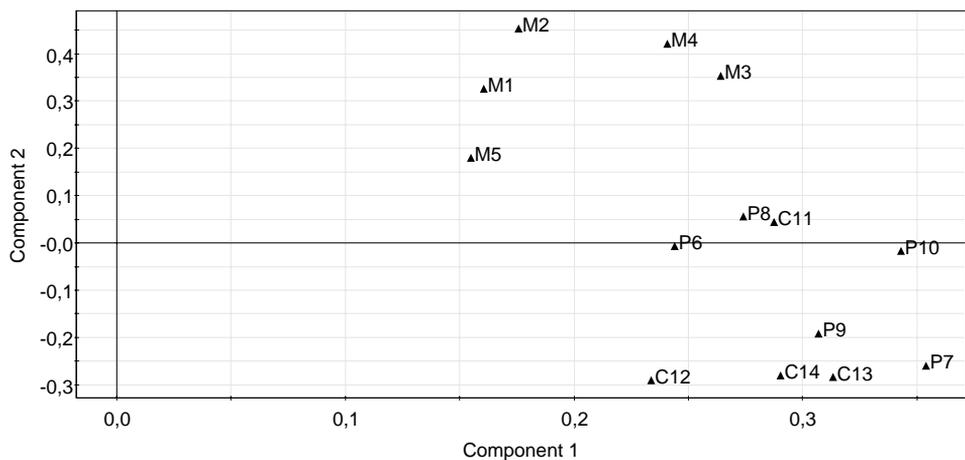


Figure 3: Variable plot for the PCA analysis of AWP. M1-M5=motor skills, P6-P10=process skills, and C11-C14=communication and interaction skills [114].

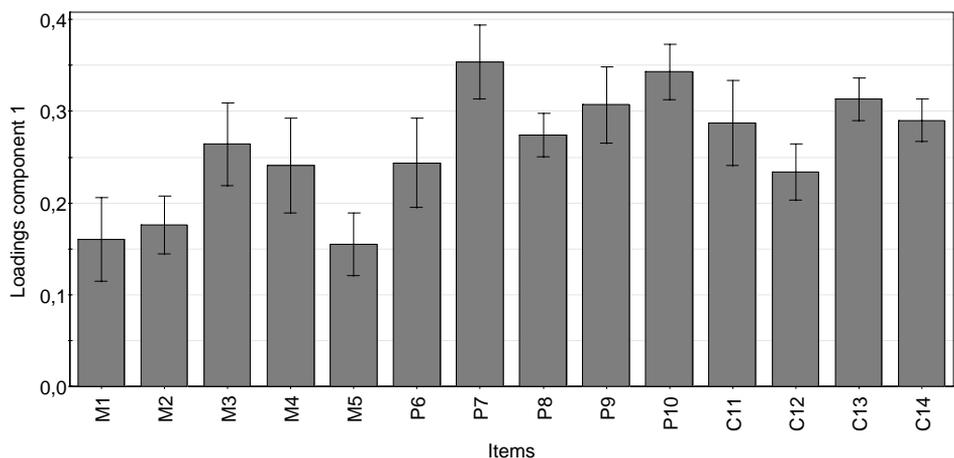


Figure 4: Loadings and confidence interval for each item in component 1 (Figure 3). M1-M5=motor skills, P6-P10=process skills, and C11-C14=communication and interaction skills [114].

In conclusion, the results of this study indicated that the AWP has construct validity, is sensitive, has the ability to discriminate between clients, and is unaffected by the client’s sex. The result of the construct validity testing of the AWP is only based on the 364 clients used in this study. As numerous studies often are needed to provide an accumulation of evidence of

construct validity [57,99], further studies of how and to what extent the AWP is able to discriminate between client groups with different work-related problems are needed.

GENERAL DISCUSSION

THE CONCEPT OF WORK

In this dissertation thesis, the concept of work means paid employment. However, this is of course a narrow definition of work. For example, Karlsson [68] includes non-paid housework as work. A person's paid employment can be largely affected by the housework situation. A person may have major expectations from the family, for example, with respect to specific housework duties. Therefore, it is always important to consider the total amount of workload for a person – both paid employment as well as other obligations in life such as housework – when assessing a client's work functioning. For example, research has shown that it is women who are predominantly affected by musculoskeletal disorders of the upper extremities, and stress and life events were shown to be positively associated with the presence of those disorders. Therefore, it is important to consider the interactive effect of biomechanical, physical and psychosocial work factors, as well as non-work environmental demands and stressors, particularly in populations of working women [80,86,87,150]. Moreover, unemployed women constitute a group with particular needs that must be considered when developing rehabilitation strategies, or the effects of vocational rehabilitation can even be negative [119].

THE CONCEPTUAL FRAMEWORK AWF

Study I [111] creates a conceptual framework for assessment of work functioning to define the purpose, delimitation, and possible assessment outcomes of the AWP [112]. The conceptual framework (AWF) has been an important tool when introducing the AWP to future users of the instrument. The AWF made it easier to explain the specific assessment outcome of the AWP, and it was possible to explain when and why the AWP has to be complemented by other assessment instruments. In the future, it would be interesting to perform an empirical validation of the conceptual framework AWF to test how well it covers all the factors influencing a person's work functioning. A more structured and controlled use of the AWF in a number of rehabilitation settings would help researchers evaluate the empirical validity (Figure 5).

THE NEED FOR A NEW OBSERVATION INSTRUMENT

Before the development of the AWP started, a review in the area of work rehabilitation and work assessment was carried out to ensure that there were no similar instruments on the market. The results of the review motivated the development of a new instrument because in Sweden few adequate, valid, and reliable observation instruments for assessing work performance exist [112]. Still, there is no observation instrument used in work rehabilitation, except for the AWP, that focuses specifically on assessment of a client's observable skills during performance of work. Furthermore, the Swedish National Labour Market Board (AMS), an organization that also sees a need for a new observation instrument, supported the development and evaluation of the AWP financially.

A COMBINED USE OF ASSESSMENT INSTRUMENTS

Because each work assessment instrument normally has a specific focus, a single instrument generally does not address all the multiple factors involved in a client's work functioning. Therefore, assessors should use two or more instruments in combination. This means that assessors must understand both what the AWP offers and what its limits are. In the vast majority of circumstances, it will not address all the work-related problems faced by a client, requiring the assessor to use other instruments along with it. The AWP assesses a client's observable skills during performance of work. The AWP answers the question "How efficiently and appropriately does the client perform work?" from the assessor's perspective. However, an assessment with the AWP does not answer *why* the client performs in a certain way. For example, an assessment with the AWP does not supply any information about the demands the client is exposed to in the work situation or how the clients experience their work functioning. Due to the specific purpose and delimitation of the AWP, the instrument should be incorporated into a methodology that considers the client's work functioning from a wider perspective than just observation of work performance. To get a more complete and correct understanding of the client's strengths and weaknesses, one assessment instrument is not enough. Supplementary assessment instruments are required. Therefore, an assessment with the AWP should be complemented with assessments that focus on other aspects of work functioning, such as interview instruments that consider the client's perspective. According to Kielhofner [75], a combination of observation and informal interviewing appears to be the most effective way to assess clients.

An adequate assessment of a client's work functioning is characterized by the following:

- a use of multiple data sources (e.g., client, employer, co-worker, other health professionals or assessing personnel);
- a use of multiple data collection methods (e.g., interview, observation or measurement using different assessment instruments for data collection); and
- triangulation of the data collected.

The use of multiple data collection methods across multiple data sources provides deep and useful information, which combines a subjective with an objective assessment of performance [59,140]. Using single methods, such as a structured interview, with single sources, such as an injured worker, does not always ensure that the data collected are adequate and reliable. Triangulation is essential in the assessment process involving the systematic analysis of the inter-relationships of collected data in order to interpret and, finally, make judgements regarding the client's work functioning [140].

The AWP may be used in combination with the previously mentioned instruments WRI [24,25,41,148], DOA [89,101], and VALPAR [102,103,145,146]. Another conceivable interview instrument is the Work Environment Impact Scale (WEIS), which collects information about how individuals with physical or psychosocial problems experience their work environment and how different factors in the work environment affect them [15,23,79]. The Occupational Circumstances Assessment Interview and Rating Scale (OCAIRS) could also be a complement to the AWP. The OCAIRS offers a structure for systematic collection and analysis of information about a person's total activity situation and the degree of adaptation in daily life. This helps the assessor create a picture of the person's whole life situation, as the OCAIRS does not focus only on the work situation [40,67]. The AWP may also be combined with the new instrument Assessment of Work Characteristics (AWC 1) [81]. The AWC describes the extent to which a client has to use different working skills to perform a work task in an efficient and appropriate way. The AWC is based on the AWP as the 14 assessment items in both instruments are mutual. However, there are major differences between the instruments:

- the instruments have different purposes as the AWP focuses on the person and assessment of the client's work performance, whether the AWC focuses on environmental attributes and assessment of the demands on a client when performing a work task;
- the instruments have different rating scales; and

- the procedure for assessment is not the same.

An initial evaluation of the content validity and utility of the AWC has been executed. The instrument was distributed to users of the AWP who used the AWC for a period and then answered a questionnaire (n=62, response rate 71%). For example, the result showed that the content of the AWC was considered to be relevant and clear, and the instrument was also experienced as flexible and easy to administer. Thus, the study motivates further development and evaluation of the instrument [81].

An advantage of the AWP, WRI, WEIS, OCAIRS, DOA, and AWC is that all these instruments have the same theoretical foundation, the MOHO [74,75]. Assessors who combine instruments based on MOHO in their practice will probably use the model to put together all the information yielded by the different instruments, a strategy that can make it easier for the assessor to create a more complete picture of the client's work functioning. Of course, there may be other instruments that may be combined with the AWP, such as the Work Role Functioning Questionnaire [21] or SASSAM [26]. However, the instruments listed above, such as the WRI, DOA, and VALPAR CWS, are frequently used in vocational rehabilitation settings in Sweden.

INTRODUCTION COURSE

Today, there are no courses or certifications offered for assessors using the AWP because the instrument is so designed that someone who knows the model, the MOHO [74,75], should be able to learn how to use it from the manual. However, the result in study III in this dissertation indicates that the users of the AWP would like an organized course or introduction to the instrument [113]. Furthermore, the results of study IV indicate that there may be a difference in how assessors rate clients and further motivates a formal introduction of the AWP [114].

THE ORDER OF EVALUATION OF THE AWP

The evaluation of the AWP started with a test of the instrument's face validity and limited testing of its utility [Study II]. It was followed by an examination of the content validity and

utility [Study III] and later on construct validity [Study IV]. Face validity is generally considered to be a part of content validity, and content validity is considered to be a prerequisite for other forms of validity, such as criterion-related and construct validity [57]. It has also been suggested that for context-sensitive instruments and instruments that tend more toward qualitative approaches, such as the AWP, validity and utility are more highly valued than aspects such as reliability and dependability. The latter aspects may be more important for quantitative assessments. However, all assessment instruments should demonstrate acceptable results regarding critical attributes, such as validity, reliability, and utility, but they may be required at different levels for different types of assessment instruments [60]. Therefore, the authors have started with an evaluation of validity and utility for the AWP, but future studies of the instrument will also consider reliability attributes such as inter-rater reliability.

FUTURE EVALUATION OF THE AWP

As a part of the ongoing development and evaluation of the AWP, the instrument is at present used by more than 300 registered users working in a number of different vocational rehabilitation settings in Sweden, and approximately more than 10 000 clients have been assessed with the instrument.

An evaluation of the predictive validity of the AWP is planned in collaboration with the National Labour Market Board (AMS). Establishing predictive validity is essential and would indicate whether the AWP is a valid predictor of a future criterion or not. For work-related assessments, a client's success in returning to work is a relevant criterion score and a valid indicator of the predictive validity of an assessment instrument [57]. Future evaluations of the AWP should also establish the inter-rater reliability and internal consistency reliability of the instrument.

Another aspect of the future evaluation and development of the AWP will be to evaluate how and with what results the instrument could be combined with other assessment instruments such as the AWC [81], WRI [24,25,41,148], and WEIS [15,23,79].

A graphic overview of performed and future evaluations of the AWF, AWP, and AWC is presented in Figure 5.

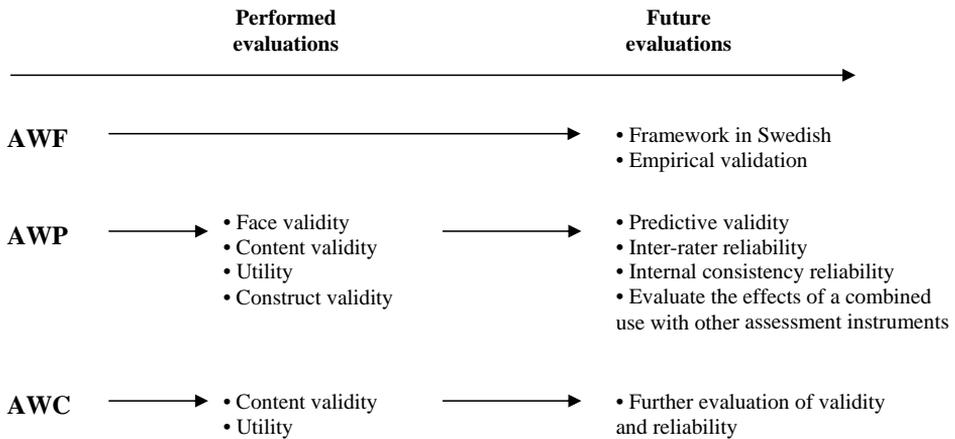


Figure 5: Performed and future evaluations of the AWF, AWP, and AWC.

As pointed out earlier in this thesis, single studies are not enough to determine the validity of an assessment instrument. This implies that multiple studies of various forms of validity are required [57,99]. For example, it is possible to further evaluate the construct validity of the AWP using alternative methods for analysis – i.e., methods other than Principal Component Analysis (PCA), such as factor analysis [57] or the Rasch Measurement Model [6,29,149,158,159].

USE OF ASSESSMENT INSTRUMENTS IN VOCATIONAL REHABILITATION

Vocational rehabilitation professionals often use assessment instruments to develop a course of intervention for clients [94,106]. However, there may be a risk that assessors ascribe assessment instruments too much significance and importance. There may be a risk that assessors have a “blind faith” in assessment instruments, where just the fact that an instrument is used is believed to be enough to guarantee the quality of an assessment. The assessor must always keep in mind what the purpose of an instrument is and what information it can contribute with. An assessment instrument is not “the solution for everything”, but merely a tool in the hands of a professional - the assessor. A sound and precise instrument helps the assessor collect information in a valid, reliable, and structured way, but it is the assessor who

must evaluate the information yielded by the used instruments, interpret its meaning, and evaluate in what way it contributes to the total understanding of a client's work functioning.

CONCLUSION OF RESULTS

Study I proposes a conceptual framework for different dimensions of work functioning and point out important factors for work assessment. The concepts proposed and defined in the study are work functioning, work participation, work performance, and individual capacity. The study was also conducted to create a conceptual framework to define the purpose, delimitation and possible assessment outcomes of the assessment instrument AWP. The conceptual framework (AWF) has been an important tool when introducing the AWP to potential users of the instrument. The AWF made it easier to explain the specific assessment outcome of the AWP, and it was possible to explain when and why the AWP needs to be complemented by other assessment instruments. The development and evaluation of the AWP is presented in study II-IV.

Study II develops an observation instrument for assessment of work performance, the AWP (Assessment of Work Performance), and provides an initial evaluation of face validity and utility for the instrument. The initial evaluation in study II was made within a group of 21 assessors in Sweden and the result indicated face validity and utility for the AWP that supported further development and evaluation of the instrument.

Study III investigates the content validity and utility of the AWP. A questionnaire was answered by 67 respondents who used the AWP in various work rehabilitation settings in Sweden. The result indicated content validity and utility for the AWP.

Study IV investigates the construct validity of the instrument AWP. This study is based on 364 assessments with the AWP (version 1.1) of clients with various work-related problems that went through an insurance medicine investigation at a Social Insurance Office in Sweden during the years 2004-2005. The major findings in this study indicated that the AWP has construct validity, is sensitive, has the ability to discriminate between clients, and is unaffected by the client's sex.

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Bedömning av Färdigheter i Arbete

- - -

BaFiA Version 1.1

In English:
Assessment of Work Performance 1.1
(AWP 1.1)

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Bedömning av färdigheter i arbete – BaFiA 1.1

Inledning

Syftet med detta bedömningsinstrument är att via observation bedöma en klients färdigheter vid utförandet av arbete. Med BaFiA bedöms klientens färdigheter inom tre områden: motoriska färdigheter, processfärdigheter samt kommunikations- och interaktionsfärdigheter. Dessa tre områden består i sin tur av totalt 14 stycken olika färdigheter. Instrumentet bygger på den teoretiska modellen A Model of Human Occupation (Kielhofner, 1995). Av denna anledning är det fördelaktigt om bedömaren har goda kunskaper vad gäller denna modell.

BaFiA kan användas för att bedöma färdigheterna i arbete hos klienter med alla former av arbetsrelaterad problematik, dvs instrumentet är ej sjukdoms-, skade- eller diagnosbundet. Bedömning kan ske i olika arbetsrelaterade uppgifter och i såväl reell som mer artificiell miljö, dvs instrumentet är ej heller uppgifts- eller kontextbundet.

BaFiA är aktuellt att använda då en klient uppvisar svårigheter inom ett eller flera av tidigare nämnda färdighetsområden.

Det är viktigt att påpeka att syftet med BaFiA endast är att bedöma en klients observerbara färdigheter vid utförandet av arbete. För att få en mer komplett uppfattning om en klients förmåga att utföra arbete bör därför bedömningar med BaFiA sättas in i ett sammanhang, där även andra faktorer som kan påverka arbetssituationen beaktas. En bedömning med BaFiA ger endast svar på *hur* effektivt och ändamålsenligt en klients utförande av en arbetsuppgift är, men inte svaret på *varför* det fungerar på detta sätt. En bedömning med BaFiA ger exempelvis inga svar på vilka krav individen utsätts för i arbetssituationen, t.ex. påverkan från olika miljöfaktorer. Instrumentet bidrar heller inte med information när det gäller hur klienten upplever arbetssituationens krav eller hur han/hon upplever sin arbetsförmåga. Instrumentet BaFiA kan därför med fördel kompletteras med olika bedömningsinstrument, vilka fokuserar på andra bedömningsfaktorer än BaFiA.

Bedömning med BaFiA

Det är en fördel om bedömaren får en introduktion och praktisk träning i hur instrumentet är avsett att användas och hur bedömning genomförs.

Klienten ska själv vara delaktig i och kunna påverka valet av arbetsuppgift för att uppgiften ska kännas meningsfull. Bedömaren ska informera klienten om syftet med bedömningen samt var, när och hur bedömning kommer att genomföras. Innan bedömning sker ska klienten ha erbjudits en rimlig tid för att lära sig arbetsuppgiften för att minimera risken att klienten får ett förbättrat bedömningsresultat vid en ny bedömning pga inläring eller praktisk träning.

Bedömning kan ske i vilken arbetsrelaterad miljö som helst, dvs bedömaren får i detta fall lita till sin kompetens och sina erfarenheter för att avgöra vad som är en adekvat uppgift och miljö för varje klient. Om klienten under utförandet av arbetsuppgiften använder sig av någon form av hjälpmedel eller anpassningar skall detta anges på första sidan i sammanställningsblanketten. Bedömaren ska dock vid bedömningen ej skatta klientens färdigheter lägre om han/hon använder hjälpmedel, utan dessa ska då betraktas som ingående i arbetsmiljön.

Tidsintervallet för bedömning är inte förutbestämt utan syftet med bedömningen får avgöra under hur lång tidsperiod bedömning ska ske. Exempelvis kan bedömning ske under ett fåtal timmar eller under en veckas tid, allt utifrån det unika behovet för varje enskild klient. Bedömaren får i detta fall åter lita till sin kompetens och sina erfarenheter för att avgöra vad som är en adekvat tidsrymd. Bedömningen ska dock göras i en och samma arbetsuppgift. Resultatet av bedömningen bör diskuteras med individen så snart som möjligt efter bedömningens slutförande, för att återkoppling ska ske medan såväl bedömaren som klienten har klara minnesbilder från bedömningssituationen.

Om man avser att utvärdera klientens färdigheter efter en viss tidsperiod genom att göra en ny bedömning, bör tidsintervallet vara så stort mellan bedömningarna att bedömaren inte "kommer ihåg" resultatet av den föregående bedömningen, för att minimera risken för påverkan av det tidigare bedömningsresultatet.

Bedömning sker genom att bedömaren observerar klientens utförande av någon arbetsuppgift. Bedömning ska ske genom direkt eller deltagande observation.

Bedömning sker inom tre områden: motoriska färdigheter, processfärdigheter och kommunikations- och interaktionsfärdigheter. Inom vart och ett av dessa tre områden återfinns ett antal centrala begrepp, 14 stycken totalt. Begreppen återspeglar de observerbara färdigheter en klient använder sig av vid utförandet av arbete.

Bedömaren gör under observationen kontinuerliga noteringar utifrån de centrala begreppen angående klientens utförande av arbetsuppgiften. Noteringarna samt övrig information som registrerats under observationsperioden används av bedömaren vid ifyllandet av sammanställningsblanketten.

Det är vid ifyllandet av sammanställningsblanketten som bedömaren gör den egentliga bedömningen av klientens färdigheter i arbetsuppgiften. Detta kräver att bedömningsmanualen finns tillgänglig för bedömaren som vägledning i bedömningsförfarandet.

Bedömning sker genom att bedömaren under varje färdighetsbegrepp gör en sammanfattande beskrivning av sina observationer av varje färdighet. Till sin hjälp i detta arbete har bedömaren ett varierande antal delfärdigheter som återfinns under var och en av de 14 färdigheterna. Dessa delfärdigheter används som vägledande begrepp vid sammanfattningen av varje färdighet.

Sammanfattningen ligger sedan till grund för skattningen på den fyrgradiga skalan, där 4 är det högsta värdet och 1 det lägsta. Skattningen 4 indikerar att klientens utförande av arbetsuppgiften är kompetent, ändamålsenligt och effektivt. Skattningen 1 indikerar att klienten har betydande problem att utföra arbetsuppgiften på ett kompetent, ändamålsenligt och effektivt sätt. Om färdigheten inte går att bedöma i den valda arbetsuppgiften skattas denna med EA, Ej Aktuellt.

Att BaFiA har en fyrgradig skala beror på att bedömaren på så sätt måste besluta sig för om klientens utförande av arbetsuppgiften är övervägande negativt (värde 1 och 2) eller övervägande positivt (värde 3 och 4). Om skalan skulle vara femgradig kan det föreligga en risk att bedömaren i stor utsträckning skattar värde 3, ex. då bedömaren saknar eller har bristfällig information. Om information saknas om en färdighet skall bedömaren istället skatta EA. Om bedömaren tvekar mellan två skalsteg vid bedömning av en klient ska det lägre skalsteget väljas då det är den lägsta prestationen som ska ligga till grund för skattningen. Observera att skattningarna på den fyrgradiga skalan ej kan summeras till någon slutsumma som sedan kan jämföras med andra individer osv.

Skattningarna på den fyrgradiga skalan kan även föras samman i en översikt som återfinns på den sista sidan av sammanställningsblanketten. Om bedömaren önskar kan linjer dras mellan markeringarna i översikten vilket ger en grafisk profil över klientens färdigheter i arbete. Om denna möjlighet används bör bedömaren vara observant på att i de fall skattningsalternativet EA använts, och en linje dras mellan skattningarna, kan en missvisande grafisk profil över klientens prestation framträda, dvs profilen ger sken av en alltför låg grad av prestation pga att skattningsalternativet EA använts.

Sammanställningsblankettens första sida

På sammanställningsblankettens första sida ska anges:

Bedömare: *Bedömarens namn.*

Bedömning nr: *Här anges vilken bedömning i ordningen det är, d.v.s. den första bedömningen benämns nummer 1, den andra nummer 2 o.s.v.*

Klientdata

Namn: *Här anges klientens namn.*

Personnummer: *Här anges klientens personnummer.*

Kön: *Här anges om klienten är man eller kvinna.*

Arbetsrelaterad problematik: *Här anges kortfattat den problematik klienten har i relation till arbete. Detta omfattar såväl fysisk, psykisk som social problematik. Alla individdata som av bedömaren bedöms kunna påverka utförandet av arbetsuppgiften noteras här. Om klienten har någon form av medicinering som kan påverka bedömningsresultatet ska även detta anges.*

Bedömningssituation: *Här beskrivs den arbetsuppgift bedömaren bedömer klienten i. De i arbetsuppgiften ingående momenten ska kortfattat beskrivas.*

Hjälpmedel/anpassningar: *Här anges om klienten använder någon form av hjälpmedel vid utförandet av arbetsuppgiften. Här noteras också om arbetsplatsen/arbetsmiljön eller arbetsuppgiften anpassats på något sätt.*

Datum: Observationstillfälle/period: *Här anges den tidsperiod under vilken bedömaren genomfört sina observationer.*

Faktisk bedömning: *Här anges den tidpunkt bedömaren gjort den faktiska bedömningen av klientens färdigheter i arbete, dvs när bedömaren sammanställt bedömningsresultatet. Denna bedömning bör göras så snart som möjligt efter avslutad observation för att minimera risken att någon information glöms bort eller förändras pga en alltför lång tidsrymd mellan observation och bedömning.*

Observationsform: *Här anges vilken typ av observation bedömaren använt sig av. Direkt observation innebär att bedömaren observerar klienten utan att själv på något sätt deltaga i utförandet av uppgiften. Vid deltagande observation är bedömaren på något sätt delaktig i utförandet av uppgiften och bör ta hänsyn till eventuell påverkan av detta faktum vid skattningen.*

BaFiA – ett instrument under utveckling

Färdighetsbegreppen i BaFiA grundar sig huvudsakligen på de begrepp som återfinns i kapitlet om "Skills" i den teoretiska modellen A Model of Human Occupation (Kielhofner, 1995), ur vilket för området (arbete) relevanta begrepp valts ut, översatts och i vissa fall modifierats. En del begrepp är mer eller mindre nykonstruktioner medan andra begrepp i kapitlet "Skills" (Fisher et al., 1995) helt uteslutits. En begränsad prövning av instrumentets innehållsvaliditet ("face validity") har även genomförts. Denna validitetsprövning indikerar att BaFiA är ett relevant bedömningsinstrument utifrån sitt syfte (Sandqvist, 1997).

Denna version av BaFiA har fått den numeriska beteckningen 1.1 då vissa förändringar gjorts vad gäller ffa bedömningsmanual och layout i förhållande till version 1. Mer detaljerad information om gjorda förändringar i instrumentet kan erhållas från Jan Sandqvist (se nedan för kontaktinformation).

För närvarande pågår fortsatt prövning av olika former av validitet, reliabilitet och sensitivitet för instrumentet, vilka får utvisa om instrumentet har de egenskaper man kan kräva av ett väl utformat bedömningsinstrument. Resultatet av dessa prövningar kan leda till att instrumentet revideras i framtiden.

Om Du har några frågor gällande BaFiA är Du välkommen att höra av Dig på något av nedanstående sätt.

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Definitioner av färdigheter

Motoriska färdigheter

Motoriska färdigheter är observerbara och ändamålsenliga kroppsställningar och kropps rörelser som används vid utförandet av olika arbetsuppgifter.

Motoriska färdigheter består av fem olika färdigheter. Dessa är *kroppsställning*, *rörlighet*, *koordination*, *styrka/hantering av föremål* och *energi*. I var och en av dessa färdigheter ingår ett varierande antal delfärdigheter.

Kroppsställning

Förmåga att stabilisera och placera sig i förhållande till omgivning och arbetsuppgift.

- **Stabilisera:** Förmåga att upprätthålla balans och bålkontroll under arbete.
- **Inta position:** Postural förmåga att placera kroppen ändamålsenligt i förhållande till objekt och arbetsuppgift.

Rörlighet

Förmåga att förflytta kropp och kroppsdelar i förhållande till omgivningen.

- **Gå:** Förmåga att använda sin kropp för att gå, vända sig och ändra riktning.
- **Sträcka:** Förmåga att använda armarna och bålen för att kunna nå och placera objekt.
- **Böja:** Förmåga att aktivt böja, rotera och vrida kroppen på ett ändamålsenligt sätt.

Koordination

Förmåga att samordna olika kroppsdelars rörelser i förhållande till varandra och i relation till miljön.

- **Koordinera:** Förmåga att samordna rörelser vid bilaterala och trilaterala (som involverar både händer och fötter) uppgifter.
- **Manipulera:** Förmåga att använda finmotoriska rörelser och isolerade fingerrörelser vid hantering av föremål.
- **Vara följsam:** Förmåga att utföra isolerade arm- och handrörelser i en sammanhängande följd och ha "flyt i rörelserna".

Styrka/hantering av föremål

Förmåga att använda styrka/hantera föremål på ett ändamålsenligt sätt vid utförande av arbete.

- **Greppa föremål:** Förmåga att använda styrka för att gripa och släppa föremål vid arbete.
- **Skjuta föremål:** Förmåga att skjuta föremål längs en understödsyta eller runt en axel.
- **Dra föremål:** Förmåga att dra föremål längs en understödsyta eller runt en axel.
- **Lyfta föremål:** Förmåga att lyfta föremål från en understödsyta.
- **Transportera föremål:** Förmåga att bära eller frakta föremål under förflyttning.
- **Anpassa muskelstyrka/hastighet/rörelseomfång:** Förmåga att använda lämplig styrka, hastighet och rörelseomfång utifrån arbetssituationens krav.

Energi

Förmåga att utföra och slutföra arbete inom rimlig tid och utan att bli fysiskt uttröttad.

- **Vara uthållig:** Förmåga att utföra och slutföra arbete utan att ta ut sig.
- **Bibehålla tempo:** Förmåga att bibehålla hastighet och slutföra arbete inom rimlig tid.

Processfärdigheter

Processfärdigheter är de observerbara handlingar som används för att på ett ändamålsenligt sätt planera, anpassa och genomföra olika arbetsuppgifter

Processfärdigheter består av fem olika färdigheter. Dessa är *energi, kunskap, tidsorganisation, planering av arbetssituationen* och *adaptation*. I var och en av dessa färdigheter ingår ett varierande antal delfärdigheter.

Energi

Förmåga att utföra och slutföra arbete med bibehållen uppmärksamhet utan att bli psykiskt uttröttad.

- **Vara uthållig:** Förmåga att utföra och slutföra arbete utan att ta ut sig psykiskt.
- **Bibehålla uppmärksamhet:** Förmåga att fokusera på relevanta aspekter vid utförandet av arbete.

Kunskap

Förmåga att använda kunskap vid utförandet av arbete.

- **Välja:** Förmåga att selektera lämpliga verktyg och material som krävs vid utförandet av arbetsuppgiften.
- **Använda:** Förmåga att bruka och hantera verktyg, material och övrig miljö på ett ändamålsenligt sätt vid arbete.
- **Efterfråga information:** Förmåga att söka och ta reda på verbal (skriftlig/muntlig) eller icke-verbal information.
- **Slutföra:** Förmåga att genomföra en arbetsuppgift i enlighet med uppgiftens syfte och mål.

Tidsorganisation

Förmåga att initiera, fortsätta, avsluta och utföra arbete i logisk ordningsföljd.

- **Initiera:** Förmåga att påbörja enskilda handlingar utan påtaglig tvekan vid arbete.
- **Fortsätta:** Förmåga att utföra enskilda handlingar utan avbrott vid utförandet av arbete.
- **Utföra i ordningsföljd:** Förmåga att utföra enskilda handlingar i en logisk följd för effektivt utnyttjande av tid och energi vid arbete.
- **Avsluta:** Förmåga att slutföra enskilda handlingar utan upprepning.

Planering av arbetssituationen

Förmåga att organisera arbetsplats och föremål.

- **Planera:** Förmåga att placera och arrangera verktyg, material och övrig miljö på ett för arbetsuppgiften lämpligt sätt.
- **Iordningställa:** Förmåga att ställa tillbaka verktyg och material och iordningställa arbetsplatsen till ursprungligt skick.

Anpassning

Förmåga att notera/reagera, anpassa beteende och anpassa miljön vid arbete.

- **Notera/reagera:** Förmåga att lägga märke till och svara på icke-verbala miljömässiga och perceptuella ledtrådar som ger återkoppling beträffande arbetets fortskridande.

- **Anpassa beteende:** Förmåga att förutse konsekvenser och utifrån detta modifiera sina handlingar samt att kunna förändra sina handlingar då problem uppstår under arbete. Förmåga att dra nytta av tidigare erfarenheter för att förutse och förhindra att oönskade omständigheter och problem uppstår.
- **Anpassa miljö:** Förmåga att förutse konsekvenser och utifrån detta modifiera omgivningen samt att kunna förändra omgivningen då problem uppstår under arbete.

Kommunikations- och interaktionsfärdigheter

Kommunikations- och interaktionsfärdigheter är de observerbara färdigheter som används vid umgänge med andra människor och vid givande och mottagande av information. Dessa färdigheter gör det möjligt för individen att förmedla sina behov och intentioner samt koordinera sitt sociala beteende vid interaktion med andra människor.

Kommunikations- och interaktionsfärdigheter består av fyra olika färdigheter. Dessa är *fysisk kommunikation och interaktion, språk, relationer* och *informationsutbyte*. I var och en av dessa färdigheter ingår ett varierande antal delfärdigheter.

Fysisk kommunikation och interaktion

Förmåga att fysiskt kommunicera och interagera med andra människor.

- **Gestikulera:** Förmåga att använda lämpliga kropps rörelser vid kommunikation och interaktion för att uttrycka, delge eller betona information.
- **Använda ögonkontakt:** Förmåga att använda ögonkontakt för att kommunicera och interagera med andra.
- **Närma sig:** Förmåga att placera sig på lämpligt avstånd i förhållande till andra människor vid arbete och konversation.
- **Inta kroppsställningar:** Förmåga att inta kroppspositioner som är passande för arbetsuppgiften och interaktionen. Kroppsställningar innefattar också att förmedla icke-verbala meddelanden med sitt kropps språk.
- **Kontakt:** Förmåga att använda fysisk kontakt i lämplig grad. Detta kräver en medvetenhet och förmåga att tolka andra människors reaktioner på fysisk kontakt samt den betydelse fysisk kontakt har i olika sociala situationer.

Språk

Förmåga att använda språk vid kommunikation och interaktion.

- **Anpassa språk:** Förmåga att använda ord på ett relevant sätt i meningsfulla fraser och meningar för att förmedla sina tankar och känslor. Förmåga att kunna uttrycka sig grammatiskt riktigt.
- **Anpassa tal:** Förmåga att tala på ett mjukt och flytande sätt utan störande avbrott samt att kunna anpassa talets volym, tonfall, hastighet och varaktighet.
- **Fokusera:** Förmåga att koncentrera sig på en konversation och använda logiska och meningsfulla fraser och meningar som är relevanta i sammanhanget. Förmåga att "hålla sig till ämnet", "följa en röd tråd" m.m.

Sociala kontakter

Förmåga att åstadkomma förbindelser och social samhörighet med andra personer.

- **Etablera kontakt:** Förmåga att spontant initiera interaktion, få någons uppmärksamhet, ta sig in i en pågående interaktion mellan andra personer m.m.
- **Bibehålla kontakt:** Förmåga att agera på ett sådant sätt att komfortabla förbindelser upprätthålls med andra personer. Förmåga att hålla kvar andra personers uppmärksamhet och få dem att fortsätta interaktionen.
- **Anpassa beteende:** Förmåga att kunna anpassa sitt sociala beteende efter arbetssituationens krav.

- **Samarbeta:** Förmåga att samverka med andra för att kunna utbyta information och objekt samt att samordna sitt arbete med andra.

Informationsutbyte

Förmåga att kunna utbyta information med andra.

- **Fråga:** Förmåga att efterfråga information, hjälp och bekräftelse från andra personer.
- **Delge:** Förmåga att informera andra personer.

Referenser

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Sandqvist, J. (1997). "Development of instrument for assessment of working skills". Bachelor of Science thesis, Linköpings universitet, Sweden.

BaFiA - Sammanställningsblankett

Bedömare: _____

Bedömning nr: _____

Klientdata

Namn: _____

Personnummer: _____

Kön: Man Kvinna

Arbetsrelaterad problematik: _____

Bedömningssituation: _____

Hjälpmedel/anpassningar: _____

Datum: Observationstillfälle/period: _____

Bedömning: _____

Observationsform: Direkt Deltagande

1**Bristande utförande**

Genomförandet av uppgiften är ej ändamålsenligt och/eller effektivt samt ger ett oacceptabelt resultat.

2**Ineffektivt utförande**

Genomförandet av uppgiften är ineffektivt och ger ett ej tillfredsställande resultat.

3**Tveksamt utförande**

Genomförandet av uppgiften är tveksamt, vilket får bedömaren att ifrågasätta det riktiga i utförandet. Vanligtvis har bedömaren en vag känsla av osäkerhet beträffande klientens färdigheter.

4**Kompetent utförande**

Det finns ingen tvekan hos bedömaren utan klientens utförande är kompetent och ändamålsenligt samt ger ett bra resultat.

EA= Ej aktuellt

Motoriska färdigheter

1. Kroppsställning (stabilisera, inta position)	EA	1	2	3	4
2. Rörlighet (gå, sträcka, böja)	EA	1	2	3	4
3. Koordination (koordinera, manipulera, vara följsam)	EA	1	2	3	4
4. Styrka (greppa, skjuta, dra, lyfta, transportera, anpassa muskelstyrka/hastighet/ rörelseomfång)	EA	1	2	3	4
5. Energi (vara uthållig, bibehålla tempo)	EA	1	2	3	4

1**Bristande utförande**

Genomförandet av uppgiften är ej ändamålsenligt och/eller effektivt samt ger ett oacceptabelt resultat.

2**Ineffektivt utförande**

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4**Kompetent utförande**

Det finns ingen tvekan hos bedömaren utan klientens utförande är kompetent och ändamålsenligt samt ger ett bra resultat.

EA= Ej aktuellt

Processfärdigheter

6. Energi (vara uthållig, bibehålla uppmärksamhet)	EA	1	2	3	4
7. Kunskap (välja, använda, efterfråga information, slutföra)	EA	1	2	3	4
8. Tidsorganisation (initiera, fortsätta, utföra i ordningsföljd, avsluta)	EA	1	2	3	4
9. Planering av arbetssituationen (planera, iordningställa)	EA	1	2	3	4
10. Anpassning (notera/reagera, anpassa beteende, anpassa miljö)	EA	1	2	3	4

1**Bristande utförande**

Genomförandet av uppgiften är ej ändamålsenligt och/eller effektivt samt ger ett oacceptabelt resultat.

2**Ineffektivt utförande**

Genomförandet av uppgiften är ineffektivt och ger ett ej tillfredsställande resultat.

3**Tveksamt utförande**

Genomförandet av uppgiften är tveksamt, vilket får bedömaren att ifrågasätta det riktiga i utförandet. Vanligtvis har bedömaren en vag känsla av osäkerhet beträffande klientens färdigheter.

4**Kompetent utförande**

Det finns ingen tvekan hos bedömaren utan klientens utförande är kompetent och ändamålsenligt samt ger ett bra resultat.

EA= Ej aktuellt

Kommunikations- och interaktionsfärdigheter

11. Fysisk kommunikation och interaktion (gestikulera, använda ögonkontakt, närma sig, inta kroppsställningar, kontakt)	EA	1	2	3	4
12. Språk (anpassa språk, anpassa tal, fokusera)	EA	1	2	3	4
13. Sociala kontakter (etablera kontakt, bibehålla kontakt, anpassa beteende, samarbeta)	EA	1	2	3	4
14. Informationsutbyte (fråga, delge)	EA	1	2	3	4

Sammanfattning av skattningar

Översikt över skattningar av de 14 färdigheterna

Färdighet	Motoriska färdigheter					Processfärdigheter					Kommunikations- och interaktionsfärdigheter			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Skattning	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA

Sammanfattande kommentarer

Paper I

Work functioning: A conceptual framework

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Abstract. Adequate and reliable methods for evaluation of clients with work disabilities are crucial for both the individuals who are assessed and for society as a whole. Sound and precise work assessments are needed to guide clients to suitable interventions using a minimum of rehabilitation resources [31,46,51,68]. Occupational therapy literature contains evidence that work function assessments are complex and that there is confusion over work assessment concepts [30,31]. Therefore, further development and evaluation of adequate concepts and theoretical models within the area of work assessment is needed [68,74]. This article proposes a conceptual framework for different dimensions of work functioning and points out important factors for work assessment. The concepts proposed and defined in the article are: work functioning, work participation, work performance, and individual capacity.

Keywords: Occupational therapy, ability, performance, capacity, assessment

1. Introduction

This article reviews literature within the “occupational therapy” and “assessment of work” domains. The review served as a foundation for the development of the proposed conceptual framework presented in the article.

An individual’s ability to perform different kinds of activities in life is a central concern of occupational therapy and one of these activities is work [5]. The concept of work has been fundamental to occupational therapy theory and practice ever since the birth of the profession in the beginning of the 20th century [5, 24,29,32,48,50,53–55,62,71]. Furthermore, the term occupational therapy indicates that the profession addresses the rehabilitative needs of disabled workers [5]. Karen Jacobs [32] states that:

“Work is at the heart of the philosophy and practice of occupational therapy. In its broadest sense, work, as productive activity, is the concern in almost all therapy” [p. XI].

The way in which occupational therapists have been devoted to work as an activity has varied through the years. Since the beginning of the 20th century, occupational therapists have been influenced by a number of theoretical perspectives concerning the use of work as a therapeutic treatment method. There are three main perspectives, described in an overview by Lohman and Peyton [48], which have affected the practice of the profession: the medical model, the pre-vocational model and the biopsychosocial model.

The *medical model* uses a scientific way to describing health. This model strives to simplify an individual’s situation. It understands that an individual’s situation is a direct result of their personal behaviors, choices and attitudes and nothing else. This model does not assign any particular importance to environmental conditions, neither physical nor social, which may also affect health. The model aims to discover and eliminate disease. Interventions are based on the person’s biological status [37]. The use of the medical model helped occupational therapy gain integrity within the medical world. Increasing collaboration with medicine was considered essential for the development of occu-

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pational therapy and for recognition of the profession within society.

The *pre-vocational model* prepares an individual to return to work by teaching or training certain “basic skills” which are necessary for performance of work. These skills include general physical and mental skills that are essential to most jobs.

The *biopsychosocial model* is a multi-dimensional model. It considers the relations between factors that influence an individual’s ability to work, including biological, psychological and socio-cultural factors [48]. Even if one part of this model focuses on biological conditions, it is substantially different from the medical model because it includes psychological and socio-cultural aspects. Though the roots of this model can be found early in occupational therapy history, the model was developed in more detail during the 1960s. Since then, it has been used in occupational therapy practice. Reilly’s thoughts about biopsychosocial factors [59] gradually led to the development of models such as *The Model of Occupational Behavior and The Model of Human Occupation* [39,47]. One of the characteristics that distinguish the biopsychosocial model is the assertion that rehabilitation should be implemented in close connection with the individual’s proposed job, such as in realistic work environments and during the performance of real tasks. This is commensurate with the aim of contemporary vocational rehabilitation practices, which assess individuals to determine their individual ability to fulfil a worker role [30,61]. Within the area of work rehabilitation, Swedish occupational therapists currently strive to consider both personal, as well as environmental factors that influence the person. They seek a better understanding of the person’s work situation [21,64]. Within rehabilitation settings where professionals employ pre-vocational rehabilitation and medical rehabilitation methods, their assessments often do not take into account the external influences on an individual’s ability to work, especially environmental factors (social and physical) [51].

2. Assessment of occupational performance

An individual’s ability to perform activities is not a static phenomenon. For example, it changes, regardless of the activity or the environment. Specifically an individual’s ability to perform activities also depends on the requirements of the situation [49,56]. Nordenfelt [56] considers the performance of activities to be a non-absolute occurrence. He claims that an individual

does not have a general ability or inability to perform activities. There are, according to Nordenfelt, three mutually dependent factors that hinder or enable an individual, or “agent,” to perform work activities:

- the agent involved
- the goal of this agent
- the circumstances in which the agent acts [56, p. 101]

It is the dynamic relationship between the person, his or her activities, and the surrounding environment that decides the person’s occupational performance [2,8,36,38,44,45,73]. Reduced ability is described as the discrepancy between the person, his or her activities, and the environment in which the activities are performed. There must be a harmony between the person, the activity, and the environment to accomplish an efficient occupational performance [2,45]. The environmental influences on an individual’s ability can be divided into two different aspects. Haglund and Henriksson [22] name these the occupational norm and the occupational circumstances. The occupational norm refers to the socio-cultural consensus regarding how an activity should be performed. The occupational circumstances include the environmental attributes and demands necessary to perform an activity [22]. According to this, occupational performance could be understood as the relation between two factors: the person and the environment (including the occupational norm and the occupational circumstances).

Assessment of an individual’s abilities to perform activities serves as the foundation for almost everything occupational therapists do [44,63]. In the past, occupational therapists focused mainly on assessing basic functions, such as joint motion, perception, and intelligence, rather than assessing the individual’s ability to perform activities [2,17,52]. They based their interventions on the assumption that training of separate functions would automatically lead to an improved occupational performance [71]. Nevertheless, these basic (underlying) functions are poor indicators of an individual’s ability to perform activities. Research has shown that it is not possible to predict how an individual will use his or her basic functions in different activities and contexts [17]. For this reason, these assessments were insufficient for predicting an individual’s occupational performance in various situations [3,71,74]. Therefore, contemporary occupational therapists assess the person in realistic and meaningful activities or occupations, so as to more accurately understand an individual’s abilities [14–16,25,43,57,70]. Instead of assessing

basic functions, they identify and analyze skills that are visible during the performance of activities. These skills are observable elements of action with different functional purposes. There are three types of skills that can be observed during occupational performance: motor skills, process skills, and communication and interaction skills [17]. Every individual uses a number of observable skills, both acquired and inborn, in their performance of activities [45]. These skills can then be used to describe what the individual is able, or not able, to do in different activities [17]. For this reason, the occupational therapist should assess the individual's ability to perform activities, not his or her basic functions. Furthermore, the assessment should follow what is often called a "top-down approach" [15,16,71]. Using this approach, the occupational therapist should begin by identifying both the individual's roles, which activities he or she must perform, and the individual's goals, what the individual wants, or is expected to manage, after the rehabilitation period. Based on his or her observations of the individual performing activities, the occupational therapist can then identify the factors influencing the individual in this particular case [71]. However, there are situations when it is necessary to investigate whether, or how, the basic functions are affected (e.g. motor, cognitive or emotional functions). Such an investigation may help the therapist understand and explain the cause of a reduced ability to perform activities. The occupational therapist might consider how disturbances of the basic functions may affect ability. However, the primary focus of occupational therapy is still to improve the person's performance of activities, rather than improving the basic functions [17,37,43, 52].

The factors influencing the performance of activities can be assessed at different levels depending on which type of, or how much, information the occupational therapist needs for a satisfactory understanding of the individual's occupational situation. Therefore, assessments could focus on a variety of factors. These factors could include the person's competency in, and satisfaction with life roles; skills in performance of activities; or basic functions such as muscle strength, joint motion or memory.

Different levels of functioning can also be found in the International Classification of Functioning, Disability and Health, the ICF [76]. The ICF provides a unified language and framework for the description of human functioning and disability as an important component of health. It classifies functioning and disability according to an individual's life circumstances. The

ICF organizes information into two dimensions: body functions and structures and activities and participation. The body functions and structures dimension refers to the physiological or psychological functions of body systems and the anatomical parts of the body such as organs, limbs, and their components. The activity and participation dimension refers to the performance of tasks or actions by an individual and to the individual's ability to function in various life areas [76].

3. Assessment of work functioning¹

The last decades have shown an increasing need for work rehabilitation due to work disability for reasons such as an aging workforce and occupational stress [77]. When an individual's ability to work is reduced, there are social and economic consequences for both the individual and society. Therefore, reduced work functioning is not only a medical problem but also a socio-economic one [1,34,35,46,53].

Besides sleep, work is the activity that occupies the most amount of time in an individual's life [33]. Therefore, assessment of work functioning can affect an individual on many levels and his or her whole life situation [35,46]. Gary Kielhofner [35] explains why a reliable assessment of work functioning is important, saying:

"... functional assessment is often used to determine what freedoms a person will and will not have, what roles he or she may take on, what activities he or she may do, and what benefits or resources he or she will receive" [p. 248].

Because an individual's ability to work is so intimately associated with his or her position in society, the assessment could affect other people's perception about the individual's basic human dignity [35].

There are several reasons why gaining an understanding of work functioning may be problematic. Work functioning is not a simple concept. Rather, it concerns a relationship between several elements. Specifically, if an individual is to manage a job, he or she has a number of needs which must be fulfilled. Simply tending to an individual's physical and psychological needs may not always be enough to help them

¹Work functioning in this article is used as an umbrella term for all forms of work-related functioning and includes functioning in different dimensions and on different levels, i.e. body, individual and society levels.

successfully return to work. Therefore, it is important for occupational therapists to broaden their focus while performing assessments. They must look beyond the individual's internal capacities or biomedical diagnosis and consider, for example, psychosocial or environmental factors [18,68].

In literature concerned with assessment of work functioning, there is a consensus that work functioning should be assessed in the individual's real work situation. There is also agreement that both the individual's capacities and the specific demands and opportunities in the work environment or the work situation should be considered [30,31,35,46,51,53,61,68,74].

Thus, the individual's ability to perform work should be assessed on several different levels [30]. Similarities between various conceptual frameworks, which outline different levels of functioning, can be found in the top-down approach [71], work-related assessments [30], Lohman and Peyton's conceptual models of practice, i.e. the medical model, the pre-vocational model and the biopsychosocial model [48], WHO's ICF [76], A Model of Human Occupation [38], and specified rehabilitation areas (Table 1).

4. Factors of importance for work functioning

To sufficiently understand an individual's work functioning it is not enough to assess the efficiency and appropriateness of an individual's work performance. It is also necessary to find out why the person functions in a certain way. To find the answers to these questions, there are several factors that must be considered. These factors could be personal, environmental or temporal.

4.1. Personal factors

Several personal factors may affect an individual's ability to perform work or their ability to understand a work situation. There are both physical and psychological characteristics which can affect, or be affected by, the work situation or other aspects of his or her life. Research has identified the impact of a number of personal characteristics, including; age [78], sex and gender [4,9,13], basic functions, such as muscle strength and endurance or memory (human capital), impairments or biomedical diagnosis [4,26,65,68], values, activity choices, occupational choices, vocational interests, work commitment [19,28,42], interests in general, attitudes, health or well-being (in relation to the person's values) [12,65], job satisfaction [4,7,27,

60], personality and identity [28,69], career attainment, worker role and other roles in the person's life [23,72], habits, geographic mobility (individual), vocational adjustment and coping ability [65], balance between work and leisure [58], and education [65].

4.2. Environmental factors

There are many environmental factors which affect an individual's work functioning in different ways [10]. They can be divided into two groups: environmental factors related to working life and environmental factors related to private life.

Environmental factors related to working include values in society, labor market, physical work environment [42], work adjustability or adaptability, demands of the work tasks or duties [26,65], workload, geographical barriers [23], organizational variables [60, 66], attitudes and support in the workplace and social support from fellow workers [75], salary [11,20], and the prestige or status of the occupation in society [4, 19].

Environmental factors related to private life include social support from family and friends outside the workplace [75], family influences, crossover effects of work and family i.e. work-family interface [12,67], expectations and demands, the person's social class [6], the person's economy (economic situation), and culture [4].

4.3. Temporal factors

An individual's ability to work may also be affected by temporal factors. By assessing the personal and environmental factors listed above, an occupational therapist may gain a better understanding of the individual's present work situation. However, the point in time when this assessment is made is also very important. For example, the individual's past experiences and expectations about the future could also influence his or her current work conditions. His or her earlier work experience, work history, education, and other life experiences could greatly affect his or her present ability to work [40,41,65]. When assessing personnel, it is important for an occupational therapist to consider the individual's hopes and expectations for his or her future work situation, and his or her larger life goals and beliefs about his or her own work functioning in the future. The constant changing demands of some work places or the general condition of the labor mar-

Table 1
Comparison of concepts in different conceptual frameworks.

“Top-down approach” [71]	“Work related assessments, individual factors” [30]	“Conceptual models of practice” [48]	ICF [76]	Model of Human Occupation [38]	Rehabilitation area
Sense of efficacy and Self-Esteem, Satisfaction with life roles, Competency in task or life roles	Role	The biopsychosocial model	Participation (society level) &	Participation	Vocational rehabilitation
Activities, Abilities (and skills)	Activity, Task, Skill	The pre-vocational model	Activities (individual level)	Performance (incl. Skills)	Pre-vocational rehabilitation
Developed capacities, First-level capacities, Cognitive-neuromusculoskeletal substrate	Body system	The medical model	Body functions and structures (body level)	Performance capacity	Medical rehabilitation

ket [42,75] also influence an individual’s future work prospects.

Temporal factors could also impact functioning on three different levels including, on the level of the body, the individual, and society. To use the terminology of the ICF [76], an individual’s bodily functioning refers to his or her anatomical, physiological and psychological capacities at a given point of time, such as during a single measurement or assessment. On the individual level, functioning relates to performance of activities over a given period of time such as work performance in a certain activity over a period of one week. On the “highest” level of functioning, the level of society, temporal factors have no predetermined time limits and can vary from situation to situation. Therefore, they may have a varied effect on an individual’s ability to participate in society through work. For example, there could be a crucial difference between the results of an assessment on the body level at a given point of time, compared with an assessment of the person’s performance of a realistic work activity in a real work environment over a longer period of time. Therefore, it is important for the assessor to consider the temporal factors when evaluating an individual’s work functioning.

5. Proposed conceptual framework for assessment of work functioning

The conceptual framework proposed in this article focuses on the previously mentioned aspects of assessment, i.e. assessment dimension, influence of personal and environmental factors, and influence of the temporal factors. The framework aims to clarify certain aspects in the area of work assessment so as to make it easier for occupational therapists to describe which aspects of an individual’s work functioning they are focusing on in different assessment situations. Here,

the term work functioning refers to all forms of work-related functioning as it appears on different levels, i.e. body, individual, and society level.

5.1. Different dimensions of work functioning

Work function assessments consider three separate dimensions. The proposed concepts for the three different dimensions of assessment are; work participation as it pertains to society, work performance as it pertains to the individual, and individual capacity as it pertains to physical and psychological functioning.

Dimension 1: Work Participation & Society

Work participation is an individual’s ability and opportunities to fulfill a worker role and acquire and/or maintain a work position in society. This dimension is not only related to the individual, but also to societal factors such as the conditions of labor market, the society’s financial safety net, laws and regulations, etc. Within this dimension, there is a complex interaction between personal and environmental factors and the temporal aspect. This dimension focuses on the public support for the individual, the demands placed upon him or her and his or her ability to utilize the opportunities that the community provides.

Dimension 2: Work Performance & The Individual

Work performance is an individual’s ability to satisfactorily perform different work activities and tasks required for a certain work position. These abilities are evident during the actual execution of work activities by the individual. To describe the work performance of an individual, an occupational therapist must assess the individual while he or she performs a work activity, such as observation of the client’s working skills during performance. Occupational therapists should ask, “How purposefully and effectively is a work activity performed?” and “What is the quality of the outcome (product or service) of the work activity?” A work per-

Table 2
Proposed conceptual framework for work functioning in comparison with the ICF [76]

Proposed conceptual framework	ICF [76]
Work participation: The person's ability and possibility to fulfil a worker role and acquire or maintain/retain a work position in society.	W O R K Participation (society level) &
Work performance: (including Working skills) The ability to satisfactorily handle and carry out different work activities and tasks.	F U N C T I O N Activities (individual level)
Individual capacity: Different physical and psychological attributes that enable the person to perform work tasks and activities, e.g. muscle strength, joint motion, sensibility, memory and cardio-pulmonary functions.	B O D Y Body functions and structures (body level)

formance assessment made in a realistic work setting, or if possible, in the actual work place over an adequate period of time yields the most accurate results [35,46, 51,68,74].

Dimension 3: Individual Capacity and Physical/Psychological Functioning

Individual capacity refers to the physical and psychological attributes that enable an individual to perform work activities. These attributes include muscle strength, joint motion, sensibility, memory and cardio-pulmonary functions. This dimension is not directly connected to the actual execution of work activities, but focuses instead on underlying functions that indirectly affect the individual's ability to perform work. These functions vary on an individual basis and also depend heavily on the context in which they are being performed. Therefore, there is no linear relationship between underlying functions and an individual's ability to perform work, because there may be other reasons why an individual performs in a certain way, such as motivational factors.

The natural focus for assessment of work functioning should be on the person's ability and opportunities to fulfill a worker role and acquire and/or maintain a work position in society (work participation), i.e. the society level using the terminology of the ICF [76] (Table 2).

This does not mean that other dimensions of assessment are not important. In contrast, examining these dimensions could help a therapist to obtain a broader picture of an individual's work situation. However, it does imply that a limitation of capacity for example may be one factor contributing to an individual's work

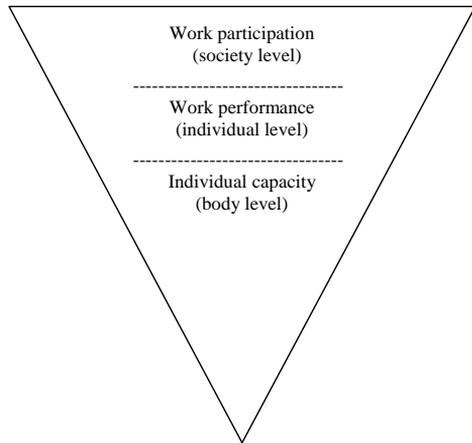


Fig. 1. Dimensions in assessment of work functioning.

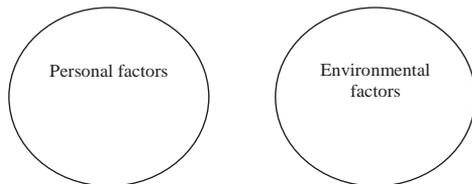


Fig. 2. Personal and environmental factors influencing work functioning.

functioning but not necessarily the fundamental one.

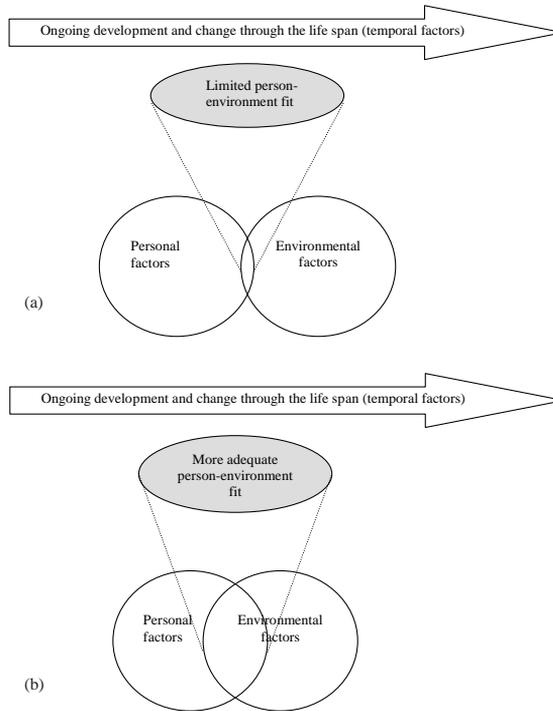


Fig. 3. (a): Limited fit between person and environment. (b): More adequate fit between person and environment.

Due to the interactive relationship between the three dimensions, a significant change in one dimension could influence one or both of the other dimensions [36,38, 76]. Ideally, a work assessment should simultaneously focus on all three dimensions, which are related to each other in a correlational (interactive-dynamic) way, but not necessarily in a causal (causal-linear) way. Because it is almost impossible to predict whether, or how, a change in one dimension affects the other dimensions, ideal assessments include three independent assessments of the individual from each of these dimensions. Examples of such assessments are evaluation of the client's worker role (society level), observation of the person performing an activity (individual level), or measurement of a work-related pain condition (body level). It is also important to point out that there is no hierarchy between the dimensions. They merely focus on different aspects, or levels, of functioning. The assessor must therefore always collect and interpret results of assessments in all three dimensions to find out

which information that is most decisive for the client's future work situation.

The different dimensions may be understood more readily in visual terms, as an inverted cone, where the work participation dimension is wider than the other two dimensions because it focuses on the person's interaction with society and not only on individual factors (Fig. 1).

5.2. Factors influencing work functioning

In order to work, an individual must be able to balance his or her personal abilities and characteristics (personal factors) with factors external to the person (environmental factors) (Fig. 2). These factors may constrain or support the person's work functioning. Whether a certain factor constrains or supports work functioning is individual, and may even vary for the same person in different situations.

Personal factors are the physical and psychological aspects of the individual that in different ways affect

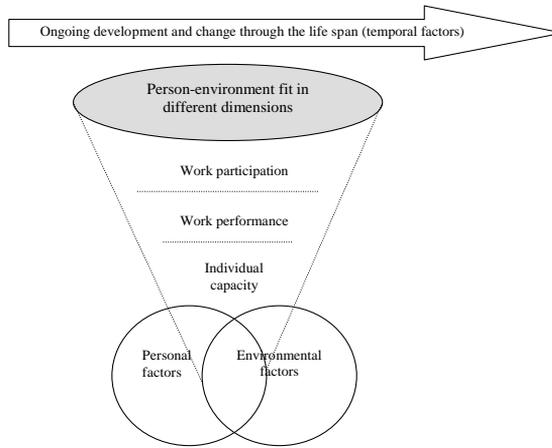


Fig. 4. Work functioning in different dimensions.

the person's work functioning. The personal factors influencing work functioning are so varied that it is not meaningful to make an attempt to classify all of them in the conceptual framework proposed in this article. The personal factors influencing each individual have to be investigated from situation to situation. For example, one individual may not be able to work because of a pain condition that limits his or her work performance, and for another individual it may be the lack of a worker role that restricts satisfactory work functioning.

Environmental factors contain two components that influence work functioning; 1) the physical, psychological and social circumstances under which the work activity is carried out, and 2) the socio-cultural consensus regarding how a certain work activity should be carried out. Environmental factors interact with the individual in all three dimensions, but in different ways. In the work participation dimension, there are mainly societal factors, such as the labor market, legislations and regulations, and other resources in society that affect a person. Within the work performance dimension, the individual is primarily interacting with the physical and social environment in his or her workplace and with the physical and social environment in his or her private life, such as family and friends. In the individual capacity dimension, such things as temperature, light and sounds affect the underlying functions. Because factors normally can affect the functioning in more than one dimension, it is not possible to say that a certain factor influences the work functioning in one, and only one, of the dimensions.

The interaction between person and environment is dynamic, and the functioning changes over time, i.e. an individual's functioning can change between one situation and a situation later on. This implies that functioning has both spatial and temporal considerations. Functioning can be viewed as a fit between an individual and his or her environment in order to function in the area of work. The constantly ongoing interaction across time and space results in a changing fit, i.e. functioning, between the person and his or her environment. The closer the overlap, or fit, the more harmonious is the functioning. This dynamic interaction, with effects of the influencing factors on work functioning, i.e. personal and environmental factors, and the time perspective, will vary across time and change through an individual's life span (Figs 3(a) and (b)).

5.3. Summary

The aspects mentioned above, the assessment dimensions and the influencing factors, can be summarized and visualized in a graphic figure where different factors influence functioning in different dimensions (Fig. 4).

6. Conclusion and discussion

The proposed conceptual framework presents a number of concepts that will discern different aspects of work functioning assessments. These aspects include

1) dimensions of work functioning, and 2) factors influencing work functioning, such as personal factors, environmental factors and temporal factors. The three work functioning dimensions are work participation, work performance, and individual capacity.

An individual's functioning in the area of work occurs on a continuum, rather than on one or the other side of a clear boundary distinguishing ability from disability. Work functioning is not a clear-cut fixed condition. It is accurate to consider the functioning as existing along a continuum with indistinct and changing boundaries. Because the complexity of assessments make them "unstable," they should be regarded solely as a temporary description of an individual's functioning. Likewise, the person may only be regarded as temporarily disabled. This suggests that an individual's work functioning assessment may yield different results at a later time and under other circumstances or work conditions.

Another aspect of the assessment of work functioning is the "objective" and the "subjective" perspective of an assessment. The meaning of the terms "subjective" and "objective" can be different, but one way of defining them is as follows. An objective assessment means that someone, such as an occupational therapist, assesses the client's work functioning and interprets the results. A subjective assessment means that the client assesses his or her own work functioning. Ideally, a work assessment should consider both the therapist's (objective) and the client's (subjective) perspective because these two people may have different opinions about the client's work performance. For example a client and his or her therapist may have different opinions about the importance of different factors influencing the work situation. It is important for the therapist to seek out the client's opinion. This allows the therapist to better understand the unique life circumstances of that client.

The conceptual framework presented in this article is not a complete description of all possible factors influencing people's work functioning, or an attempt to show how, and to what extent, different factors influence each other. Further studies, of both the existing literature as well as of an empirical nature, are needed to test the validity of the factors presented. The description of the factors has to be more detailed and specified, and the relations between the factors must also be investigated and clarified. Due to these shortcomings of the conceptual framework, it is important that the structure be regarded solely as a conceptual framework and not as a model. Another shortcoming of the presented framework is the lack of concepts for describ-

ing reduced work participation, work performance, and individual capacity.

The framework might be used as a screening tool that could make it easier for assessing personnel to clarify their client's problem area. This could indirectly lead to more adequate and well-founded interventions. The framework could also be used in the assessment process when the personnel select one or more instruments to be used for a particular client. Nationwide studies in Sweden [21,64] indicate that a number of different assessment instruments are used within work rehabilitation settings in Sweden today. However, a conceptual framework that could help the personnel to choose suitable instruments for various situations or the needs of different clients is not routinely used.

This article has presented some arguments that explain why a social perspective is important in work assessment. As argued before, it is not enough to merely assess the personal factors without considering environmental and societal circumstances. Work functioning cannot be understood outside its social context. The present focus on biomedical diagnoses in work assessment causes a particular problem in society, since work functioning may often be reduced even though no diagnoses have been found [68].

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Paper II

Assessment of Work Performance (AWP) – development of an instrument

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Abstract. Adequate work assessments are a matter of importance both for individuals and society [25,29,31,38,40,46,52]. However, there is a lack of adequate and reliable instruments for use in work rehabilitation [14,15,20,21,31,44]. The purpose of this study was to develop and evaluate an observation instrument for assessing work performance, the AWP (Assessment of Work Performance). The purpose of the 14-item instrument is to assess the individual's observable working skills in three different areas: motor skills, process skills, and communication and interaction skills. This article describes the development and results of preliminary testing of the AWP. The testing indicates a satisfactory face validity and utility for the AWP and supports further research and testing of the instrument.

Keywords: Occupational therapy, measurement, instrument development, skills, MOHO

1. Introduction

Assessment of a person's work functioning¹ requires a multidimensional approach and consideration of numerous aspects [2,11,12,14,23,31,35,39–41,43,45,51,52]. It requires a broad focus of assessment whereby assessing a person's physical and psychological functions is not sufficient, but psychosocial or environmental factors must also be included [2,9,12,14,23,39,40,43,45,46,51]. If possible, work functioning should be assessed in the individual's real work situation, and both the person's individual capacity and the specific demands and opportunities of the work environment

and the work situation should be considered [17–19,22,25,29,32,33,38,42,45,46,49,52].

According to a conceptual framework presented by Sandqvist and Henriksson [41], the following aspects must be considered when assessing a person's work functioning: assessment dimension, influence of personal and environmental factors, and influence of temporal factors. The three different dimensions of assessment are: work participation (society level), work performance (individual level), and individual capacity (body level). Personal factors are the physical and psychological aspects of the individual that affect the person's work functioning. Environmental factors contain two components that influence work functioning: 1) the physical, psychological and social circumstances under which the work activity is carried out, and 2) the socio-cultural consensus concerning how a certain work activity should be carried out. Environmental factors interact with the individual in all three assessment dimensions. The interaction between person and environment is dynamic, and the functioning changes over time, i.e. an individual's functioning can change

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¹Work functioning in this article is used as an umbrella term for all forms of work-related functioning.

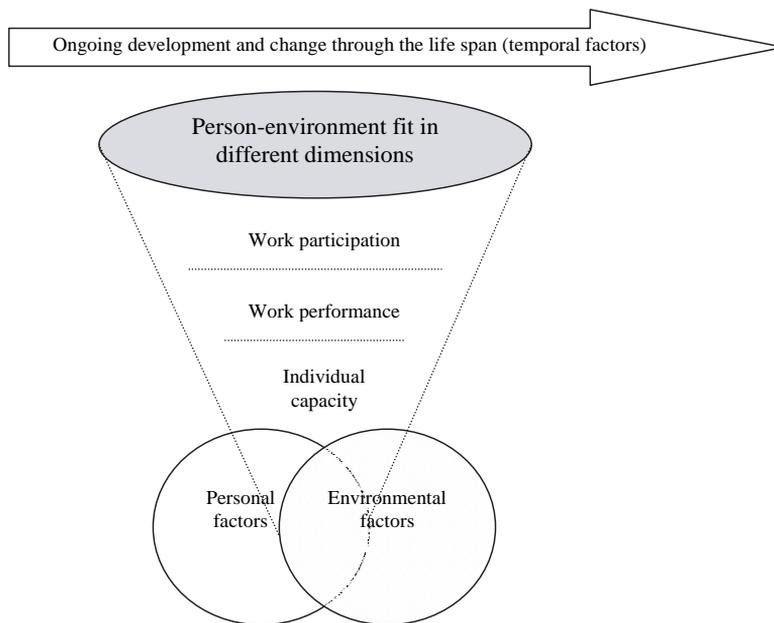


Fig. 1. Work functioning in different dimensions [41].

between one situation and another. Moreover, the individual's past experiences and expectations of the future could influence current work conditions. This implies that work functioning comprises spatial and temporal aspects. Work functioning can be understood as the result of a dynamic interaction between an individual and the environment to enable the individual to function in the area of work. This constantly ongoing interaction across time and space results in a changing fit, i.e. functioning, between the person and the environment that can vary over time and change through the individual's life span. The closer the overlap, or fit, between the person and environment, the more harmonious and adequate is the functioning (Fig. 1).

To sufficiently understand a person's functioning in the area of work, it is not enough to assess how efficient and appropriate a person's performance of work is from an assessor's perspective (an objective perspective). It is also necessary to discover why the person functions in a certain way. Therefore, it may be necessary to assess how the individual experiences the work situation and work functioning (a subjective perspective) [41,45]. The individual's total life situation, including values and goals in relation to work, should also be analyzed [22,45]. These aspects can be summarized graphically (Fig. 2):

A reliable assessment of a person's work functioning is important as the results of an assessment can affect the person's entire life situation [25,52] and may determine whether a person is entitled to compensation from the sickness insurance system or other forms of financial compensation from society due to loss of earnings [29,31,38]. Therefore, it is vital that assessing authorities have sufficient adequate information to support their standpoints when a person's work functioning is assessed [46]. One means of collecting the necessary information, and thereby of creating a sufficient foundation for decisions, is to use valid and reliable assessment instruments [20,21,47].

However, many instruments used in work rehabilitation show insufficient evidence of qualities such as validity and reliability [14,20,21,29]. Validity is the degree to which an instrument measures what it is intended to measure [3,14,20,34,37], and reliability is the degree of consistency or dependability with which an instrument measures the attribute it is designed to measure [3,14,21,34,37]. Nationwide surveys in Sweden indicate that a number of different assessment instruments are used within work rehabilitation settings in Sweden, usually designed and constructed within the local assessment settings and of the "check-list" type.

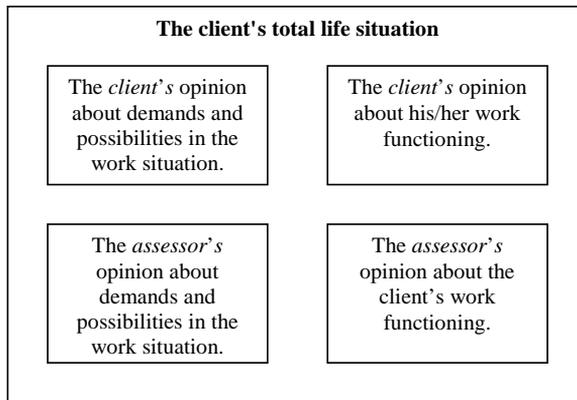


Fig. 2. Different aspects in work assessment.

However, the instruments have seldom been exposed to adequate testing of their specific qualities, such as validity and reliability, and are usually not based on a model or theory. In general, the instruments lack operational definitions of their assessment items [15, 44].

2. Assessment of work performance – AWP

2.1. Theoretical foundation

The “Assessment of Work Performance” (AWP) is developed from an occupational therapy perspective and based on a theoretical model, the Model of Human Occupation (MOHO) [26], which is intended to be used by occupational therapists in their daily work. The MOHO is a theoretical framework that explains the meaning and importance of activities for human beings, and offers a common conceptual framework for the description of human occupation [26,27]. The model describes humans as open systems that constantly interact and change in the interplay with the physical and social environment surrounding them [26]. The MOHO seeks to explain how human occupation is motivated, patterned, and performed [26,27].

2.1.1. Occupational performance skills

In the performance of everyday activities, a number of different skills are used. According to Fisher and Kielhofner [8], three types of occupational performance skills can be observed during the execution of activities: motor skills, performance skills, and communication and interaction skills. Motor skills are ob-

servable actions, such as body movements and positions, used to transport the self or objects. Process skills are observable operations used to organize and adapt actions in time in order to complete an occupational form. Communication and interaction skills are observable actions used to communicate intentions and needs, and coordinate social behavior to facilitate interaction with people. Whereas motor and process skills focus on activities and the physical world, communication and interaction skills are more directed to, and have their consequences in, the social and cultural world. The concepts of the occupational performance skills provide a conceptual framework for reasoning about and describing the elements of occupational performance [8]. The occupational performance concepts in the MOHO [8] are closely connected to the development of two assessment instruments: the Assessment of Motor and Process Skills (AMPS) [1, 6–8,13,36] and the Assessment of Communication and Interaction Skills (ACIS) [8,10].

The skills terminology in the MOHO [8] served as the foundation for the development of the items in AWP. The instrument is based mainly on the 1995 version of MOHO [26], as this version gives a more detailed description of occupational performance skills, with operational definitions of the assessment items [8], compared with the 2002 version of the MOHO [27]. Therefore it was necessary to base the development of AWP on the MOHO from 1995 [26]. However, the AWP is in line with the MOHO from 2002 [27] as this version has a similar description and classification of occupational performance skills as the 1995 version [26], but no operational definitions of the assessment items.

2.2. Purpose and field of application

The purpose of the AWP is to assess an individual's observable (working) skills during work performance, i.e. how efficient and appropriate the client performs a work activity. The items in the AWP are developed mainly from concepts incorporated in the MOHO as presented by Fisher and Kielhofner [8]. The AWP is intended to be used not only by occupational therapists but also by other professionals working with the assessment of work functioning. However, it is recommended that any user of the AWP be familiar with the MOHO because the interpretation and valuation of the assessment results will be more adequate and meaningful if the assessor understands the concepts behind the instrument and how it is all put together according to the model. It is also assumed that an assessment with the AWP is used as part of therapy. Just as it is a strength that an assessment is theory-based, it is equally important that therapy is based on theory. It is assumed that if the assessors are using assessments based on a theory that theory will probably be used in intervention as well.

Related to the conceptual framework for assessment of work functioning [41], an assessment with the AWP comprises the following aspects: The instrument assesses the observable outcome of the dynamic relationship between the person and the environment, i.e. the work performance (individual level). With the AWP the assessor describes the client's current work performance (time perspective), i.e. the assessment is not focused on previous or future work performance. The data collection method is observation, and it is the assessor who interpretes assessment results and the client's work performance, i.e. an assessment from an objective perspective (Table 1).

The assessment results give the assessor a description of *how* the client performs in a work activity, but no information about *why* the client functions in a certain way. The assessment is related to the work situation, and the instrument provides no information about the client's life situation in general.

2.3. Content

The AWP uses observation as a data collection method, and assesses the client's observable working skills in three domains: motor skills, process skills, and communication and interaction skills. These three domains contain 14 different skills in total; 5 in the domain of motor skills, 5 in the domain of process skills,

and 4 in the domain of communication and interaction skills (Fig. 3).

The motor skills domain contains skills such as mobility, coordination, and strength. The process skills domain includes skills such as organization of time, planning of the work situation, and adaptation. Finally, the communication and interaction skills domain consists of skills such as social contacts and information exchange. The skills are numerically and individually assessed on a Likert-type four-point ordinal rating scale (1 = deficient performance, 4 = competent performance). As this is ordinal data, the numerical assessment of the items cannot be summarized into a total score for all items, and thus it cannot be divided into a quotient [37,48].

AWP can be used to assess the working skills of clients with different kinds of work-related problems, i.e. the instrument is not designed for any particular diagnosis or deficits. The AWP does not target any special tasks or contexts, and assessment can be made of any work tasks performed in realistic or real life work situations, or in more constructed or artificial environments. The time period for an assessment is not predetermined, but can vary from a few hours to weeks, depending on the unique requirements of each client. For each individual client assessors must rely on their competence and experience when determining an adequate period of time for assessment. Although the period of time for assessment can vary, the assessor should strive to make the assessment in only one work task at a time and not mix several different work tasks in one assessment. This would make it difficult for the assessor to discriminate in which tasks or situations the client is performing well or is having problems.

2.4. Development

The development of the AWP started by formulating the purpose of the instrument and defining its target group, i.e. people with work-related problems. After that, a literature review in the area of work rehabilitation and work assessment was carried out to ensure that there were no similar instruments on the market. The results of the review motivated the development of a new instrument as there was a lack of adequate, valid, and reliable observation instruments in Sweden for assessing work performance [15,44].

After deciding to base the new instrument on the MOHO, a more profound analysis of the concepts and items that describe occupational performance skills was carried out [8]. Relevant items in the area of work

Table 1
Assessment aspects and data collection method for the AWP

Focus of assessment	Personal factors	Environmental factors	Interaction between personal and environmental factors
Assessment dimension	Individual capacity (body level)	Work performance (individual level)	Work participation (society level)
Time perspective	The past situation	The present situation	The future situation
Data collection method	Observation	Interview	Measurement/test

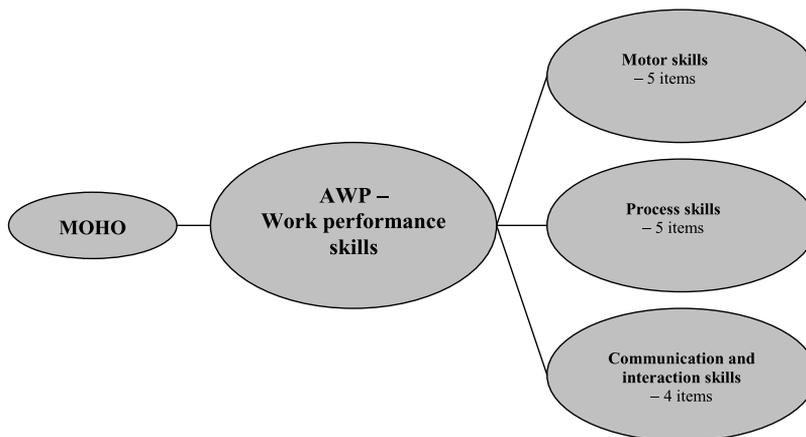


Fig. 3. Content of the AWP in relation to the MOHO.

were then selected and translated from the MOHO [8], and when necessary, were modified by the authors. If an item in the model was not relevant to the area of work, the item was excluded from the AWP. Some items in the AWP have no counterparts in the model, but were constructed by the authors under the inspiration of the concepts in the model [8]. Examples of items in the MOHO [8] that were excluded from the AWP because they were irrelevant to the area of work rehabilitation were: the motor skill “aligns”; the process skills “searches/locates”, “gathers”, and “navigates”; and the communication and interaction skills “articulates”, “expresses”, and “asserts”. Examples of items whose meaning was slightly modified are: the motor skills “posture”, “positions”, and “coordinates”; the process skills “organizes” and “restores”; and the communication and interaction skills “speaks”, “focuses”, and “shares”. Some items in the MOHO were combined from two items to make a new single item in the AWP, including: the process skills “uses” and “handles”, and the communication and interaction skills

“emanates” and “modulates”. The “moves” motor skill in MOHO was divided into two items in the AWP. Two items in the AWP are new constructions that are not included in MOHO. One item is in the domain of process skills and one in the communication and interaction domain. Besides the changes in the items, the order of items in the three domains has been altered in the AWP in relation to the MOHO.

Different prototype versions of the instrument were developed and discussed among the authors before the present content and design of the instrument were established. A method called DELPHI [3] was used, where the authors and an external expert panel individually reviewed the different versions of the instrument before discussing them with each other. The external expert panel were composed of persons with significant experience from assessment in work rehabilitation, and gave the authors instant feedback from persons representing the intended user group for the instrument. After each review, the authors discussed their findings and opinions, and reached consensus about necessary

changes to the instrument. This phase of the development process went on for about six months, after which preliminary testing of the instrument was initiated.

2.5. Preliminary testing

The purpose of this study was to develop and evaluate the face validity and utility of the AWP. Face validity is the extent to which an instrument appears to measure what it purports to measure [37,48]. Utility represents the overall value of the instrument to the users in terms of its relevance, usefulness, efficiency, practicality, ease of administration, and flexibility [22].

2.5.1. Subjects

Preliminary testing of the face validity and utility of the AWP was made within a group of 21 assessors in Sweden with a varying amount of assessment experience; 13 occupational therapist working with work assessment with social insurance issues, and 5 occupational therapists and 3 work counsellors working within work rehabilitation ($n = 21$). The respondents were selected through convenience sampling. All the respondents were familiar with the AWP; the occupational therapists working with social insurance assessment were the most experienced users. The authors strived to engage respondents with varying amounts of experience of the AWP to examine whether the respondents' opinion about the instrument varied depending on how long they have used the instrument.

2.5.2. Methods

The respondents filled in a questionnaire with open-ended questions that contained questions about: whether the instrument was adequate for the intended purpose; whether anything essential was missing in the instrument (related to its purpose); whether any part of the instrument was irrelevant or superfluous; the grade of clarity and comprehensibility of the instructions for assessment and assessment items; to what extent the AWP is manageable in the daily work of the assessors, and how much time the assessor had to spend to get to know the AWP well enough to be able to use it. The questionnaire also included a question about the layout of the instrument. Finally, the respondents were asked to add their own comments about the instrument.

2.5.3. Results

In the following description of the respondents' answers there are sometimes less than 21 answers presented on a question, i.e. $n < 21$. The reason for this is an internal loss of information due to unanswered questions.

2.6. Adequacy

The majority of the respondents ($n = 18$) found the AWP adequate for the intended purpose and client group, and three of them suggested that an assessment with the instrument should be complemented by an assessment with an interview instrument.

2.7. Missing or superfluous parts

Seventeen respondents said that nothing essential was missing in the instrument. However, two respondents suggested that the AWP also should comprise factors such as stress, motivation, and the client's prior experiences. No part of the AWP was irrelevant or superfluous according to 17 of the respondents.

2.8. Clarity and comprehensibility of instructions for assessment and assessment items

The instructions for assessment (in the manual) were found to be clear and comprehensible by 18 respondents. Seventeen of the respondents said that the definitions of the assessment items were understandable. However, three of them suggested that the assessor should have good knowledge about the theoretical framework from which the instrument is developed, i.e. the MOHO [26] for a better understanding of the items and easier interpretation of the results. Two respondents indicated the communication and interaction skills as the most complicated skills area to assess in the AWP.

2.9. Manageability

Sixteen respondents experienced the AWP as user-friendly and manageable in their daily work, and they had no significant problems becoming familiar with the instrument. Three respondents said that they needed more time to become acquainted with the AWP before they could express an opinion, and one respondent was fairly uncertain about the instrument's manageability in daily work.

2.10. Learning time

Nineteen respondents said that they had to spend a reasonable amount of time to get to know the AWP, but six of them pointed out that the learning process was much easier if the assessor was familiar with the MOHO [26]. Two respondents recommended an introduction to the instrument, and regular meetings at which the instrument and its use could be discussed with experts.

2.11. Layout

The layout and design of the AWP was found to be adequate and easy to grasp by 13 of the respondents. Some respondents suggested that the manual should be complemented with one or more illustrative case examples to illustrate how an assessment could be performed.

3. Discussion

The result of the questionnaire indicates a satisfactory face validity and utility for the AWP. However, to be able to claim with acceptable certainty that an instrument is valid or reliable, it is necessary to examine several different forms of validity and reliability [20, 21]. The evaluation of the AWP started with a test of the instrument's face validity and will be followed by an examination of the content validity. Face validity is generally considered to be a part of content validity [20], and content validity is considered to be a prerequisite for other forms of validity, such as criterion-related and construct validity [20]. It has also been suggested that for context-sensitive instruments and instruments that tend more toward qualitative approaches, such as the AWP, validity and utility are more highly valued than aspects such as reliability and dependability. The latter aspects may be more important for quantitative assessments. However, all assessment instruments should demonstrate acceptable results regarding critical attributes, i.e. validity, reliability, and utility, but they may be required at different levels for different types of assessment instruments [22]. Therefore, the authors have initiated the further testing of the AWP with an evaluation of characteristics such as content validity, utility and construct validity in this order, but future studies of the instrument will consider reliability attributes such as inter-rater reliability.

It is important to point out that the purpose of the AWP is to assess a client's observable working skills during performance. The AWP answers the question "How efficiently and appropriately does the client perform work?" from the assessor's perspective. However, an assessment with the AWP does not answer why the client performs in a certain way. For example, an assessment with the AWP does not supply any information about the demands the client is exposed to in the work situation, or how the clients experience their work functioning. Due to the specific purpose and delimitation of the AWP, the instrument should be incorporat-

ed into a methodology that considers the client's work functioning from a wider perspective than just observation of work performance. To get a more complete and correct understanding of the client's strengths and weaknesses, one assessment instrument is not enough. Supplementary assessment instruments are required. Therefore, an assessment with the AWP should be complemented with assessments that focus on other aspects of work functioning, such as interview instruments that consider the client's perspective. According to Kielhofner [27], a combination of observation and informal interviewing appears to be the most effective approach to assessing clients.

One example of an interview instrument is the Worker Role Interview (WRI), which focuses on how psychosocial and environmental factors influence a person's ability to return to work after injury or illness [5, 50]. Another conceivable interview instrument is the Work Environment Impact Scale (WEIS), which collects information about how individuals with physical or psychosocial problems experience their work environment, and how different factors in the work environment affect them [4,28]. The Occupational Circumstances Assessment Interview and Rating Scale (OCAIRS) could also be a complement to the AWP. The OCAIRS offers a structure for systematic collection and analysis of information about a person's total activity situation and the degree of adaptation in daily life. This helps the assessor to create a picture of the person's whole life situation, as the OCAIRS does not focus only on the work situation [16,24]. All three instruments are also available in Swedish versions, denoted by adding an S to the name of each instrument, i.e. WRI-S, WEIS-S, and OCAIRS-S. Another instrument that in some situations can be combined with the AWP is A Dialogue About Ability Related To Work (DOA). DOA is directed toward clients with psychiatric or psychosocial problems, and the instrument's construct validity has been tested in psychiatric work rehabilitation [30]. One aspect of the future testing and development of the AWP will be to evaluate how the instrument could be combined with other assessment instruments.

Today, there are no courses or certifications offered for assessors using the AWP because the instrument is so designed that someone who knows the model, the MOHO [26,27], can learn how to use it from the manual. The manual recommends that any user of the AWP should know the model (MOHO) as it will be easier for the assessor to understand the content of the assessment items and to interpret the results. As instruments used

in work assessment settings usually are of the “check-list” type [15,44], they function more often as memory lists for the assessor than as assessment instruments where the assessor can interpret the results in relation to a model or theory. An assessment based on a model or theory creates conditions that are conducive to a valid interpretation of assessment results. In the case of the AWP, the model may be very useful in helping the assessor to better explain or communicate the assessment results to the client, which is an important part of the assessment process.

4. Conclusion

In the preliminary testing of the AWP in different assessment settings, the face validity and utility of the instrument appear to be satisfactory. This indicates that it is worthwhile further testing the instrument’s psychometric properties by testing its validity and reliability and how the AWP may be complemented by other assessment instruments for various needs, situations, and settings.

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Paper III

Title

Content Validity and Utility of the Assessment of Work Performance (AWP)

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Abstract

In the area of work rehabilitation, many decisions about future interventions for the client are based on the results of various kinds of assessments. Therefore, it is important that the assessment instruments used are adequate, useful, and reliable. The purpose of this study was to investigate the content validity and utility of the instrument Assessment of Work Performance (AWP) which is used to assess an individual's observable (working) skills during work performance, i.e. how efficient and appropriate a client performs a work activity. A questionnaire was answered by 67 respondents who used the AWP in various work rehabilitation settings in Sweden. The result indicates content validity and utility for the AWP that supports further testing of the instrument.

Keywords

Occupational therapy, measurement, instrument development, skills, MOHO.

1 INTRODUCTION

Although rehabilitation professionals use assessment instruments to develop a course of intervention for clients [13,17], evidence suggests that inconsistent assessment practice can arise from problems associated with the design, administration, and interpretation of work-related assessments [22]. Accurate work assessment helps disabled workers return to suitable employment or receive other adequate interventions. Unreliable and inadequate assessment instruments may complicate the rehabilitation process and result in immediate or latent health issues and socio-economic consequences for workers, their employers, and society [12,13,22]. To improve consistency in the work assessment process and accuracy of assessment outcomes, rehabilitation professionals should use valid, reliable, and useful assessment instruments [6,7,17,21,22].

Validity is the degree to which an instrument measures what it is intended to measure [5,6,15,16], and reliability is the degree of consistency or dependability with which an instrument measures the attribute it is designed to measure [5,7,15,16]. Content validity is the degree to which the items in an instrument adequately represent the universe of content [15,16]. In performance measurement, a very important characteristic of a measure is its utility (usefulness) [14]. Utility represents the overall value of the instrument for the users in terms of its relevance, usefulness, efficiency, practicality, ease of administration, and flexibility [8,14].

Because testing psychometric properties of assessment instruments is important [6-8,17], this study investigates the content validity and utility of the instrument Assessment of Work Performance (AWP) [18,20].

1.1 Assessment of Work Performance (AWP)

1.1.1 Theoretical foundation

The AWP is based on the Model of Human Occupation (MOHO) [3]. The MOHO is a theoretical model that offers a conceptual framework for describing human occupation and explains the meaning and importance of activities for human beings. Human occupation refers to the doing of work, play, or activities of daily living within a temporal, physical, and socio-cultural context [9,10]. To define the purpose, the limits, and possible assessment outcomes of the AWP, the instrument has been related to a conceptual framework for assessment of work functioning (AWF) [19,20].

1.1.2 Purpose and content

The AWP assesses an individual's observable (working) skills; that is, the AWP observes how efficient and appropriate the client performs a work activity. The AWP assesses three domains: motor skills, process skills, and communication and interaction skills. These three domains contain 14 skills: 5 in the domain of motor skills, 5 in the domain of process skills, and 4 in the domain of communication and interaction skills. The 14 skills are numerically and individually rated on a Likert-type four-point ordinal rating scale (1 = deficient performance, to 4 = competent performance) [18,20].

1.1.3 Field of application and use of the AWP

The AWP can be used to assess the working skills of individuals with various kinds of work-related problems, but the instrument is not designed for any particular diagnosis or deficits. The AWP does not target any special tasks or contexts and can be used in various work assessment settings and with work activities performed in realistic or real life work situations or in more constructed or artificial environments [18,20]. As a part of the development and

testing of the AWP, the instrument is used by more than 200 assessors working in a number of different work rehabilitation settings in Sweden.

1.1.4 Preliminary testing

Preliminary testing was made within a group of 21 users in Sweden with a varying amount of assessment experience. The testing indicated face validity and utility for the AWP that supported further testing of the instrument [20].

2 METHODS

2.1 Participants and procedure

A questionnaire was used to collect information about the content validity and utility of the AWP. The questionnaire contained 29 questions in total; question 1-5 were aimed to collect demographic data, while question 6-29 focused on the instruments content validity and utility. The majority of the questions had fixed response alternatives and were rated on a four-point ordinal rating scale, but it was also possible for the respondents to give written comments on a number of questions.

The questionnaire was sent to all expected users of the AWP in Sweden at the time of the study (n=151). All these users had previously committed to participating in the testing and evaluation of the AWP as a part of a national project in Sweden with the aim to test and evaluate the AWP. The national project is funded by the Swedish National Labour Market Board (AMS).

The inclusion criterion for participation required the respondents to have some practical experience using the AWP to assess people with work-related problems (in their work

rehabilitation setting). Of the 151 expected users, 54 had not used the AWP because of reorganization of their workplace, lack of time, change of work tasks, or change of place of work. The study sample eventually consisted of 97 people.

Three reminders were sent to the 97 users of the AWP. Out of these 97 users, 30 did not answer the questionnaire and gave no reason for not answering; i.e., they initially constituted a group of unexplained external dropouts. To follow-up the external dropouts, the first author contacted a random sample ($n=10$) of the non-responders ($n=30$) and asked them why they had decided not to participate in the study. The reasons given for dropout were similar to the reasons for not complying with the inclusion criterion: reorganization of the workplace, lack of time, change of work tasks, or change of place of work. The questionnaire was completed by 67 respondents, i.e. a response rate of 69 % (Table 1). Because some respondents did not answer some questions (the internal drop-outs), sometimes less than 67 respondents are represented in the presentation of the results.

The respondents answered the questionnaire anonymously and confirmed when they had filled in the questionnaire by sending the first author an e-mail.

2.2 Data analysis and statistics

The computer programme used for statistical analysis was SPSS version 12.5. Descriptive statistics (frequencies and percentages) were used to present the results of the questions with fixed response alternatives. Written comments made by the respondents on the open-ended questions in the questionnaire were analysed qualitatively.

Spearman's rho correlation coefficients calculated analysis of correlations. To analyze differences between groups, Fisher's Exact Test, Mann-Whitney U-test (with Bonferroni correction for multiple significance), and Kruskal-Wallis Test were used. The result was considered statistically significant when $P < 0.05$. Because the majority of the respondents

were occupational therapists, in the results three groupings – “Work counsellor”, “Physio-therapist”, and “Other profession” (Table 1) – were combined to form one group, “Mixed professions”. This group was analysed in relation to the group “Occupational therapist” in the analysis of the variable *profession*.

3 RESULTS

3.1 Respondents to the questionnaire

The majority of the respondents were female (82.1%) and the mean age was 44.7 years, ranging from 25-64 years (Table 1).

Table 1: The respondents’ profession and employer (n=67)

	<i>n</i>	%
Profession		
Occupational therapist	56	83.6
Work counsellor	7	10.4
Physio-therapist	1	1.5
Other profession ¹	3	4.5
Employer		
Public Employment Services Office	43	64.2
Social Insurance Office	9	13.4
Other ²	15	22.4

1 Other professions stated by the respondents were for example work instructor and project leader.

2 Examples of other employers were private companies, community based rehabilitation, public health care, and government service.

3.2 Use of the AWP

In this study, the respondents had performed a total of 7,498 assessments, and the median number of assessments was 20 assessments per person. Of the respondents, 50% had used the instrument for more than 12 months. Over half of the respondents (54.8%) had used the AWP 1-3 times a month, and 22.6 % several times a week. The median time to make an observation

of a client using the AWP (data collection) was 2.5 hours (range 1-40 hours), and the median time to fill in the AWP assessment forms was 30 minutes (range 10-90 minutes). The AWP was most frequently used in a simulated work context (85.1%), but 13.4% of the respondents used the instrument in real work contexts (Table 2). When the AWP was used, the clients worked in a variety of occupations: wood work, metal work, textile work, computer work, administrative task, and manufacturing/production tasks.

Table 2: Use of the AWP

	<i>n</i>	%
The period of time the AWP has been used (n=66)		
1-2 months	10	15.2
3-6 months	14	21.2
7-9 months	5	7.6
10-12 months	4	6.1
>12 months	33	50
Frequency of use of the AWP (n=62)		
1-3 times/month	34	54.8
Once a week	7	11.3
Several times/week	14	22.6
Daily	7	11.3
Assessment context (n=67)		
Simulated work context	57	85.1
Real work context	9	13.4
Equally in both contexts	1	1.5

3.3 Content validity

The majority of the respondents (63.2%) thought that the AWP covered all possible aspects of observable working skills at least “To a great extent”. The extent to which the content of the three skills areas was considered to cover all possible aspects of each skill area was 89.2% for motor skills, 76.2% for process skills, and 81.2% for communication and interaction skills (Table 3).

A few respondents suggested that the content of the AWP also should contain aspects such as pain, psychological aspects, self-consciousness, concentration, memory, motivation, interests,

values, responsibility, calculation skills, and the ability to read and write. Other respondents suggested that the AWP should be complemented by other assessment instruments such as interview instruments because different instruments could provide more information about various aspects of a client’s work-related strengths and weaknesses.

Table 3: Content validity of the AWP

	<i>n</i>	<i>%</i>
The extent to which the AWP was found to cover all possible aspects of “observable working skills” (n=67)		
Completely	2	3.0
To a great extent	41	61.2
To some extent	20	29.9
Not at all	4	6.0
The extent to which the content of the area “<u>motor skills</u>” in the AWP was found to cover all possible aspect of this area (n=65)		
Completely	18	27.7
To a great extent	40	61.5
To some extent	7	10.8
Not at all	-	-
The extent to which the content of the area “<u>process skills</u>” in the AWP was found to cover all possible aspect of this area (n=65)		
Completely	10	15.4
To a great extent	46	70.8
To some extent	9	13.8
Not at all	-	-
The extent to which the content of the area “<u>communication and interaction skills</u>” in the AWP was found to cover all possible aspect of this area (n=65)		
Completely	10	15.6
To a great extent	42	65.6
To some extent	11	17.2
Not at all	1	1.6

3.4 Comprehensibility and clarity

The majority of the respondents (87.7%) found at least a great extent of guidance from the definitions of assessment items when performing an assessment. A similar response pattern

was found regarding the extent of comprehensibility and clarity in definitions of assessment items: 91.1% rated this as at least “To a great extent” (Table 4).

According to the respondents, the communication and interaction skills area seemed to be the most complex and difficult to assess. A few respondents found it confusing that the item “Energy” appeared in two skill areas – motor skills and process skills. It was suggested that one of the items should be renamed to avoid confusion.

Regarding the clarity and comprehensibility, and discrimination between the steps in the four-point ordinal rating scale in AWP, the majority of the respondents chose the alternatives “To a great extent” (51.6 %) and “Complete” (26.6 %). However, 11 of the respondents (17.2 %) chose the alternative “To some extent”, and 3 users (4.7 %) the alternative “Non at all” (Table 4).

The respondents noted several difficulties related to the use of the rating scale. Some found it hard to see any difference between steps in the AWP rating scale, and some had problems with different steps in the scale. It was suggested that the instrument manual should have concrete examples of client performance related to the four steps in the rating scale and that the rating “Not relevant” should be clarified. One respondent commented that the rating scale consisted of “3 negative rating steps and only 1 positive”, and another thought that the rating steps 1 and 2 should change place with each other. A few respondents did not use the rating scale at all, or only to a limited extent; they focused on describing the client’s performance verbally using the terminology of the assessment items.

Most of the respondents (80.6%) found that the instructions in the assessment manual at least “To a great extent” offered enough guidance to use the instrument (Table 4) although it was

suggested that the assessment manual should contain more instructions on how to describe the work environment in which the assessment is carried out.

Table 4: Comprehensibility and clarity of the AWP

	<i>n</i>	%
The extent of guidance the respondent had from the assessment items to be able to perform an assessment (n=65)		
Complete	17	26.2
To a great extent	40	61.5
To some extent	7	10.8
Non at all	1	1.5
The extent of comprehensibility and clarity in definitions of assessment items (n=67)		
Complete	16	23.9
To a great extent	45	67.2
To some extent	6	9.0
Non at all	-	-
The extent of comprehensibility and clarity of and discrimination between the steps in the rating scale used in the AWP (n=64)		
Complete	17	26.6
To a great extent	33	51.6
To some extent	11	17.2
Non at all	3	4.7
The extent the instructions in the assessment manual offer enough guidance to be able to use the instrument (n=67)		
Completely	23	34.3
To a great extent	31	46.3
To some extent	11	16.4
Not at all	2	3.0

3.5 Relevance, usefulness and efficiency

The majority (83.3%) of the respondents reported that the AWP was relevant for assessment of their clients at least “To a great extent”, and the corresponding figure was 72.3% regarding the extent of usefulness of the AWP in relation to the service provided by the work rehabilitation setting (Table 5).

The respondents indicated that the AWP was a relevant and useful tool in the majority of situations when a client’s work functioning was assessed, and the AWP made it easier to

determine the client's possibilities to work. The AWP was useful for observing the client's actual performance in a work task as a complement to the client's own subjective opinion about his/her work performance. The respondents found the AWP useful in situations when clients had difficulties explaining their own performance or were unsure of their own ability and what they could manage in a work situation. The respondents reported that the AWP provided a description of *how* the client performed in a work task, but no information about *why* the client functioned in a certain way.

The respondents considered it to be a strength that the AWP is based on the theoretical model (MOHO) because the model made it easier to interpret the assessment results and relate the findings to the client's total life situation. Furthermore, the assessment results generated by the AWP could be used in the planning of work place adaptations for each client's specific needs. The AWP was used in discussions about the client's work performance with an employer, the social insurance officer, or a physician in order to clarify the client's rehabilitation needs or to plan for the client's return to work. The respondents also stated that the definitions of the assessment items in the AWP provided a mutual language with specific concepts that facilitate communication between colleagues about a client's work performance. Furthermore, the users found it helpful that several assessors in a team could assess the same client in different work tasks and contexts and then discuss the findings with each other. The AWP also made it easier to give the client feedback on the assessment results. It was suggested that some guiding instructions should be included in the manual on how to inform the client about the purpose and use of the instrument and how to give feedback on the assessment results.

The respondents appreciated that the AWP can be used in different work tasks and contexts, artificial as well as realistic/authentic work environments, and that the AWP can be used to observe the client's performance over time and not only as a single observation.

However, some respondents found it difficult to use the instrument when they had too little time to observe the client and the assessment period was too short. Comments were also made regarding the extension and complexity of the work tasks used in an assessment. For example, if a task was too limited or too simple, it was not feasible to make an assessment with the AWP; if an activity lacked communicative elements and interaction with other persons, it was not possible to make an assessment of the client's communication and interaction skills. Some respondents suggested that the client should have an active part in the assessment process and have the possibility to rate his/her own performance.

When compared with the use of previous methods or instruments, the majority (75.5%) of the respondents answered that it takes less or the same time to use the AWP, whereas 24.5% of the respondents stated that it takes more time (Table 5). However, some respondents reported that even if the use of AWP takes more time, the assessment of the client is more accurate when using the AWP.

In addition, 82.5% of the respondents found the time for an assessment with the AWP to be worthwhile to at least "a great extent" (Table 5). It was commented that the use of the AWP made the assessments more effective and gave structure to the assessment. Time was saved both in the data collection phase, as the assessor knew what to look for, as well as in the documentation phase, as it was easier to formulate and express findings.

Table 5: Relevance, usefulness, and efficiency of the AWP

	<i>n</i>	<i>%</i>
The extent of relevance of the AWP for assessment of clients (n=66)		
Complete	7	10.6
To a great extent	48	72.7
To some extent	8	12.1
Non at all	3	4.5
The extent of usefulness of the AWP in relation to the service provided by the work rehabilitation setting (n=65)		
Complete	22	33.8
To a great extent	25	38.5
To some extent	16	24.6
Non at all	2	3.1
The amount of time it took to make an assessment with the AWP compared to the previously used method/instrument (n=53)		
It takes less time when using the AWP	23	43.4
No change in time	17	32.1
It takes more time using the AWP compared to the previous method	13	24.5
Whether the time for an assessment with the AWP was found to be worthwhile in relation to the usefulness of the assessment outcome (n=63)		
Completely	21	33.3
To a great extent	31	49.2
To some extent	9	14.3
Not at all	2	3.2

3.6 Flexibility, practicality and ease of administration

The AWP is not designed for any particular diagnosis or deficits. Almost half of the respondents (49.2%) stated that the client’s work-related problems did not affect whether the assessor decided to use the AWP or not although 21.5% considered it to be an influencing factor (Table 6), but these respondents did not discuss how or in what way the client’s work-related problems affected the use of the AWP.

Most of the respondents (95.5%) considered the manual to have at least a “Fairly good design”, and 86.4% stated that the manual was user friendly and easy to use in everyday work at least “To a great extent” (Table 6). Some respondents had differing opinions about the

extensiveness of the manual: some said the manual should be compressed, whereas others said it should be expanded and complemented with case examples.

Almost all of the respondents (98.5%) reported that the scoring sheets had at least a “Fairly good design”, and 83.1% found the scoring sheets to be user friendly and easy to use in everyday work at least “To a great extent” (Table 6). One respondent suggested that there should be a “short-form version” of the scoring sheets, whereas one respondent suggested that the space for comments was too short.

Most of the respondents (69.2%) believed an introduction or short course would help make the use of AWP more efficient, whereas 30.8% believed it is not necessary. The respondents who suggested an introduction or course would be helpful suggested that a 2-day course would be sufficient, but the suggested time span varies from ½ a day to one week. Some respondents suggested that the course length should depend on how much experience the user has with the MOHO; that is, a user with extensive experience with MOHO would only need a short course. The length of a course may also depend on the profession and educational background of the user. The respondents suggested several topics for a course: recommendations on work tasks that can be used in assessment situations; other assessment instruments that may complement the AWP; and discussions about problems that may arise when using the instrument. Some respondents suggested that regular follow-up meetings for AWP users should be scheduled. Such meetings would allow the users to learn the latest news about the instrument and to discuss experiences with other users. The users stressed the importance of having an opportunity to contact the developers of AWP.

The majority of the respondents (64.1%) stated that “A small amount of extra work” was required to learn the AWP well enough to be able to use it, and 26.6% stated that “A large amount of extra work” was necessary (Table 6). They suggested that extra work included individual studies of the AWP, participation in AWP-related introductory activities, discussions with colleagues, and use of the instrument in practice. At the beginning, the use of the AWP took more time as the respondents had to reflect on the assessment process and the use of the instrument, but the extra work gradually decreased as the respondents became more familiar with the instrument. Some found it fruitful to have assessment sessions where colleagues at a work place together assessed a client and then discussed their findings and use of the AWP. Obstacles that complicated the use included lack of time and high burden of work and work place related problems, such as unclear directives from the employer regarding how a work assessment should be carried out. It was more difficult to start using the instrument if some people in a work group were doubtful about using the AWP, as this sometimes hindered the ones in a work group who wanted to use the instrument.

Table 6: Flexibility, practicality, and ease of administration of the AWP

	<i>n</i>	<i>%</i>
To what extent the client's work-related problems affected whether to use the AWP or not (n=65)		
Not at all	32	49.2
To some extent	18	27.7
To a large extent	14	21.5
Completely	1	1.5
The respondent's opinion about the design (layout) of the manual for the AWP (n=67)		
Very good design	24	35.8
Fairly good design	40	59.7
The design is quite bad/not so good	3	4.5
The design is very bad/not good at all	-	-
The extent the manual for the AWP was found to be user friendly and easy to use in everyday work (n=66)		
Completely	18	27.3
To a great extent	40	59.1
To some extent	9	13.6
Not at all	-	-
The respondent's opinion about the design (layout) of the scoring sheets for the AWP (n=65)		
Very good design	17	26.2
Fairly good design	47	72.3
The design is quite bad/not so good	1	1.5
The design is very bad/not good at all	-	-
The extent the scoring sheets for the AWP was found to be user friendly and easy to use in everyday work (n=65)		
Completely	16	24.6
To a great extent	38	58.5
To some extent	11	16.9
Not at all	-	-
Whether any extra work was demanded to get to know the AWP well enough to be able to use the instrument (n=64)		
No extra work at all	2	3.1
A small amount of extra work	41	64.1
A large amount of extra work	17	26.6
A very large amount of extra work	4	6.3

3.7 Relations between variables and differences between groups

No statistically significant relations were found between the variable *age* of respondents and other variables in the questionnaire; correlation coefficients varied between -0.28 and 0.26

(n.s). Furthermore, no statistically significant differences were found for the variable *gender* of respondents in relation to other variables.

For the variable *profession*, statistically significant differences were found between the groups “Occupational therapists” and “Mixed professions”. The “mixed professions” group

- used the AWP more frequently than occupational therapists ($p=0.022$), and
- reported that the content of the area “motor skills” in the AWP covered all possible aspect of this area to a greater extent compared with occupational therapists ($p=0.036$).

For the variable *employer*, some statistically significant differences were found between respondents employed at the Social Insurance Office, and respondents employed at the Public Employment Services Office or some other employer. Respondents from the Social Insurance Office included the following characteristics:

- had used the AWP more frequently ($p=0.0015$);
- had made more assessments with the AWP ($p=0.00019$);
- found that the AWP covered all possible aspects of “observable working skills” to a greater extent ($p=0.024$);
- found the content of the area “process skills” in the AWP to cover all possible aspect of this area to a greater extent ($p=0.045$); and
- found the time for an assessment with the AWP to be more worthwhile in relation to the usefulness of the assessment outcome ($p=0.006$).

Compared with respondents employed at the Public Employment Services Office, the respondents employed at the Social Insurance Office stated that they had less use for the AWP in relation to the service provided by their employer ($p=0.027$).

Furthermore, compared with respondents in the group “Other employer”, the respondents employed at the Social Insurance Office reported the following:

- they used more time for observation of clients with the AWP ($p=0.006$); and
- they had used the AWP for a longer period of time ($p=0.036$).

4 DISCUSSION

The findings indicate that the users of the instrument were generally satisfied with the content validity and utility of the AWP. The positive results may be affected by the fact that there were expected users of the instrument that had not started to use the AWP; they were not included in the study according to the inclusion criterion. However, the reported reasons to why they had not started to use the AWP were not related to the instrument, but more to organizational aspects such as change of work place or work tasks. If all the expected users would have used the instrument and answered the questionnaire, the result of the study may have been different as it may be the people with the most positive attitude towards the AWP that started to use the instrument.

The majority of the respondents thought that the AWP covered all aspects of observable working skills at least “To a great extent”. Some respondents suggested that the AWP should be expanded and contain other assessment aspects such as pain, psychological aspects, self-consciousness, concentration, memory, motivation, interests, values, responsibility, calculation skills, and the ability to read and write. Even if these aspects are relevant to assess in the rehabilitation process, it is not possible to assess these aspects by *observing* a client’s performance of work and thereby not possible to assess with the AWP. The purpose of the

AWP is merely to assess a client's observable working skills, not to assess any other aspects influencing a client's work functioning. Due to this specific purpose of the AWP, an assessment with the instrument should be supplemented with assessments with other instruments, producing a more complete and correct understanding of the client's strengths and weaknesses. Examples of instruments based on MOHO [9,10] that could supplement the AWP are interview instruments such as the Worker Role Interview (WRI) [2,4,23] or Work Environment Impact Scale (WEIS) [1,11].

The respondents seemed to find the definitions of assessment items to be clear and comprehensible although a few respondents found it confusing because the item "Energy" appears in two different skill areas in the AWP – motor skills and process skills. Some respondents suggested that one of the items should be renamed to avoid confusion. As it is important that the assessment items in an instrument are distinguished from each other, it may be necessary to rename one of the items named "Energy" in the AWP.

Most of the respondents found the instructions in the assessment manual to offer enough guidance to use the instrument. Nevertheless, almost 70% of the respondents stated that some form of introduction of the instrument is desirable. Today, there are no formal courses or certifications offered for people using the AWP because the instrument is intended to be designed so that someone who knows the underlying model, the MOHO [9,10], should be able to learn how to use the instrument by reading the manual. The results of this study indicate that there seems to be a need for an introduction to the instrument as a supplement to the instructions in the AWP manual.

Some comments were made regarding the extension and complexity of the work tasks used in an assessment: if a task is too limited or simple, the respondents found it difficult to make an assessment with the AWP. This is a problem with how an assessment of a client is planned and executed in the assessment setting and the work tasks the assessor uses for assessment, rather than a shortcoming of the instrument AWP. Therefore, it is important for an assessor to consider the adequacy of the work task used for assessing a client irrespective of whether the instrument is the AWP or any other assessment instrument.

The result indicates that the AWP is mostly used in artificial work contexts. However, the AWP could also be used in real work settings. A problem when assessing a client in a real work setting may be the difficulty for the assessor to observe the client for an extended period of time as the assessor normally only observes the client for a short time when visiting the client at the work place. This may be compared with the different circumstances in an artificial setting where the assessor normally is present in the same work setting as the client during the whole assessment period, providing the assessor the opportunity to observe the client for a much longer time.

5 CONCLUSION

The evaluation of the AWP started with a test of the instrument's face validity in connection to the instrument construction phase [20]. This study investigates the content validity and utility of the instrument AWP. According to the findings in this study, the users were satisfied with the qualities of the instrument and indicate content validity and utility for the AWP. In the next study, the construct validity of the AWP will be tested.

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Paper IV

Title

Construct Validity of the Assessment of Work Performance (AWP)

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Abstract

The instrument Assessment of Work Performance (AWP 1.1) can be used to assess an individual's observable (working) skills during work performance – how efficient and appropriate a client performs a work task. The instrument is at present used by more than 300 assessors working in a number of different work rehabilitation settings in Sweden, and more than 10,000 clients have been assessed with the instrument. As a part of the ongoing development and testing of the AWP, the purpose of this study was to investigate the construct validity of the instrument Assessment of Work Performance (AWP 1.1). This study is based on 364 assessments with the AWP (version 1.1) of clients with various work-related problems that went through an insurance medicine investigation at a Social Insurance Office in Sweden during the years 2004-2005. The method used for statistical analysis was Principal Component Analysis (PCA). The major findings in this study indicate that the AWP has construct validity, is sensitive, has the ability to discriminate between clients, and is unaffected by the client's sex.

Keywords

Ability, capacity, instrument development, measurement, MOHO, occupational therapy, rehabilitation, skills, vocational, work.

1 INTRODUCTION

The Assessment of Work Performance (AWP) is an instrument that can be used to assess the working skills of clients with various kinds of work-related problems such as musculoskeletal problems or psychological disorders. The instrument is not designed for any particular diagnosis or deficits. The AWP does not target any special tasks or contexts and can be used in various assessment settings and work activities performed in realistic or real life work situations or in more constructed or artificial environments [13,15-16]. As a part of the ongoing development and testing of the AWP, the instrument is at present used by more than 300 assessors working in a number of different work rehabilitation settings in Sweden. For example, assessors use the instrument when working with clients within the Public Employment Services Office, the Social Insurance Office, medical rehabilitation, primary care, and company health service.

The AWP is based on the Model of Human Occupation (MOHO) [3]. The MOHO is a theoretical framework that explains the meaning and importance of activities for human beings and offers a conceptual framework for the description of human occupation [8-9]. Human occupation refers to “the doing of work, play, or activities of daily living within a temporal, physical, and sociocultural context that characterizes much of human life” [9, p. 1]. The AWP instrument manual recommends that any user should know the model (MOHO) as it will be easier for the assessor to understand the content of the assessment items and to interpret the results in relation to the model. An assessment based on a model or theory creates conditions that are conducive to a valid interpretation of assessment results. In the case of the AWP, the model may be very useful in helping the assessor to better explain or communicate assessment results to the client, which is an important part of the assessment process [15]. Furthermore, the AWP has also been related to a conceptual framework for

assessment of work functioning [14] to define the purpose, delimitation, and possible assessment outcomes of the AWP [15].

The purpose of the AWP is to assess an individual’s observable (working) skills during work performance – how efficient and appropriate the client performs a work task. The AWP assesses the client’s observable working skills in three domains: motor skills, process skills, and communication and interaction skills. These three domains contain 14 different skills: 5 in the domain of motor skills, 5 in the domain of process skills, and 4 in the domain of communication and interaction skills (Table 1). The 14 working skills are numerically and individually rated on a Likert-type four-point ordinal rating scale (1 = deficient performance, 2 = inefficient performance, 3 = uncertain performance, and 4 = competent performance). If a user of AWP finds it not relevant to assess a certain item or if he or she lacks necessary information to be able to assess the item in question, the alternative EA (not applicable) can be used [13,15].

Table 1: Assessment domains (n=3) and skills (n=14) in AWP 1.1

Motor skills (n=5)		Process skills (n=5)		Communication and interaction skills (n=4)	
1	Posture	6	Mental energy	11	Physical communication and interaction
2	Mobility	7	Knowledge	12	Language
3	Coordination	8	Temporal organization	13	Social contacts
4	Strength and handling of objects	9	Organization of workplace	14	Information exchange
5	Physical energy	10	Adaptation		

The 14 skills mentioned in Table 1 were translated from Swedish solely for the use in this article to give the reader an understanding of the content of the various skills in the AWP; i.e., at the moment there is no English version of the instrument. If and when the AWP is translated into English, the process of translation will be presented in future studies.

Preliminary testing of the face validity and utility of the AWP was made within a group of 21 assessors in Sweden with a varying amount of assessment experience. The testing indicated

face validity and utility for the AWP that supported further development and testing of the instrument [15]. Testing of the content validity and utility was made in a study where 67 users with various experience of the AWP answered a questionnaire. The results of the study indicate content validity and utility for the AWP [16].

All forms of validity are appropriate for work-related assessments [6-7]; however, only these forms of validity have been judged most relevant: face, content, construct, and criterion-related (predictive and concurrent) [4,6,17]. Construct validity refers to the extent that the items of an instrument accurately measure a theoretical construct [6,10-11]. There is no single method to determine construct validity and often numerous studies are needed to provide an accumulation of evidence [6,10]. Methods used in collecting evidence for construct validity include *Factor Analysis* (FA) [1,6,10-11] and *Principal Component Analysis* (PCA) [5]. As an addition to the results of the previous testing of the psychometric properties of the AWP 1.1, the purpose of this study was to investigate the construct validity using the method PCA.

2 METHODS

2.1 Subjects and procedure

This study is based on 364 AWP (version 1.1) assessments of clients with various work-related problems that went through an insurance medicine investigation at a Social Insurance Office in Sweden during the years 2004-2005. Initially, the study was planned to be based on 419 assessments, but assessments where more than 43% of the items (>6 items of 14) were not rated on the four point ordinal rating scale in the AWP were excluded from the study (n=55). There were two criteria for inclusion in the study:

- The AWP assessments included in the study were performed during the years 2004-2005.
- The clients should be in the age interval 23-56 years.

The 364 AWP assessments were performed by six occupational therapists working at a Social Insurance Office in Sweden (mean 61 assessments, range 24-81 assessments). One of the occupational therapists assisted the authors by feeding de-identified client data into an AWP computer application (specially designed for this study) before the data was provided to the authors. By using this procedure, the authors only had access to de-identified client data. In addition to the AWP assessments, there was information about the clients' age, sex, and work-related problems.

The clients were classified into three groups of work-related problems based on the diagnoses of the clients at the completion of the insurance medicine investigation at the Social Insurance Office. The classification into three groups was inspired by a framework for classification presented in a study made by the Swedish Social Insurance Administration [12]:

- 1) *Musculoskeletal problems* such as problems (i.e., mainly chronic pain conditions) with the neck, shoulders, arms and/or legs, back, joints, and fibromyalgia.
- 2) *Psychological disorders* such as psychotic problems, depression, anxiety, stress, burn out syndrome, and abuse of drugs or alcohol.
- 3) *Other problems* such as symptoms or diseases related to the heart, lungs, stomach and/or intestines, skin, allergies, migraine, ears, and eyes and problems related to pregnancy.

When classifying a client's work-related problem, the alternative that reflected the client's primary work-related problem was chosen. For example, if a client's primary problem was

back pain, the client was classified into the first group (musculoskeletal problems). A client could only be classified into one of the three groups.

Before the study was conducted, it was presented to the regional ethical review board in Linköping. The board concluded that it was not necessary to review the study according to the Swedish Ethical Review Act. The study was also approved by the Social Insurance Office before it was carried out.

2.2 Data analysis and statistics

Pre-processing of data

The 14 working skills are rated on a Likert-type four-point ordinal rating scale (1 = deficient performance, 2 = inefficient performance, 3 = uncertain performance, and 4 = competent performance). The alternative “EA” (=not applicable) were coded as missing in the dataset.

Principal Component Analysis

In the present study, we used the multivariate method *Principal Component Analysis (PCA)* [Eriksson et al., 2001] to evaluate the construct validity in AWP. PCA can be viewed as a multivariate correlation analysis, which was performed using the software SIMCA-P (version 11.0; Umetrics Inc. Umeå, Sweden). PCA can be used to detect if a number of variables reflect a smaller number of underlying components. In the present study, the analysis revealed whether all the items in AWP were reflected by a uni-dimensional pattern and whether there were any non-contributing items in the instrument.

In the analysis, the variables (in this study the 14 assessment items in AWP) are projected onto a minimum of significant information bearing dimensions (components). A component

consists of a vector of numerical values between -1 and 1 , referred to as loadings. The loading expresses the degree of correlation between the item and the component. A loading is obtained for each item in AWP included in the PCA model. Items that have high loadings (with positive or negative sign) on the same component are inter-correlated. Two items with high loadings but opposite signs are negatively inter-correlated. We have considered items having a high loading with a confidence interval that does not include “0” to be of interest for the component.

Two types of plots are used to graphically explain the components in the model; the *score plot* is an optimal projection showing the relation between the different subjects (in the present study the clients enrolled in the study). Subjects close to each other in the score plot have similar variable characteristics. The corresponding plot of the variables, the *loading plot*, shows how the items are related to each other and how they influence the different components in the model. The loadings including 95% CI are shown in bar diagrams. Outliers were identified using the two methods available in SIMCA-P: 1) score plots in combination with Hotelling’s T2 (identifies strong outliers) and 2) distance to model in X-space (identifies moderate outliers).

To determine the number of components in the PCA-model, two concepts were used. The *goodness of fit* is given by the R^2 value, which expresses the explained variation in the X-matrix. The R^2 varies between 0 and 1, where 1 means a perfectly fitting model and 0 no fit at all. The number of components also depends on the predictive ability of the model. To test how valid the model was for a predictive purpose (in this case to predict the work performance of another data set from their results in AWP), a cross-validation method in SIMCA was used. The method keeps part of the data out from the model development and

develops a number of parallel models from the reduced data and predicts the omitted data by the different models. This procedure is repeated several times until all cases in the data set have been used for predictions. Finally, the method compares the predicted values with the actual ones and the results in a value called *goodness of prediction* (Q^2), which also varies between 0 and 1. The Q^2 value is related to the R^2 value. For example, it is impossible to get a high Q^2 without a high R^2 . The difference between R^2 and Q^2 should not exceed 0.2-0.3 [2,5].

3 RESULTS

Descriptives

The final study sample consisted of 364 clients (234 women and 130 men). The mean age of the clients was 45 years (standard deviation 7.4 years, range 23-56 years). Based on the classification made by the Swedish Social Insurance Administration [12], 237 of the clients had musculoskeletal problems, 102 psychological problems, and 25 had other problems.

Data analysis

The PCA analysis resulted in a two-dimensional model – two significant components explaining in total 52% ($R^2=0.52$) of the variance in the data with the predictive value (Q^2) of 30%. The first component explained 38% of the total variance (R^2) in the AWP-scores of the clients. It had a predictive value of 26% ($Q^2=0.26$). The second component explained 14% of the clients' AWP-scores. The corresponding Q^2 was 6%.

Component one revealed that the items in AWP are positively inter-correlated; i.e., they have positive loadings according to the first component (Figure 1a). According to the loading plot in Figure 1a, the items of each domain are relatively well clustered but without showing total

identity (i.e., when two items are very near each other). The items of motor skills are clearly separated from the items of the two other domains. The items within each of the two other domains (Process and Communication and Interaction skills) are also located near each other in the loading plot. However, these two domains are interwoven; the item C11 is relatively distant from C12-C14 and more closely located to items P6 and P8 of the process domain. Furthermore, P7, P9, C13, and C14 are relatively close to each other; i.e., they are positively inter-correlated. The first component is mainly dominated by 2 variables in the process skill domain in AWP (variables P7 and P10). When investigating the confidence interval (CI) of each variable loading in component 1 (Figure 1b), no CI includes zero. This indicates that all variables contribute to the component. The items with the highest loadings (P7, P10, C13, P9, C11 and C14) are correlated (Figure 1a) and are the items with the highest variance, making them the most influential in the component. In other words, the clients varied most prominently with respect to the items with high loadings upon the first component.

The second component indicates a negative correlation between the motor skills variables M2 and M4 and the communication and interaction variables C12-C14 (Figure 1c). As seen from Figure 1c, the items P6, P8, P10, and C11 do not belong in the second component since their CIs include zero. Figure 1c also reveals that M1, M2, M3, M4, and M5 are negatively correlated to P7, P9, C12, C13, and C14. In other words, in the variance not explained by component 1, there are a group of clients with high scores in M1-M5 and low scores in C11-C14 forming component 2.

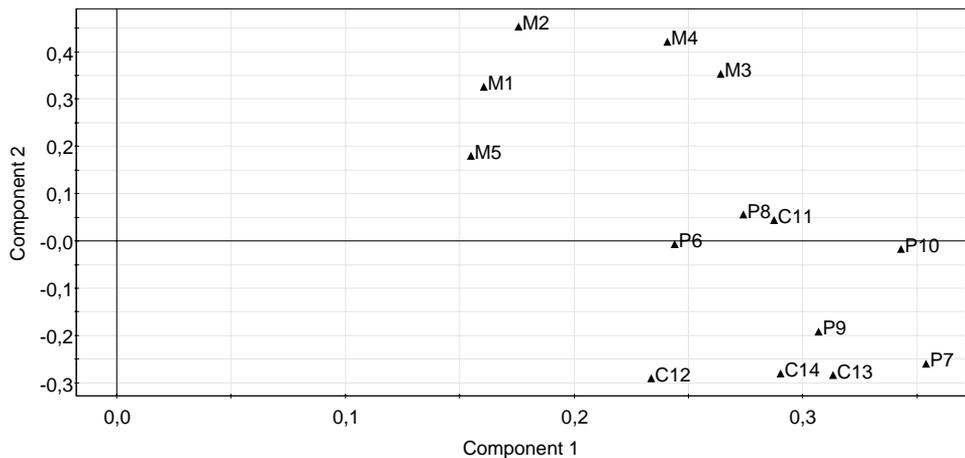


Figure 1a: Variable plot for the PCA analysis of AWP. M1-M5=motor skills, P6-P10=process skills, and C11-C14=communication and interaction skills.

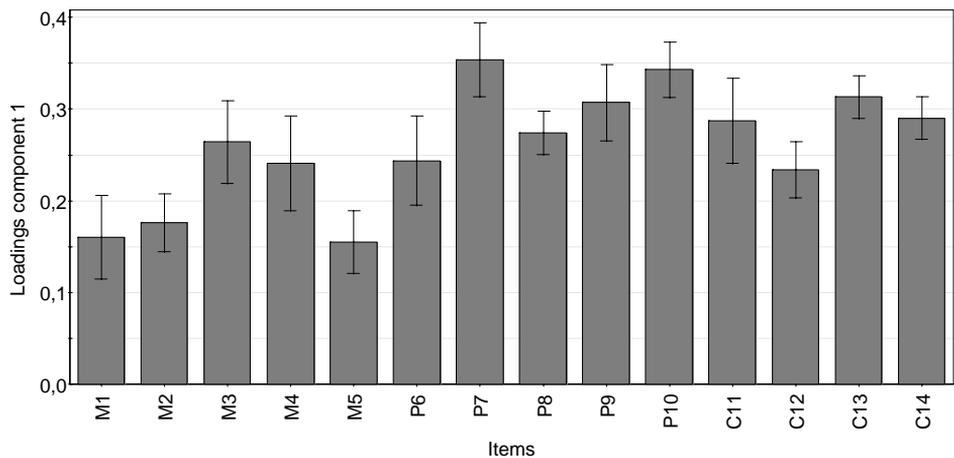


Figure 1b: Loadings and confidence interval for each item in component 1(Figure 1a). M1-M5=motor skills, P6-P10=process skills, and C11-C14=communication and interaction skills.

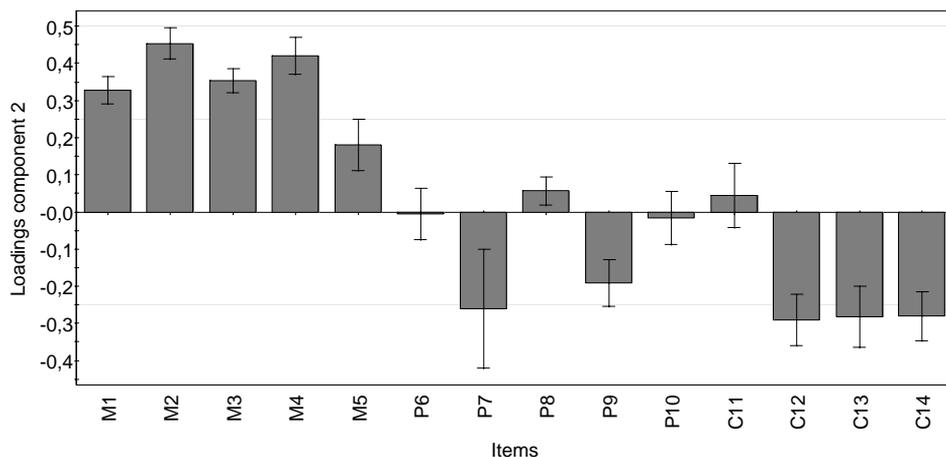


Figure 1c: Loadings and confidence interval for each item in component 2. M1-M5=motor skills, P6-P10=process skills, and C11-C14=communication and interaction skills.

In the score plot, 14 clients were outside the 95% tolerance region (the circle given by Hotelling's T2) (Figure 2a). As seen in Figure 2a, the clients, represented by t-scores, were evenly distributed all over the score plot. There are no evident subgroups in the score plot that indicate that AWP is sensitive and has the ability to discriminate between clients.

To further investigate whether there were subgroups among the clients, symbols were used in the score plot according to sex (Figure 2b) and rater (Figure 2c). Since there is no evident pattern or groupings of women and men in the score plot, it can be concluded that the AWP does not seem to be affected by the client's sex.

Symbols were also used to illustrate the t-scores in Figure 2c according to which of the six raters made the assessment. There is a tendency that some raters are not evenly distributed over the score plot. For example, the rater marked with the triangle tends to assess clients with scores indicating high positive t-scores in component 1. In Figure 1a, this corresponds to high scores in the items with high loadings in component 1 such as P7, P10, and C13. In other

words, the rater marked with the triangle tends to score the clients higher on the AWP rating scale (Figure 2c).

As seen from Figure 2a, the strongest outliers are in the left upper part of the plot, outside the circle. Figure 2b and 2c show that these five outliers are four women and one man. Four of them were assessed by the same rater. From their position in the score plot, they seem to have a strong influence on component 2. To test whether these five clients are strong outliers (extremes) that affect the power in the model, they were excluded from the data set and a new PCA was calculated in the same way as before. The new PCA model only identified one significant component, which was identical with component 1 in the first PCA ($R^2=0.37$ and $Q^2=0.24$). This indicates that these five outliers formed a subgroup that had so strong power on the PCA that they could form their own significant component. When the outliers were excluded, the significant second component disappeared, but the first component was still unaffected and significant.

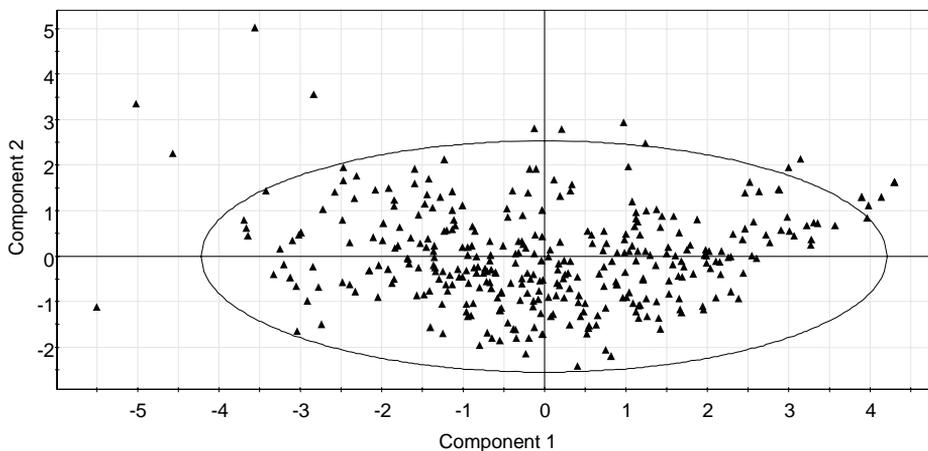


Figure 2a: Score plot for the PCA analysis of AWP. Each triangle indicates a client's score in the new variables (the components). For corresponding loading plot, see Figure 1a.

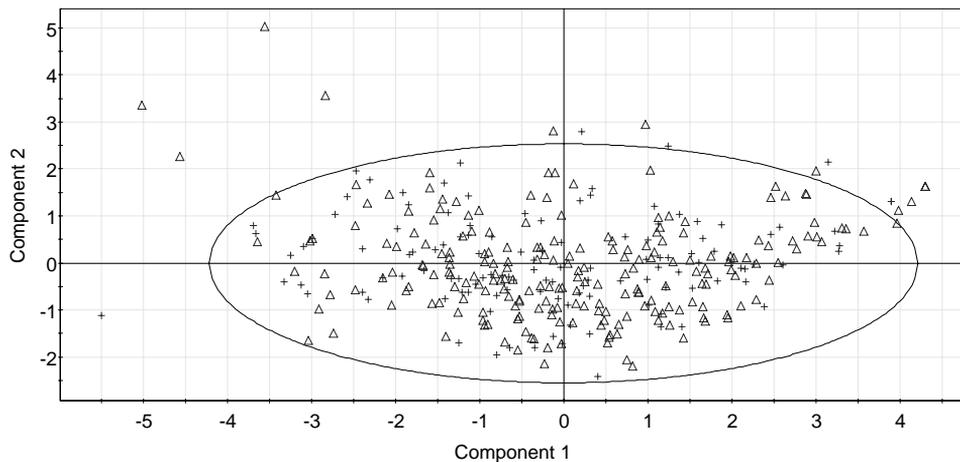


Figure 2b: T-score for each client assessed with AWP. The symbol Δ indicate a female client, and $+$ a male client.

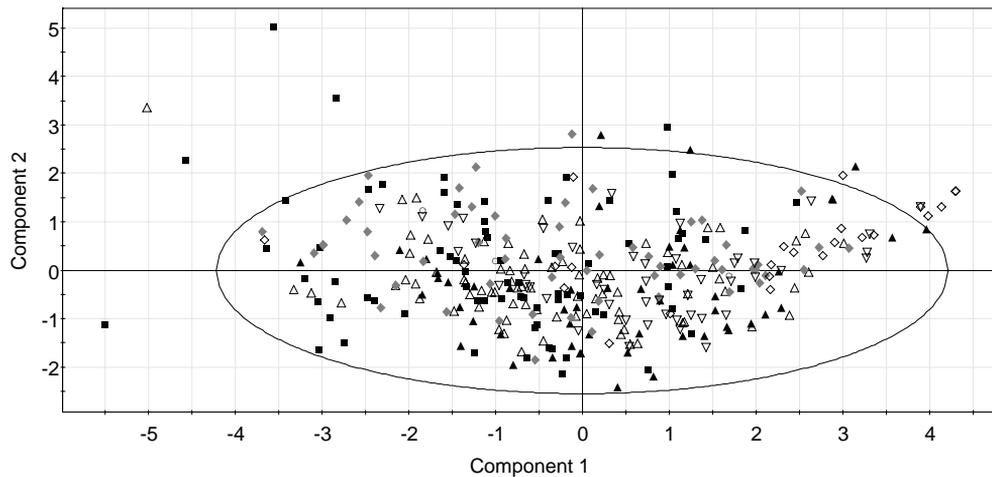


Figure 2c: T-score for each client assessed with AWP. The different symbols represent the six raters.

4 CONCLUSION AND DISCUSSION

The major findings in this study are listed below:

- The results indicate construct validity for the AWP because
 - all the 14 items in AWP have positive loadings (Figure 1a) and contribute to component 1 (Figure 1b), and
 - the items in the three domains are relatively well clustered but still separated from each other (Figure 1a), indicating that every item contributes with relatively unique information.
- The results in Figure 1a indicate that the AWP may consist of two dimensions: one dimension with motor skills and one dimension with a combination of process skills and communication and interaction skills.
- The fact that there are no evident subgroups of clients (Figure 2a) indicates that AWP is sensitive and has the ability to discriminate between clients.
- Since there is no evident pattern or groupings of women and men in the score plot, the AWP does not seem to be affected by the client's sex (Figure 2b).
- The six raters seem to vary in their assessments; for example, one assessor tends to rate clients higher on the AWP rating scale (Figure 2c).

Factor analysis (FA) is often used to evaluate construct validity [6] and could have been an alternative to the PCA in the present study. These two techniques may seem to be quite similar and are sometimes incorrectly interchanged since they both reduce data. There are, however, some important differences between the two techniques. In PCA, the objective is to summarize the variation of data into a few components and consequently new variables [2]. In FA, on the other hand, the purpose is to explain the correlation between variables with common factors [5]. In this study, we wanted an overview of the inter-correlation of the items

without searching for any interpretable factors. The PCA showed the pattern of the inter-correlation among the items in the AWP not derived from any theoretical assumptions of latent explanations. The PCA performed by SIMCA also has the advantage of coping with multi-collinearity, missing data, separate regularities from noise and providing informative graphical illustrations [2].

Of the 364 assessments, 82 had some missing values – items not rated. This can be explained by the fact that some items were not necessary to assess for a specific client or a lack of information when assessing a client in a specific item. To understand to what extent this non-systematically internal missing affected the result, we have also performed an analysis based only on complete AWP-ratings where all the 14 items in the AWP had been rated on the numerical scale by the occupational therapists: AWP-ratings with no internal dropouts (n=282). Since PCA has the advantage that it copes with missing data, this analysis showed only minor differences in the findings compared with the analysis based on 364 assessments. Thus, to use as much variance as possible, the result in the study is based on the analysis made on 364 assessments.

The results in Figure 1a indicate that the AWP may consist of two dimensions: one dimension with the motor skills and one dimension with a combination of process skills and communication and interaction skills. This finding indicates that the process skills and the communication and interaction skills are inter-correlated and interwoven with each other. However, Figure 1b indicates that all 14 items in the AWP are relevant and contribute to component 1. This implies that all assessment items are needed as they each contribute with relatively unique information.

The fact that there is no evident pattern or groupings of women and men in the score plot (Figure 2b) suggest that an assessment with the AWP seems to be unaffected by the client's sex. This agrees with the intentions of the AWP: the instrument is designed for assessing both male and female clients.

Figure 2c shows that there is a tendency that the raters are not evenly distributed over the score plot. This fact may indicate a need for education and training of assessors that intend to use the AWP. Maybe it is not enough to learn how to use the instrument from the instructions in the instrument manual [13]. Nevertheless, there may be other reasons to why one rater differentiates somewhat in the AWP-ratings. This rater may have assessed clients with work-related problems that were different from the clients assessed by the other five raters. However, for the clients assessed by this rater, there are no evident patterns in the diagnoses that support the hypothesis that this rater may have worked with a client group with specific problems.

The result of the construct validity testing of the AWP is only based on the 364 clients incorporated in this study. As numerous studies often are needed to provide an accumulation of evidence of construct validity [6,10], further studies of how and to what extent the AWP is able to discriminate between client groups with different work-related problems are needed. The future testing of the AWP will also focus on aspects such as predictive validity and various forms of reliability.

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