The Camberwell Assessment of Need as an Outcome Measure in Community Mental Health Care

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Abstract

The aim of this thesis was to critically examine the current use of the Camberwell Assessment of Need (CAN) in outcome assessment for service evaluation. A further aim was to propose a metric for assessing the adequacy of community mental health services in meeting ongoing needs over longer stretches of time.

We made four prospective follow-up studies of CAN assessments of patients with severe mental illness in community-based mental health care.

A factor analysis (n=741) gave support for a three-factor model, comprising only 60% of the CAN items. Need assessments (n = 92) in 1997 and 2003 were compared at both the summed total and the underlying item levels of the CAN. The mean total scores did not change, yet there were significant changes in the underlying items. Changes in mean number of needs between 1997 and 1999 were measured (n=262) with both total scores, summed over all CAN items, and with sub-total scores, summed over two sets of items reflecting the social services and the psychiatric services respectively. As indicated by the sub-total scores, all significant changes occurred within the psychiatric services, a result not possible to discern from the total scores. The Met Needs Index (MNI), defined by us as the aggregate measure of beneficial outcome, indicated that needs in general were met during 71% of the intervals between the annuals assessments from 1997 through 2004. However, the variation among particular items was large.

In conclusion, the summary scores typically used as outcome measures are likely to conceal meaningful variation at the item level. Nevertheless, sub-total scores, being more transparent, might be more useful in outcome assessment. The MNI is a continuous, normally distributed metric, estimable over any number of consecutive assessments, which seems suitable for assessing the achieved benefit of services for patients with long-term ongoing needs.

Keywords: needs assessment, outcome measures, mental health care, health service evaluation, severe mental illness, psychotic disorders

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IV Wennström E, Berglund L, Lindbäck J, Wiesel F-A. The Met Needs Index: A new metric for outcome assessment in health services. [Submitted for publication].
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Abbreviations

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<th>Description</th>
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<tr>
<td>ADL</td>
<td>Activities of Daily Living</td>
</tr>
<tr>
<td>CAN</td>
<td>Camberwell Assessment of Need, a family of assessment schedules, currently including CANSAS, CAN-C and CAN-R</td>
</tr>
<tr>
<td>CANSAS</td>
<td>Camberwell Assessment of Need Short Appraisal Schedule</td>
</tr>
<tr>
<td>CAN-C</td>
<td>Camberwell Assessment of Need – Clinical version</td>
</tr>
<tr>
<td>CAN-R</td>
<td>Camberwell Assessment of Need – Research version</td>
</tr>
<tr>
<td>CAN-S</td>
<td>Camberwell Assessment of Need – Standard version. The Swedish version of CAN-R</td>
</tr>
<tr>
<td>DSM-IV</td>
<td>Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition</td>
</tr>
<tr>
<td>MNI</td>
<td>Met Needs Index</td>
</tr>
</tbody>
</table>
Introduction

The care of the mentally ill in Sweden,\textsuperscript{1-5} and elsewhere,\textsuperscript{6-9} seems to have followed a spiralling trajectory; from the ‘community care’ in pre-modern times, into the enclosed asylums and large mental hospitals for the better part of the last century, and after that out again to the ‘extramural’, community-based mental health care of today. Typically, in the large mental hospitals, often remotely located, all aspects of life of the inmates were conducted within the confines of the hospital and all their essential needs were planned for, although in undifferentiated ways. The very negative consequences for people living under such circumstances were pregnantly described by Erving Goffman in \textit{Asylums},\textsuperscript{10} a book exerting much influence on the deinstitutionalisation of the mental health services commencing in the 1970s.

The reforming of mental health services in Europe during the last decades have been fuelled by a strong optimism for the community mental health approach,\textsuperscript{9} characterised by the provision of a comprehensive and integrated range of services for a local population. However, as community-based care is coming of age there is a growing recognition of the vastly complex interfaces and interactions among the services involved, where changes or deficiencies in each may have serious impact on the care of vulnerable, mentally ill persons.\textsuperscript{11,12}

A fundamental principle underlying community-based mental health care is that care and services should be proportional to the comprehensive and changing needs of individuals.\textsuperscript{13-15} But how might this be accomplished? Obviously, knowledge of the prevalence of needs through health needs assessment is a necessary prerequisite for planning, allocating, and providing health services. ‘Health needs assessment’ refers to a systematic method of identifying health needs at the population level as well as at the individual level and planning services and interventions to meet these needs.\textsuperscript{16,17}

Using population health statistics as correlates of needs has been the traditional public health approach to health needs assessment.\textsuperscript{18} This epidemiological approach is, however, of limited use for the planning of services for the severe mentally ill, having a wide range of long-term, intermittent health and social needs.\textsuperscript{19,20} It must then be supplemented by formalised approaches to needs assessment, such as aggregated data from social services assessment or individual health care needs assessment.\textsuperscript{21} Formal needs assessment is therefore considered a central strategy to achieve good health outcomes in services for patients with severe mental illness.\textsuperscript{22-24}
The recent introduction of tested scales and surveys for formal health needs assessment in the routine care of patients with severe and enduring mental illness\textsuperscript{25-27} was therefore an important development in mental health care during the 1990s. These tools are generally constructed to serve two purposes at the same time: (1) to inform and coordinate the care planning process of individual patients and (2) to estimate needs at the system (or local), service, or programme levels,\textsuperscript{16 28} by aggregating to those levels information gathered from individual patients. The individuals in the group of severe mentally ill are considered so few, that the aggregated individual view usually also gives a good approximation of the local population view.\textsuperscript{21} Hence, needs assessment is considered an important approach also for measuring outcome in psychiatric service evaluation in terms of met and unmet needs.\textsuperscript{29} The subject of the present thesis is needs assessment for the latter purpose, that is, for outcome evaluation at the system, service, and programme levels.

Unfortunately, these terms are used with slightly different meanings among mental health service researchers. In this thesis, ‘system level’ refers to the comprehensive range of services provided by collaborating local agencies for a local population. In other words, this is the community mental health system. The ‘service level’ refers to the particular services within the community mental health system, such as psychiatric services, social services, child care and so forth. Finally, the ‘programme level’ refers to particular components of the services, such as pharmacological treatment, social skills training or assisted care living. It is not always easy to separate these levels. A certain amount of overlap is therefore inevitable. This use is reasonably consistent with those used by authoritative researchers in this field.\textsuperscript{30-32}

The most prominent of the current scales and surveys for health and social needs targeted at mental health services are the MRC Needs for Care Assessment,\textsuperscript{33} the Cardinal Needs Schedule (a modified version of the former),\textsuperscript{34} and the Camberwell Assessment of Need.\textsuperscript{35} These three are covering almost the same areas of potential need, and are all focused on measuring personal and social functioning in order to identify needs for care and services within these areas. However, both the MRC Needs for Care Assessment and the Cardinal Needs Schedule are complex and time-consuming. They require extraneous standardised instruments to measure the patient’s psychiatric, personal, and social functioning as a prerequisite for the needs assessment itself. Moreover, the criteria for identifying the different categories of needs specified requires extensive clinical competence on the part of the assessor.

These features make both the MRC Needs for Care Assessment and the Cardinal Needs Schedule more likely to be used in research settings than in routine clinical practice. In contrast, the Camberwell Assessment of Need was specifically designed to be suitable for both routine clinical practice and
research purposes, to be completed within a short time, to be self-contained and self-explanatory, and to be usable after a short introduction by a wide range of professionals.

The Camberwell Assessment of Need – CAN

The CAN is an interviewer-administrated instrument for comprehensive assessment of the health and social needs of patients with severe and enduring mental illness, principally disorders within the schizophrenia spectrum. Originally developed in the beginning of the 1990s to meet the requirements for needs assessment according to the British National Health Service and Community Care Act 1990, it has since been disseminated internationally and is now the de facto standard for needs assessment of people in this clinical population, currently available in more than twenty languages.

A Family of Assessment Schedules

The CAN was developed incrementally at the Institute of Psychiatry in London, and first published in 1994 as ‘CAN (Research version 3.0, CAN-R)’. At the same time, a variant of the CAN, ‘CAN (Clinical version 3.0, CAN-C)’, was published. However, the difference between these variants is slight. The CAN-R has a section for rating the interviewee’s perception of the appropriateness of any current intervention, and for asking the patient (‘user’) whether he or she is satisfied with the amount of help received. In the CAN-C this section is replaced with a space to record additional information given by the patient and to write action plans. Both variants have been republished once, with only a few minor stylistic changes, along with the Camberwell Assessment of Need Short Appraisal Schedule (CANSAS). The CANSAS is a shortened clinical version excluding the many follow-up questions included in CAN-R as well as in CAN-C. However, all versions of the CAN cover the same areas of needs, and the assessment technique and the scoring instruction is the same irrespective of which version is used. Thus, the differences among the versions have no bearing whatsoever on the subject of this thesis. Henceforth, ‘CAN’ will be used as a catchall term for all variants of the CAN ‘family’ of assessment schedules.

The CAN was translated into Swedish during 1994, and published the year after as ‘CAN (Research version R3.0)’. It was republished in 1996 with minor stylistic changes and at the same time renamed as ‘CAN-S’. A further two years later the CAN-S was amended with boxes to record also the perception of carers (e.g., a family member or a friend), an option that is also available in the CANSAS. Since neither the CAN-C nor the CANSAS is
available in Swedish translations, the research version is the only choice for a CAN schedule in Swedish, in clinical practice as well as in research.

Scope and Administration

The CAN covers 22 areas or domains of needs (Table 1). These domains were chosen after pilot studies comprising both psychiatric professionals and patients from the target population of the measure, in order to cover the whole range of relevant health and social needs of persons with severe mental illness. There is no given order of priority among the need domains, and neither is weights used in the scorings, even though patients as well as professionals seem to put different weights of importance on the need domains.

Table 1. Need domains in the CAN, with corresponding labels in the British and in the Swedish versions

<table>
<thead>
<tr>
<th>British version</th>
<th>Swedish version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation</td>
<td>Bostad</td>
</tr>
<tr>
<td>Food</td>
<td>Föda</td>
</tr>
<tr>
<td>Looking after the home</td>
<td>Hemmets skötsel</td>
</tr>
<tr>
<td>Self-care</td>
<td>Hygien</td>
</tr>
<tr>
<td>Daytime activities</td>
<td>Daglig sysselsättning</td>
</tr>
<tr>
<td>Physical health</td>
<td>Fysisk hälsa</td>
</tr>
<tr>
<td>Psychotic symptoms</td>
<td>Psykotiska symptom</td>
</tr>
<tr>
<td>Information on condition and treatment</td>
<td>Information om hälsa och behandling</td>
</tr>
<tr>
<td>Psychological distress</td>
<td>Psykologiska besvär</td>
</tr>
<tr>
<td>Safety to self</td>
<td>Egen säkerhet</td>
</tr>
<tr>
<td>Safety to others</td>
<td>Andras säkerhet</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Alkohol</td>
</tr>
<tr>
<td>Drugs</td>
<td>Droger</td>
</tr>
<tr>
<td>Company</td>
<td>Sociala kontakter</td>
</tr>
<tr>
<td>Intimate relationships</td>
<td>Intima/nära kontakter</td>
</tr>
<tr>
<td>Sexual expression</td>
<td>Sexuell funktion</td>
</tr>
<tr>
<td>Child care</td>
<td>Barnomvårdnad/barnomsorg</td>
</tr>
<tr>
<td>Basic education</td>
<td>Grundläggande skolfädigheter</td>
</tr>
<tr>
<td>Telephone</td>
<td>Telefon</td>
</tr>
<tr>
<td>Transport</td>
<td>Transport</td>
</tr>
<tr>
<td>Money</td>
<td>Pengar</td>
</tr>
<tr>
<td>Benefits</td>
<td>Sociala förmåner/bidrag</td>
</tr>
</tbody>
</table>

There are as many sheets in the schedule as there are need domains, and each sheet is divided into four sections (see example in Appendix). In the first section, a rating of need for the particular domain is made on a problem severity scale (Table 2), with examples as anchor points. If a need is recognised (i.e. a severity rating of 1 or 2), then the interviewer proceeds to the following sections, otherwise to the next need domain. Section two assesses
the amount of help received from friends and relatives, whereas section three assesses the amount of help received by and needed from local services. The last section assesses the appropriateness of any current intervention and whether the patient is satisfied with the amount of help currently received.

Table 2. The CAN severity ratings and the corresponding indications of need status

<table>
<thead>
<tr>
<th>CAN severity rating</th>
<th>Indication of need status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = No problem</td>
<td>No need</td>
</tr>
<tr>
<td>1 = No/moderate problem due to help given</td>
<td>Met need</td>
</tr>
<tr>
<td>2 = Serious problem</td>
<td>Unmet need</td>
</tr>
<tr>
<td>9 = Not known</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

The time scale for all questions and for all assessments is the last month. The CAN assessment as a whole is made by interviewing the patient and a member of the staff, one at a time, about what might be the patient’s needs. The ratings based on each of the interviewees’ perspective are recorded separately. Alternatively, in clinical practice (e.g., for care planning) a member of staff might interview and record the views of the patient, while afterwards recording his or her professional view by self-completion.

Principal Foundations

Four broad principles were endorsed as a foundation for the CAN. First, that everybody has needs and that people with severe mental illness will have the same basic needs as others, as well as specific additional needs related to the illness. Second, the majority of the people with severe mental illness have multiple health and social needs, some of which might not be recognised by those caring for them. The CAN is therefore primarily aimed at screening for, rather than describing in detail, serious needs in relevant health and social areas, which might require a more thorough specialist assessment, once a need is identified. Third, need is recognised as a subjective concept, and that staff and patients (‘users’) might have different opinion on the presence or absence of specific needs. Therefore both patient and staff views are asked for, as well as recorded separately. Fourth, ideally needs assessment should be both a regular part of clinical practice for treatment planning and a component of service outcome evaluation. The CAN is therefore intended for both routine clinical practice and research.

The Concept of Need in Health Care

Health care, as well as social care is commonly referred to as services to be supplied and distributed according to need. Yet what constitute need is as a
rule left undefined in policy documents, and even in acts. One reason for this might simply be the complexity of the subject. The concept of health need has indeed been discussed extensively for a long time, without however, reaching consensus as to the definition.

Nonetheless, a committee under the Swedish Ministry of Health and Social Affairs pragmatically proposed, that sick people are primarily in need of a cure, provided that any cure is to be found. In that sense, there is a concept of need essentially defined by prospects of amelioration and health gain. However, in the presence of incurable illnesses there are needs for relief, comfort and consolation through palliative care, functional rehabilitation, or support in daily living. In that sense, there is also a legitimate concept of need linked to health-related quality of life. Consequently, no one is in need of interventions that have the power neither to improve health nor increase the health-related quality of life. Furthermore, need was considered proportional to the seriousness of illness, such that people with more serious illnesses, and thereof lower quality of life, are in greater need of effective interventions than those with less serious illnesses.

This pragmatic definition of ‘need’, which is now officially acknowledged in Swedish health services, is well in line with another, often cited definition of ‘need’ in health care, as ‘the capacity to benefit from health care’. Need in that sense implies interventions (comprising everything from health education to terminal care) which on average are effective, not that every outcome is guaranteed to be beneficial, as some critics claim.

Although a discussion about the various definitions of ‘need’ in health care is beyond our scope here, one notion implicit to the ‘capacity’ definition of ‘need’ might be highlighted. This implicit notion admits a need for health care to be established only on clinical signs, logically independent from any symptoms that a patient may experience. This is often of great importance. Hypertension might be a pertinent example of such a case, where an essential need of treatment often goes unrecognised by the person suffering from high blood pressure (thereof ‘the silent killer’). Also in many psychiatric conditions, such as dementia, hypochondriasis, delusional disorders, adult antisocial behaviour, and schizophrenia, discrepancies between outward signs and evidence, and the experiences of the person in case are often found.

This corresponds to a normative notion of health care needs, which makes the assumption that a need exist when an expert assessor of some kind (e.g., a psychiatrist, or a researcher) believes that health care should be provided. Other notions of health and social needs, such as ‘felt need’ (want) or ‘expressed need’ (demand), are more restricted in that sense, since they seem to require that the person in need always has an explicit meaning on his or her needs. Yet it is obvious that not all relevant health care needs are felt, and even when they are, they are nevertheless far from always being expressed and demanded.
However, the same Swedish committee recognised that need is indeed also a subjective, value laden concept, and that the person in need might view his or her needs quite differently from the health service professional. This might be so even when the patient and the health professional both have access to the same facts concerning the illness in question, as well as to the patient’s personal and former experiences. The assessment of needs, and how these might be met, must therefore often be decided through consultation and negotiation between the patient and the health professional. This is also explicitly stated in the Swedish legislation for health and social care.

This call for a conciliation between ‘other-assessed need’ and ‘self-assessed need’ trough negotiation between the health professional and the patient (which might extend to family members or carers) is also well in line with the current policy of evidence-based care, which has been defined as ‘the integration of best research evidence with clinical expertise and patient values’. It is also central to modern mental health care, where user-involvement and the patients as negotiators in their own treatment are acknowledged as guiding principles.

In summary, the current, pragmatic, near-consensus view is that health care needs are those that can benefit from health care interventions which have been proven to be on average effective. Health care interventions are here taken in broad meaning, including such as health-related social care and support. However, in each individual case it is always necessary to take into account personal circumstances, conditions, values and preferences by those immediately concerned when judging whether needs are present and how they might be met.

‘Need’ as Defined by the CAN

Remarkably, an explicit definition of ‘need’ is not to be found in the instructions for the CAN. Neither is, in fact, need the immediate object of the assessment. Rather, the presence of need is implicitly derived from ratings of functional ability in areas where people with severe mental illness often experience problems (see Table 1). If a ‘serious problem’ (read a functional limitation) is identified in any of these areas, such that the person concerned fare badly, is suffering or is unable to manage without help, a need for care or support is tacitly assumed simply as contingent to that problem. Thus, in the CAN need is stated in terms of disablement.

This implicit conceptualisation of need is not fully in line with the near-consensus view as described above. Most importantly it seems to lack the criteria against which an identified problem might qualify as a need, namely, being remediable by an existing and effective intervention. Rather, if serious problems are identified, need for ‘help’ of some kind seems to be directly implicated without any further qualifications. Accordingly, if there are no serious problems, neither are there any needs.
However, it is important to bear in mind that the CAN primarily is intended as a filter, or a screening instrument, to identify serious problems and highlight areas that might require further assessment. From that point of view, a problem identified by the CAN may indeed be said to implicate a capacity to benefit, namely from further assessment by a specialist and, in the extension, possibly from adequate help of any sort (treatment or support, information, reassurance, or whatever might be necessary).

The CAN also takes into account the value-laden, subjective component in needs assessment, by incorporating and recording separately both patient views and health professional views about needs. Thereby, the CAN seems, in a way, to provide all information that, according to Liss, is necessary and sufficient for an assessment of an individual’s health care needs, even though what constitutes a need is not explicitly defined. As explicated by Liss, an assessment of health care needs is performed in three steps:

(a) establishing the actual state of health or functioning;
(b) settling the goal, i.e. the optimal state of health or functioning;
(c) determining the object of need, i.e. that by which the goal (b) might be achieved, given a difference between (a) and (b).

The most crucial issue might be to judge the difference in (c), that is, the need or the capacity to benefit. One possible way to proceed, proposed by Liss, is ‘to let the individual himself directly identify the need (the difference). The specified goal may be implicitly expressed in such cases. The provider’s specification may be obtained in almost the same way. Perhaps a specified goal is implicitly expressed when health care need is assessed in ordinary clinical examinations’.

This suggested way to proceed is very much the way of the CAN. It seems also to be a reasonable way to proceed, particularly when considering the limited aim of the CAN, for which the object of need (i.e. the intervention) as a rule might be not more then indicative.

The Concept of Outcome

The Oxford English Dictionary defines ‘outcome’, as ‘a state of affairs resulting from some process; the way something turns out; a result, a consequence; a conclusion or verdict’. In health care, ‘outcome’ is used with two slightly different meanings. We speak about of outcomes in the course of a disease, such as distress, deterioration, disability, or death. However, we also speak of outcomes attributable to effective care, such as alleviation, improvements, and lower mortality. Thus, outcomes in the second sense refer
to changes in health status of an individual, or a group of individuals, stemming from the health care interventions received. Accordingly, in health services research, outcome assessment is, in principle, confined to and focused on measuring the magnitude and importance of treatment-related changes, while striving to control for other factors that may contribute to the course of an illness.

However, from a treatment outcome assessment point of view, ‘health change’ and ‘treatment outcome’ denote somewhat different concepts. Suppose that three patients, A, B, and C, before treatment had the ratings 3, 2, and 1, respectively, on a symptom scale where a high score is representing severe distress. After treatment the patients scored 2, 1, and 0 respectively. Thus, the change score, that is, the amount of improvement, was equivalent for all three. Yet it would be unreasonable to equate the outcomes in these patients. This important distinction between change and outcome was, to my knowledge, first pointed out by Sainsbury, and demonstrated with a similar example. In short, Sainsbury distinguish between ‘improvement (difference), or how much better is the patient after treatment’ and ‘outcome, or how well is the patient before and after treatment’, with the upshot that ‘outcome is a combined function of starting level and improvement’. This distinction has not yet been taken into consideration when using the CAN as an outcome measure.

Outcome Assessment and the CAN

The needs approach is considered to be one of the principal approaches to outcome assessment in mental health service evaluation. The CAN was also designed to serve as a tool to that end. The standard summary scores of the CAN – the total number of needs, met needs, and unmet needs – have already been used as outcome measures in a number of studies (e.g. ). These scores are based on the ratings of need (see Table 2 above) in the first section of the CAN schedule, and are calculated as shown in Table 3 below. Ratings of 9 (i.e. ‘not known’) are always counted as 0 when adding up any score in the CAN.

<table>
<thead>
<tr>
<th>Summary score</th>
<th>Calculation</th>
</tr>
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<tbody>
<tr>
<td>Total number of met needs</td>
<td>The number of need ratings of 1 (met need) for the 22 domains</td>
</tr>
<tr>
<td>Total number of unmet needs</td>
<td>The number of need ratings of 2 (unmet need) for the 22 domains</td>
</tr>
<tr>
<td>Total number of needs</td>
<td>The number of need ratings of 1 or 2 (met or unmet need) for the 22 domains (i.e. the sum of the total number of met and unmet needs)</td>
</tr>
</tbody>
</table>
The analyses of CAN data for outcome evaluation have as a rule focused on the summary scores, rather than on the individual domains of need. The main reason for this is that in most domains covered by the CAN, needs are encountered infrequently in individual patients. Analysis of outcome in individual need domains therefore usually requires very large samples if any difference in need frequency is to be distinguished with reasonable precision.

**The CAN and the Linear Model of Measurement**

However, a prerequisite for any summary score, that is, a score added over individual items, is that the set of items underlying the score fit the ‘linear model of measurement’. Most measurements for scaling people in psychology and psychiatry are designed to fit this model, which makes three major assumptions.

First, each item has a monotonic trace line. That is, the plotted curve relating an attribute to the probability of responding in a certain way is fairly straight. Second, the sum of the trace lines for the set of items is approximately linear. Third, it is assumed that the items as a whole tend to measure the same attribute. This model yields a linear combination of items, in which a sum of item scores is a linear combination of those scores.

For a set of items that does not fit the linear model, it does not make sense to add the item scores up in one total score. As indicated by the rather low internal consistency of the CAN and the somewhat uncertain convergent validity with other measures of personal and social disablement, there are reasons to suspect that the set of items in the CAN may not fit this model.

**The Internal Consistency of the CAN**

The internal consistency is most often estimated by Cronbach’s coefficient alpha. It is recommended that alpha should be at least 0.70 to be acceptable. In a study exploring the internal consistency of the CAN, alpha was estimated at 0.64 (95 % CI 0.58-0.70). This is slightly below the acceptable level, which indicates a certain amount of heterogeneity of items in the CAN.

This might lead to inconsistencies when, for instance, CAN scores are being compared among different samples of patients. In fact, differences among sites in the five-nation European study were found to be very low for overall met needs, even after adjusting for patient characteristics, although marked variations were apparent for specific items. It was concluded that, ‘the mean number of needs are robust statistical measures of overall levels of need, but they hide important differences in patterns in the individual domains’.

**Convergent Validity of the CAN**

Since need in the CAN is stated in terms of disablement, convergent validity with other instruments measuring disability would be expected. In a psy-
chometric study of the CAN, the Global Assessment of Functioning (GAF) scale was used as a validity criterion for disability. The comparison of the CAN with GAF showed a mixed picture with poor correlation for some items while many were not associated with levels of global functioning on their own. An aggregated score of seven items from the CAN (not further specified), intended to reflect domains of disability as measured by the GAF, gave a stronger correlation with the GAF-score ($r = -0.51$). Similar results were found in another study comparing CAN and GAF.

Divergent results were found in two studies using the Health of the Nation Outcome Scales (HoNOS) as a measure of personal and social disability. In one of these two studies it was concluded, that the overlap between what is assessed by the CAN and the HoNOS is at best partial, and that the level of agreement does not indicate that the same constructs are being measured. Contrary to this, the other study obtained results that indicates strong relationships between measures of disability and need, as measured by the HoNOS and by the CAN respectively.

**Is the CAN an Appropriate Outcome Measure?**

The characteristics of the CAN described above pose threats to the appropriateness of the CAN, particularly to the standard CAN scores, as an outcome measure. Hence, an investigation of the CAN to that end seems to be an important research issue, which has hitherto been overlooked.

Such an investigation should comprise a study of the structure of the CAN in terms of what variables are actually being measured. If the complete set of items in the CAN does not fulfil the assumption of homogeneity according to the linear model, a possible remedy might be to group correlated items together so as to make possible the calculation of sub-total scores related to different aspects of functioning and health need.

The investigation should also include a study of the correspondence of the amount of change in need status measured at the item level to that measured at the summated level, in order to throw some light on any discrepancies between the levels as suggested by subsidiary results in previous outcome studies.

Furthermore, should the standard summary scores be found inappropriate, it would be urgent to suggest and examine alternative ways of scoring the CAN without any demands for changes to the instrument itself, considering that the CAN is already widely in use.
Aims of the Thesis

The aim of the thesis was to examine the psychometric characteristics described above as to their significance for the CAN as an outcome measure. A further aim was to suggest other ways of analysing and presenting CAN data, for the purpose of service evaluation, than those that have hitherto been used. The specific objectives were:

To explore latent variables underlying the CAN (Paper I).

To investigate if the CAN summary scores adequately reflects changes in the individual need domains when used in routine mental health care (Paper II).

To propose a way to disaggregate the total CAN score into meaningful subindices, with a view to increase information transparency (Paper III).

To examine the disaggregated CAN with the objective to distinguish the meeting of needs in social, psychiatric, and in other type of services (Paper III).

To propose a metric for the CAN, fitting for assessing beneficial outcome over time in the presence of long-term ongoing needs (Paper IV).

To examine the utility of the proposed metric for outcome assessment in community mental health services (Paper IV).
Methods

The Clinical Setting

The present studies were carried out at the Clinic for Psychosis and Rehabilitation at the University Hospital in Uppsala. This clinic has since 1998 supplied and coordinated all psychiatric care, from emergency care to outpatient care and rehabilitation, for patients with severe and enduring mental illness in Uppsala County (in 1997 about 223,000 inhabitants 18 years and older, including the city of Uppsala with about 144,000 inhabitants in the same range of age).

The psychiatric services at the clinic are operated by several multidisciplinary teams, some of which are attached to small in-patient units. Complementary emergency and intensive care beds are provided in wards at the University Hospital. This clinic has been briefly described by Wennström, et al., and in more detail (in Swedish) by the present author. The psychiatric services are organised as to facilitate collaboration with services run by the Social Welfare Office, such as home help service, assisted care living, social or scheduled daytime activities, targeted at the same patient population.

Subjects

The patients that served in the studies were for some time during 1997 through 2004 in regular community-based mental health care at the clinic for Psychosis and Rehabilitation at the University Hospital in Uppsala. All studies were approved by the research ethics committee of the medical faculty of Uppsala University. The sampling procedures were as follows:

For Paper I, we selected the most complete CAN assessment of each patient recorded in the clinical case register from 1997 through 1999. An assessment was considered incomplete if one or more items (domains) in the assessment was rated ‘not known’ (i.e. a rating 9).
For *Paper II*, we selected all patients that were assessed with the CAN and registered in the clinical case register in 1997 and still being cared for within the clinic and reassessed in 2003 during the regular, annual procedure.

For *Paper III*, we selected all patients that were assessed and registered in the clinical case register in 1997 and still being cared for within the clinic and reassessed in 1999 during the regular, annual procedure.

For *Paper IV*, we selected all patients that were assessed and registered in the clinical case register in 1997 and reassessed at least once during 1998 through 2004.

Thus, the samples in *Paper II-IV* were all subsamples of all patients registered in the clinical case register during 1997 (N = 355). Accordingly, a certain amount of overlap among samples was inevitable. The demographic and psychiatric characteristics of the patients serving in each study are shown in Table 4.

**Table 4. Patient characteristics by Paper**

<table>
<thead>
<tr>
<th></th>
<th>Paper I (n = 741)</th>
<th>Paper II (n = 192)</th>
<th>Paper III (n = 262)</th>
<th>Paper IV (n = 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>373 (50.3%)</td>
<td>96 (50.0%)</td>
<td>136 (51.9)</td>
<td>163 (50.8)</td>
</tr>
<tr>
<td>Females</td>
<td>368 (49.7%)</td>
<td>96 (50.0%)</td>
<td>126 (48.1)</td>
<td>158 (49.2)</td>
</tr>
<tr>
<td><strong>Mean age, years (sd)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>43.8 (12.2)</td>
<td>43.7 (11.5)</td>
<td>43.4 (11.6)</td>
<td>44.4 (11.5)</td>
</tr>
<tr>
<td>Females</td>
<td>47.2 (12.9)</td>
<td>47.0 (10.9)</td>
<td>46.7 (11.6)</td>
<td>48.0 (12.1)</td>
</tr>
<tr>
<td><strong>Years since first contact</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>20.1 (11.2)</td>
<td>-</td>
<td>20.8 (11.3)</td>
</tr>
<tr>
<td><strong>Principal diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schizophrenia or other psychotic disorder</td>
<td>506 (68.3%)</td>
<td>150 (78.1%)</td>
<td>202 (77.1%)</td>
<td>245 (76.3%)</td>
</tr>
<tr>
<td>Other disorder</td>
<td>221 (29.8%)</td>
<td>42 (21.9%)</td>
<td>60 (22.9%)</td>
<td>76 (23.7%)</td>
</tr>
<tr>
<td>Missing</td>
<td>14 (1.9%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Number of needs (sd)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6.4 (3.4)</td>
<td>6.3 (2.9)</td>
<td>6.7 (3.0)</td>
<td>6.6 (3.1)</td>
</tr>
<tr>
<td>Met</td>
<td>4.7 (2.7)</td>
<td>4.8 (2.6)</td>
<td>4.8 (2.5)</td>
<td>4.8 (2.6)</td>
</tr>
<tr>
<td>Unmet</td>
<td>1.7 (2.0)</td>
<td>1.5 (1.7)</td>
<td>1.8 (2.0)</td>
<td>1.8 (2.1)</td>
</tr>
</tbody>
</table>

*) At the time of assessment (*Paper I*) or as of January 1997 (*Paper II-IV*).
The CAN Assessments

Neither needs assessments nor clinical examinations of the patients were made particularly for any of the present studies, since all information used were compiled from a cumulative clinical case register at the University Hospital in Uppsala, containing individual patient data that were collected in routine clinical practice.

This case register was started in 1996 for longitudinal needs assessments of patients with severe mental illness as a part of the clinic’s quality assurance system. Needs assessments of all patients in regular contact with the clinic are made annually by the patient’s key workers (i.e. the principal care worker allocated to a certain patient) using the Swedish version of the CAN.43

This is accomplished by the key worker’s recording of the patient’s own views on his or her needs during an interview. Afterwards the key worker gives his or her professional views on the patient’s needs by self-completion of the staff ratings. The patient and staff views, including any difference between the two, are then used to inform the individual care planning process. The results of the assessment are also recorded in the case register, along with the patient’s current principal diagnosis according to the DSM-IV.77 Only the staff ratings were used in the present studies.

Training for the CAN

At the time when measurements appropriate for a quality assurance system were considered at the clinic, the CAN was finally selected in consensus with the staff that would be directly involved in its practical application. The CAN schedule was thereafter thoroughly presented in several three-hour workshops for all members of staff, led by the psychologist responsible for the CAN in Sweden, Bo G. Ericson. It was then introduced in clinical practice for a trail period in 1996, during which problems and difficulties (e.g. how to score the need ratings for specific problems) were discussed. From October 1997 the CAN is in regular use at the clinic.

Recurring half-day training sessions have also been run by the present author, in which practice vignettes from the manual have been used.40 Therefore, all members of staff using the CAN in practice have at least the amount of training in the procedure that is recommended in the manual.40 During the year 2000 a five months long comprehensive needs assessment training, alternating theory and practice, for 13 members of staff was accomplished, including mental health workers, nurses, social welfare officers, and occupational therapists. These persons have since then been active as ‘supervisors’ for their clinical co-workers in the use of the CAN. They have also held regular meetings, in which the present author often took part, 2-4 times a
year to discuss issues concerning the ongoing use of the CAN in the clinical work.

Statistical Methods

In Paper I, missing values for individual items (i.e. item nonresponse) were substituted by a multiple imputation procedure, using the Expectation-Maximisation algorithm as implemented in LISREL 8.50 for Windows.\textsuperscript{83, 84} Exploratory maximum likelihood factor analyses in Paper I were carried out using LISREL 8.50 for Windows.\textsuperscript{83} The selection of the number of factors to be extracted was based on the root mean square error of approximation (RMSEA) fit index. RMSEA $\leq 0.05$ is considered a close fit.\textsuperscript{85} Oblique pro-max rotation of factor loadings was used. Only factor loadings of $|0.30|$ or above were considered for interpretation.\textsuperscript{86} To be retained, factors were required to comprise at least three salient loadings.\textsuperscript{87} Two-stage least squares (TSLS) estimates were used to judge whether a model was reasonable,\textsuperscript{88} controlling the level of significance at $\alpha = 0.01$ (two-tailed).

In Paper II and III, paired-samples (within subjects) $t$ tests were used for analysing differences in mean standard summary scores of total number of needs, met needs and unmet needs. At the item level of the CAN, analysis of change in need frequency was made with the Wilcoxon signed-ranks test. The McNemar test was used for analysis of need status change. When the total frequency of changes was small, the binomial distribution was used with the McNemar test; otherwise the chi-square distribution with continuity correction was used.\textsuperscript{89} Pair-wise deletion of missing values was applied in the analyses. Statistical significance was set to $p < 0.05$.

In Paper IV, the bootstrap percentile method\textsuperscript{90} was used to calculate 95% confidence intervals for the proportion of ‘positive outcome’ years for each item, and for the aggregated measure over all 22 items, and for the three main type of services. These analyses were also made separately for male and female patients and for patients with and without schizophrenia as principal diagnosis.
Results and Discussion

Factor Structure of the CAN (*Paper I*)

With an aim to detect any significant latent variables underlying the CAN, CAN assessments of a large sample of patients (n = 741) in out-patient mental health care were made subject to exploratory factor analysis. Three factors were found, together comprising 13 of the 22 items of the CAN (Table 5). One of the factors was relating to functional disability (ADL) and the other two to different aspects of social health,91 ‘social loneliness’ and ‘emotional loneliness’ respectively, consistent with a typology of loneliness by Weiss.92-94 The remaining nine items did not load on any factor.

Table 5. *Reference factor loadings estimated by two-stage least squares analysis*

<table>
<thead>
<tr>
<th>CAN domain</th>
<th>Functional disability</th>
<th>Social loneliness</th>
<th>Emotional loneliness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking after the home</td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>0.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-care</td>
<td>0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money</td>
<td>0.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accommodation</td>
<td>0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>0.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daytime activities</td>
<td>0.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological distress</td>
<td>0.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual expression</td>
<td></td>
<td></td>
<td>0.88</td>
</tr>
<tr>
<td>Intimate relationships</td>
<td></td>
<td></td>
<td>0.53</td>
</tr>
<tr>
<td>Safety to others</td>
<td></td>
<td></td>
<td>0.34</td>
</tr>
</tbody>
</table>

Note: Reference variable coefficients are in bold. Only coefficients ≥|0.30| are shown, all statistically significant (p < 0.001, two tailed).

A previous study80 using principal component analysis with orthogonal rotation found seven principal components, although only four were found to be interpretable. These four were interpreted as relating to ADL, relationships, drug and alcohol abuse, and living conditions. The ADL factors found in both the previous study and in the present study were fairly similar. Two domains in each of the social health factors in the present study also loaded together on two of the components in the previous study.80 However, in
comparison with the previous study we seemed to find more conceptually consistent factors. This was probably due to our chosen method for factor analysis, which generally provides a better simple structure and results that are easier to interpret than a principal component analysis.95

The result of our study confirms that the CAN is a heterogeneous instrument. Nevertheless, in regard to the linear model of measurement, summed scores over the selected items that correspond to the three factors found in the present study would be more appropriate than are the standard summary scores. Thus, the factor scores might to a certain degree be useful as outcome measures in mental health rehabilitation programmes.

The Summary Scores as Outcome Measures (Paper II)

Outpatients (n = 192) in psychiatric rehabilitation for severe mental illness were assessed with the CAN in 1997 and reassessed in 2003. No changes in need between 1997 and 2003 were noted, as measured by the mean standard summary scores. The mean total number of needs was 6.30 (sd = 2.89) in 1997 and 6.23 (sd = 3.22) in 2003; the mean number of met needs was 4.77 (sd = 2.55) in 1997 and 4.70 (sd = 2.60) in 2003; and the mean number of unmet needs was 1.53 (sd = 1.74) in 1997 and 1.53 (sd = 1.93) in 2003.

These results were then compared, first, with changes in total number of needs on the individual CAN items. Significant increases in needs were found on ‘physical health’, ‘looking after the home’, and ‘self-care’, whereas ‘psychotic symptoms’, ‘company’ and ‘child care’ decreased significantly. In total, the amount of increase was on par with the amount of decrease.

Second, when examining each CAN item separately and including only those patients with recognised needs in 1997 in the analyses, significant changes in need status between 1997 and 2003 were found on almost all items: The needs still remaining in 2003 were more often met than not, and many patients in need of a certain care or support in 1997 were found to be managing on their own in 2003. Furthermore, new needs that occurred after the baseline measurement in 1997 but still ongoing and recognised at follow-up were then rated as met to 70% or more on all but three items, on which the proportion of met needs was about 50%.

Thus, none of the mean standard summary scores was found to change between 1997 and 2003. Nevertheless, sizeable changes in need and need status were observed at the item level of the measure. This contradictory result was explained mainly by two factors; first, by the heterogeneity of the set of items in the CAN, and, second, by the way of calculating the means.

The heterogeneous nature of the CAN has been indicated by the fairly low internal consistency, estimated at 0.64 (Chronbach’s alpha).72 Normally, this
The heterogeneity of the CAN was further confirmed in our factor analytic study (Paper I), in which support was found for a factor model comprising only 13 of the 22 items. Similar results were found earlier by Slade, et.al.80 and more recently by Korkeila, et.al.96 When the individual items are measuring different attributes, they may change independently of each other and in different directions. This may yield highly misleading results, which was conspicuously shown in our study by the discrepancy between the results at the summated level and at the item level. Moreover, the amount of increase in need frequency was on par with the amount of decrease, levelling each other out. This gave a false impression of unchanged conditions. The same phenomenon is evident also in a very recent study.97

The other factor contributing to the discrepancy between the summated level and the item level is of a mathematical nature. When calculating the mean standard summary scores, a constant (the number of items in the CAN, i.e. 22) is used as the denominator. Thus, the ratings of all items are inevitably included in the mean scores, even those indicating no needs (items rated 0). This means that both patients with needs and patients without needs (on some of the items) at the baseline measurement will be included in the outcome analysis at follow-up. This will attenuate any treatment effect on the measure, which was clearly shown in the present study. When only patients with recognised needs at baseline were included and the analysis was made for each item separately, important changes were observed on most items. Similarly, when the needs that occurred after the baseline measurement but still ongoing at follow-up were taken separately in the outcome analyses, the results indicate that 70% or more of those needs were met in most domains.

In conclusion, the results of our study indicate that the standard summary scores of the CAN are very likely to conceal important changes over time on the underlying items. Hence, they should not be used as dependent measures in evaluative studies or in other types of studies where comparisons among populations or between points in time in the same population are of interest. However, the changes observed at the item level suggest that the CAN is sensitive enough to detect and identify changes in need, provided that changes are examined on an item per item basis and that the outcome in patients with recognised needs at baseline is analysed separately from those whose needs occurred later.

The CAN Score Disaggregated (Paper III)

The standard summary CAN scores may appear as ‘black boxes’, to the extent that they obscure meaningful variation at the item level of the instrument. The aim of the present study was therefore, for the purpose of service
evaluation, to explore whether any gain in information transparency might be achieved by ‘deconstructing’ the ‘black box’, as it were, of the standard CAN score into logically coherent subindices.

In a previous CAN study made in 1999 at the University Hospital in Uppsala, needs profiles at the group level in the years 1996 through 1999 were compared cross-sectionally. During 1996/97 an overhaul of the organisation of the psychiatric care of patients with severe and long-standing mental illness in Uppsala County was made, and a new organisation came into force in January 1998. Are there, in the results from the CAN assessment during the years before and after the reorganisation, any indications of improvements in meeting needs of psychiatric care in the new organisation?

This was considered a fitting question to serve in the purpose of the present study, in which we re-used and re-analysed the cross-sectional CAN data from 1997 and from 1999 collected in the previous study. In order to discriminate changes in needs in CAN domains appurtenant, in terms of legal responsibility, to the psychiatric care system, a legislative analysis was conducted. By such an analysis it is possible to compare different service systems, or different parts of one service system, in respect of their use of a certain legislation, in this case the Swedish mental health and social services legislation. Two subindices of the CAN were thus defined ad hoc: the Social Service Index (SI), containing 9 of the 22 CAN items, and the Psychiatric Service Index (PI), containing 8 items. The standard summary scores were then calculated for the full CAN and sub-total scores for each of the three subindices. Paired-samples analyses were then used to compare changes in need between 1997 and 1999.

Totally, 262 patients in psychiatric rehabilitation for severe mental illness served in the study. As measured by the full CAN, the mean total number of needs was significantly lower in 1999 compared to 1997 (6.22 vs. 6.65; p = 0.007), as was unmet needs in 1999 (1.55) compared to 1997 (1.55 vs. 1.81; p = 0.049). The mean number of met needs was similar both years (4.67 and 4.84, respectively).
All significant changes in mean needs between 1997 and 1999 seem to have occurred within the psychiatric services domain, as indicated by the sub-total scores from the SP and PI subindices (Table 6). A subsequent analysis at the item level showed that significant decreases occurred within three of the PI domains: ‘psychotic symptoms’ (p < 0.001), ‘security to self” (p = 0.039), and ‘intimate relationships’ (p = 0.006). In contrast, there were no changes in mean needs within the social services domains.

Table 6. Total needs, met needs, and unmet needs for patients (n = 262) in 1997 and in 1999 for the SI and PI CAN subindices by means (M), medians (Md) and standard deviations (Sd)

<table>
<thead>
<tr>
<th></th>
<th>1997 M (sd)</th>
<th>Md</th>
<th>1999 M (Sd)</th>
<th>Md</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total needs</td>
<td>3.30 (2.02)</td>
<td>3</td>
<td>3.15 (2.06)</td>
<td>3</td>
<td>0.070</td>
</tr>
<tr>
<td>Met needs</td>
<td>2.47 (1.80)</td>
<td>2</td>
<td>2.35 (1.85)</td>
<td>2</td>
<td>0.141</td>
</tr>
<tr>
<td>Unmet needs</td>
<td>0.83 (1.25)</td>
<td>0</td>
<td>0.79 (1.22)</td>
<td>0</td>
<td>0.720</td>
</tr>
<tr>
<td>PI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total needs</td>
<td>2.42 (1.18)</td>
<td>2</td>
<td>2.22 (1.20)</td>
<td>2</td>
<td>0.006</td>
</tr>
<tr>
<td>Met needs</td>
<td>1.66 (1.02)</td>
<td>2</td>
<td>1.65 (1.06)</td>
<td>2</td>
<td>0.884</td>
</tr>
<tr>
<td>Unmet needs</td>
<td>1.66 (1.02)</td>
<td>2</td>
<td>0.57 (0.90)</td>
<td>0</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

The p-values (two-tailed) are for Wilcoxon’s signed ranks tests. SI, Social Service Index; PI, Psychiatric Service Index.

This result seems to indicate, that sub-total scores were more transparent than the corresponding scores for the full CAN, which made it possible to discriminate changes in needs within the psychiatric services domain from those within the social services domain. This was not possible to achieve by using the standard summary scores for the full CAN alone. Thus, while retaining the usual measures (the number of met needs, unmet needs, and needs in total), sub-total scores for subindices of the CAN might be more informative and useful in services evaluation than are the standard scores for the full CAN index (i.e. for all of the 22 domains).
The Met Needs Index (*Paper IV*)

The objectives of this study were, first, to propose a metric for beneficial outcome in terms of need, and second, to examine the utility of the proposed metric for assessing the stability of services in meeting needs, and the achieved benefit for patients over time.

The metric proposed was the Met Need Index (MNI), defined by us as the aggregated measure of met need, that is, beneficial outcome. The MNI was estimated from a transition matrix for repeated CAN assessments. This is a square matrix in which both the rows and the columns correspond to the level of need categories in the CAN scale (0 = ‘no need’, 1 = ‘met need’, 2 = ‘unmet need’, and 9 = ‘not known’), the row categories referring to one time period and the column categories referring to a subsequent time period. The time periods referred to in this study were consecutive years.

The entries in the matrix are the transition counts, the transition of interest being the transition to the status of need in the *i*th year from that in the (*i*-1)th year. The transitions were classified as either positive (i.e. beneficial) or negative outcomes. Table 7 shows the definitions of ‘positive outcome’ and ‘negative outcome’ for a given comparison of values in year $T_i$ ($i = 1998-2004$) and in the previous year $T_{i-1}$ for a certain CAN domain.

<table>
<thead>
<tr>
<th>CAN rating at $T_i$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN rating at $T_{i-1}$</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>0</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>-</td>
</tr>
</tbody>
</table>

The MNI could then be estimated from the transition matrix through the following calculations. For each CAN item, the ‘positive outcome’ proportion of all years with applicable information was calculated. An aggregated measure of ‘positive outcome’ proportion was calculated as follows. The number of all years of ‘positive outcome’ transitions was calculated for each item, and then added up over all 22 items (a). The number of all years with applicable information was calculated for each item, and then added up over all 22 items (b). The aggregate measure of ‘positive outcome’ transition, i.e. the MNI, was calculated as a/b. The aggregate measure was also calculated separately for each of the main type of services, labelled ‘social services’, ‘psychiatric services’, and ‘other services’ respectively. The MNI ranges from 1.00 for perfect positive need satisfaction, i.e. adequate assessment of...
need status and satisfaction of identified needs at all observations, to 0.00 for
perfect negative need satisfaction, i.e. need status unknown or identified
needs unmet at all consecutive observations.

For estimation of the MNI we used annual CAN assessments of patients with
severe mental illness in community-based mental health care from 1997
through 2004. The total MNI was estimated at 0.71 (95% CI 0.69-0.74) (Fig-
ure 1). There was a huge variation in MNI size among the different need
domains, some significantly larger, and some significantly smaller, than the
total MNI. Although not shown in Figure 1, the overall MNI size for needs
within the ‘psychiatric services’ area of responsibility (0.64, 95% CI 0.61-
0.67) was significantly smaller compared to the corresponding MIN for both
the ‘social services’ (0.78, 95% CI 0.75-0.81) and the ‘other services’ (0.76,
95% CI 0.72-0.80) areas of responsibility. There were some associations
between sex and MNI, and between principal diagnosis and MNI, although
the differences were not statistically significant, except for ‘telephone’
which was significantly smaller for patients with schizophrenia (0.83, 95%
CI 0.67-0.96) than for patients with other diagnoses (1.00).

Figure 1. The Met Needs Index (MNI) for all patients (n = 321) by individual CAN
domains of need. The domains are sorted after service type: social services (green),
psychiatric services (blue), and other type of services (red). The mean number of
applicable transitions per patient for estimating each index is shown to the right.
The estimated total MNI indicated that the needs in general either remained met or changed from unmet to met (or to no need) during as much as 71% of the intervals between the annual assessments. Thus, recognised needs had to a large extent been met adequately by the services under episodes followed up to seven years. Interestingly, the psychiatric staff, which made all of the ratings, rated the psychiatric services in general lower than both the social services and the other type of services. This seems to speak against the assessors being biased in favour of their ‘own’ type of services.

The MNI seems to have the power to detect important differences in need satisfaction even in individual need domains. This greatly enhances the utility of the CAN to map and distinguish outcomes among particular need domains, as well as among the service components comprised in the network of a community-based mental health care system. Furthermore, the facility with which the MNI results may be displayed graphically might effectively draw attention to important outcomes and alerting the need for further investigation.

In conclusion, this analytic approach seemed to disclose patterns in the data, and relationships between the variables, that make sense from a clinical point of view, and that seems to be highly informative and useful from an outcome evaluation perspective.
General Discussion

Most patients with severe mental illness, such as schizophrenia, have continuing care and service needs throughout the course of illness, which often is life-long. Systematic needs assessment is therefore considered a core component of a modern, community-based mental health care system, for planning, care-coordination, and monitoring of the services benefits to patients. Accordingly, needs assessment for gauging a service’s ability of meeting new needs promptly and adequately, its flexibility to act in time to intermittent needs, and its ability to maintain an even level of help for long-term, persistent needs, is also an important approach to outcome assessment in psychiatric service evaluation.

Although the literature to date favours the standard summary scores of the CAN as the measures of choice for outcome assessment, virtually no study has critically examined their appropriateness for such a purpose. Nor has any aptly and convenient method been applied to the CAN for assessing the stability of services in meeting ongoing needs over time.

Given the paucity of research on these topics, the aims underlying the present studies were, to explore the structural nature of the CAN, to examine the appropriateness of the standard summary scores as outcome measures for service evaluation, and to propose and examine alternative ways to analyse and present CAN data in psychiatric service evaluation.

Main Conclusions

In the factor analysis (Paper I) we found support for a three-factor model comprising, however, only 13 (or 60%) of the 22 items, in spite of advanced statistical methods and a very large sample. This must be considered an unsatisfactory solution. It confirms however that the CAN is a heterogeneous measure with a set of items measuring more or less different attributes. Thus, summing of scores over all the individual items is rather against logic and may cause highly misleading results. This was proven in Paper II, by comparing the standard summary scores with the scores on the underlying individual items.

Nevertheless, when ‘deconstructed’ into logically related, ad hoc defined subindices (Paper III), the sub-total scores were shown to be considerably
more transparent and informative than the standard summary scores, indicating that such indices might be fitting for outcome evaluation. The results in Paper IV indicated that the new MNI is an appropriate, meaningful, powerful, and parsimonious metric for assessing the adequacy of community mental health services in meeting ongoing needs of care and support, and for measuring the beneficial outcome for the patients over time.

The validity of these conclusions, from a methodological point of view, will be considered in the following discussion. Some issues concerning the practical implications for outcome assessment will also be discussed.

Methodological Considerations

The studies in this thesis have to some extent methodological requirements similar to studies aimed for field tests of new health measurement scales. In such studies, different aspects of generality are among the critical issues. Analogously, relevant issues of generality that may pertain to the present thesis will also be considered here, as will some matters concerning the statistical methods used.

Sample Size

For item analysis in scale development, where the aim is to decide which items is to be retained for the final measure, it is recommended to have at least 5-10 times as many subjects as items, in order to minimise subject variance.73 The requirements for the present studies might be considered comparable in that sense. The subjects to item ratio was 33.7 (I), 8.7 (II), 11.9 (III), and 14.6 (IV). Thus, the sample size seems to have been large enough to eliminate subject variance as a significant concern in all of the studies.

Representativeness of the Sample

The critical issue here is whether the samples were representative for the target population of the measure. The target population for the CAN is persons with severe mental illness, typically schizophrenia and related psychotic disorders.35 The onset of schizophrenia characteristically occurs in the early 20th for both sexes.102 However, a female preponderance of individuals with an onset at a later age103 is contributing to a higher mean age at first admission for females (about 30 years) compared to males (about 25 years).102 104 For various reasons, the prevalence in treated samples tend to be equal in males and females, yet the true morbidity rate seems to be higher for males than for females.105
The mean number of total needs in psychiatric samples has been estimated in the range from 3.34 to 8.64, based either on staff or patient ratings of need. In samples with severe mentally ill the estimates were in the upper part of that range. For the present thesis, an aggregate analysis of the mean number of total needs rated by staff in samples of severe mentally ill (on average about 70% schizophrenia and other psychotic disorders) was made. The study samples were taken in Sweden, in Britain, in the Netherlands, in Norway, and in Australia. As shown in Table 8, the mean number of total needs in these samples ranged from 5.3 to 7.3, with a weighed mean of 6.4.

Table 8. Mean (M) number of staff-rated total needs and standard deviations (Sd) in samples of patients with severe mental illness (on average about 70% psychotic disorders) from different parts of the world

<table>
<thead>
<tr>
<th>Study</th>
<th>M</th>
<th>Sd</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hansson et al, 1995</td>
<td>5.3</td>
<td>2.4</td>
<td>119</td>
</tr>
<tr>
<td>UK700 Group, 1999</td>
<td>6.0</td>
<td>3.0</td>
<td>708</td>
</tr>
<tr>
<td>Van Busschbach et al, 2002</td>
<td>6.8</td>
<td>2.4</td>
<td>35</td>
</tr>
<tr>
<td>Arvidsson, 2001</td>
<td>7.1</td>
<td>3.1</td>
<td>372</td>
</tr>
<tr>
<td>Sorgaard, 1999</td>
<td>7.2</td>
<td>2.9</td>
<td>38</td>
</tr>
<tr>
<td>Issakidis et al, 1999</td>
<td>7.3</td>
<td>5.0</td>
<td>78</td>
</tr>
<tr>
<td>Weighed* totals</td>
<td>6.4</td>
<td>3.2</td>
<td>1350</td>
</tr>
</tbody>
</table>

*) Using formulas from Glass & Stanley.

Thus, by comparing the information presented above with the demographic and psychiatric characteristics of the samples used in the present thesis (see Table 4 above), it seems reasonable to consider the samples in the present studies as being representative of the target population of the measure, as well as comparable to samples used in previous CAN assessment studies.

Contextual and Assessment Characteristics

Again, the requirements concerning contextual and assessment characteristics for the studies in this thesis might be comparable to those in scale development. For testing a new rating scale, the scale should be administered in the target clinical context, under conditions resembling those under which the eventual instrument will be used.

All CAN assessments used in the present studies were made under routine clinical practice by the patients’ key workers, primarily for individual treatment planning and follow-up. The key worker’s training for the assessments is described at length above. The patients assessed were all in care in a community-based setting for which the CAN is typically intended.

These conditions, being close to reality, were fitting for the aims of the thesis and, thus, strengthen the results of the studies. Yet some of the clinical
findings may as a consequence not extend to other contexts, such as forensic care, or to untreated community populations. It should be emphasised though, that neither was the studies aimed for nor designed for estimating the prevalence of mental health care needs in any population.

**Study Design**

The studies were designed as observational, prospective follow-up studies, without comparison groups, and without access to the specifics of services received. Moreover, no objective criteria to validate the observed changes in need were available. These conditions are, in part, limitations arising from the naturalistic nature of data in the clinical case register.

The length of the intermissions between assessments was rather long (about 12 months). With assessments far apart it is likely that some of the compared need ratings may correspond to different specific needs, although within the same need domain. However, the fixed length of the intermission was determined by the policy of annual assessments decided by the head of the clinical department.

The assessors were not blind to previous assessments. This may have caused the ratings to be biased. The assessors, all being among the psychiatric staff, might have been inclined to rate the outcome of their ‘own’ psychiatric services more favourable than those supplied by other community agencies. Interestingly, results from *Paper IV* seem to speak against such an inclination; the psychiatric service as a whole was, in fact, rated more unfavourable than the other sets of services. An obvious interpretation of this result is of course: that is the way it was. However, another interpretation is that the assessors were indeed right about the psychiatric services but not quite as right about the other services. It is reasonable to assume that with better knowledge and deeper understanding in psychiatric areas compared to the other areas, more correct ratings and finer distinctions of need in psychiatric areas are to be expected. In fact, a previous study conducted in Uppsala found that the pair-wise agreement of need status at the individual patient level was quite low between psychiatric staff and staff in social services. Unfortunately, this study made use of another needs questionnaire, which make it difficult to judge whether a similar divergence might extend to assessments made by using the CAN.

These limitations have, arguably, no significant impact on the results of this thesis, since the aims of the studies were solely to evaluate the appropriateness of the standard CAN scores as outcome measures, from a methodological point of view, and to examine alternative ways to analyse and present CAN data for service evaluation. Thus, there were no aims to evaluate outcomes per se. The studies may, in a sense, be looked upon rather as simulations of outcome studies, based, however, on real data. These ‘simulations’
were conducted on the assumptions that the observed changes were true changes, which in principle were either positive effects of services received or negative consequences of unmet needs of services. These assumptions were considered reasonable, true or not, for the explicit aims of the studies.

Statistical Methods

Missing data are often a problem in clinical studies. Although the best solution still is ‘not to have any’,\textsuperscript{115} p.2 multiple imputation is a new approach to the missing data problem (for extensive reviews, see Allison,\textsuperscript{115} and Schaffer & Graham\textsuperscript{116}). There are several methods for multiple imputation. These methods produce, in general, approximately unbiased and effective estimates, and also good estimates of standard errors and test statistics.\textsuperscript{115} Simulation studies have shown that this might hold even when the proportion of missing data is large.\textsuperscript{117} However, a basic statistical assumption is that absent values are missing at random. Absent data are said to be missing at random, when the probability of a missing value is not dependent on to the value itself.\textsuperscript{115}

In \textit{Paper I}, missing values for item non-response were supplemented by a multiple imputation procedure using the Expectation-Maximisation (EM) algorithm. This approach is recommended as the method of choice for many missing-data problems.\textsuperscript{116} The EM is theoretically beyond the confines of this thesis. Yet in principle, it might be described as a two-step iterative maximum-likelihood (ML) procedure. In the first step (E), missing values are replaced with expected values, given the observed data. In the second step (M), ML estimation of coefficients and covariances are made using the now ‘complete’ data, which are then used to estimate new missing values in the next E step. These E and M steps are repeatedly cycled through until the results from the two steps converge, that is, when the estimates from consecutive iterations are almost identical. The covariance matrix is used to impute the estimated, missing values in the original data set at the final iteration. Enders\textsuperscript{118} gives a more detailed description of the procedure.

Both the EM and the factor analytic method used in \textit{Paper I} build on the ML approach. In view of the nature of the CAN scale, the assumption of multivariate normality underlying the ML may not be justified. Even so, this will not prevent the use of ML procedures. It is true that if we have normally distributed data, then we are able to show that ML gives the correct and in several respects the ‘best’ estimates. Under conditions of non-normality the estimates might be biased. However, it does not follow that estimates obtained under non-normality would be more accurate using any other technique. In fact, several simulations studies show that ML estimates generally are ‘robust’ and reasonable (Sörbom D., personal communication, 22 Mars 2004; see also Allison,\textsuperscript{115} chap.4). This also seems to hold for ML estimates.
for missing values on variables that are not normally distributed.\textsuperscript{119} The advantage of ML is that the standard errors of the ML estimates can be estimated, that is, we can tell whether the obtained estimates are statistically significant.\textsuperscript{121}

The Wilcoxon signed-ranks test and the McNemar change test are both non-parametric tests. This kind of tests is also called distribution-free tests, because they generally make few assumptions concerning the population’s distribution. Both of the tests are variants of ranks tests, the first to be used with ordinal scales and the second with categorical, binary scales. Thus, they may be used with scores which are not exact in a numerical sense,\textsuperscript{89} and therefore suitable for analysing ratings on such scales as the CAN scale. These tests are, under comparable conditions, almost as effective as their analogues parametric tests.\textsuperscript{89}

The bootstrap, or bootstrapping, is a technique that trades in computing power to relax some of the conditions needed for statistical inference with more traditional methods. Parameter estimates by bootstrapping are based on the sampling distributions of sample statistics. This is accomplished by using a single, for the population representative sample, from which a random sample of size \(n\) with replacement is taken. The statistic of interest is calculated for the random sample and this is repeated a large number of times (usually over 1000). The basic bootstrap idea is that a statistic estimated from the bootstrap sampling distribution is a correct estimate of the sampling distribution of the statistic in the population.\textsuperscript{122}

The original sample represents the population from which it was drawn. So resamples from this sample represent what we would get if we took many samples from the population. The bootstrap distribution of a statistic, based on many resamples, represents the sampling distribution of the statistic, based on many samples [from the population].\textsuperscript{ibid., p. 14.5}

Bootstrapping is a highly efficient method for statistical inference, to be used with almost any real data set of independent observations,\textsuperscript{90} which however makes heavy computational demands. Even with today’s powerful computers, bootstrapping may take days with large samples. For instance, the analyses for \textit{Paper IV} took many hours and were therefore set to run only during the night time. However, ‘the heavy computation needed to produce the bootstrap distribution replaces the heavy theory (central limit theorem, mean and standard deviation of \(x\)) that tells us about the sampling distribution. \textit{The great advantage of the resampling idea is that it often works even when theory fails.}’\textsuperscript{122 p.14.6}
Implications for Outcome Assessment

Three questions related to the use of the CAN for outcome assessment will be discussed in the light of the conclusions of this thesis. First, what value, if any, should be attached to the standard summary scores as outcome measures for service evaluation? Second, how and to what extent might subindices and the new MNI index be viable alternatives to the standard summary scores? Third, how might the CAN be used to be more favourable for outcome evaluation from a needs assessment approach? It should be emphasised that the following discussion relate to the CAN as an outcome measure for service evaluation only, not to its use and value for screening or treatment planning purposes.

The Value of the Standard Summary Scores

Obviously, although not explicitly stated in the manual, the standard summary scores are meant to be comprehensive indicators of the overall levels of needs and need status. Unfortunately, these scores were also suggested as outcome measures in service evaluation, ‘such as evaluating the impact on needs of two different types of mental health services’. Although they may indeed be adequate as overall estimates of need, they are, nonetheless, inadequate as outcome measures, as shown and explicated in detail in the present thesis. Hence, the conclusion must be that the standard summary scores should not be used as dependent measures in evaluative studies, nor in any other type of study in which comparisons between points in time or among populations are of interest.

One likely explanation for this rather unfortunate situation is that the CAN generally has been regarded as a rating scale and not, more appropriately, as a composite index. In distinction to a rating scale, a composite index is difficult to use as an outcome measure due to its construction. This has, regrettably, been rather neglected.

In general, a psychiatric rating scale is a device to measure a latent psychological dimension. A composite index, on the contrary, is an aggregation of separate scores into a single number, which as such has no real correspondence in the physical world. Rather, it is a theoretical dimension entirely defined and determined by the observed variables included in the index. These variables need not be related to each other. In other words, a rating scale tells us the magnitude of a real life phenomenon, whereas a composite index numerically summarises the overall state of the phenomena included in the index.

Thus, to apply a rating scale as an outcome measure is usually rather straightforward. With a composite index, however, it will often be quite complicated, because the strength of a composite index to condensate a com-
plex set of phenomena into a single score comes with a price; we cannot
distinguish its determining factors. To achieve the required transparency we
will first have to disaggregate the composite index into its individual ele-
ments or rearrange the elements into more appropriate subindices.¹²³

The Utility of Subindices

To define subindices for the CAN is not a new idea. In fact, the first official
manual for the CAN included a summary sheet dividing ‘the topics assessed
into groups, which may correspond to the interests of mental health disci-
plines.’ … ‘This may inform the choice of the most appropriate professional
to be identified as key worker’.³⁸ p.⁵ However, the criteria for the groupings
are not described and the sheet has since been excluded from the manual.⁴⁰
This specific grouping has, to my knowledge, mainly been used within the
South-Verona Outcome Project (e.g.⁷⁰ ¹²⁶ ¹²⁷).

Instead, researchers have as a rule relied on the standard summary scores
as outcome measures. However, these scores are not directly related to any
real service, but rather to the mental health service system as such. May
ideological factors play a role here? It has been stated that needs assessment
should be ‘needs-led’, that is, ‘not be undertaken in terms of or on the basis
of existing services, that is, assessment should not be service-based. This
means that assessment of need is a separate process from decisions about
what care or treatment to provide’.³⁷ p.⁲⁹¹

Yet, outcome assessment for service evaluation is by definition ‘service-
based’, because the validity of an outcome measure is determined essentially
by its directness to the goals of the service which is to be evaluated.¹²⁸ It
may, for several reasons, be sound to go through, as prescribed in the man-
ual,⁴⁰ all the need domains in the CAN when assessing a person’s current
needs, irrespective of which of the service agencies will be addressing each
particular need eventually. However, it does not follow that all the domains
should be used also for the purpose of service evaluation. Rather, the strat-
egy for such a purpose would be to use the ‘objectives or targets of the ser-
VICES as a framework’¹²⁹ for selecting from the CAN the appropriate need
domains. After that, the selected domains would, if possible, be rejoined into
subindices, directly related to the objectives or targets of the services. The
feasibility of such a strategy was shown in Paper III. This way of defining a
subindex will assure a correspondence between the outcome measure and the
outcome target of the service to be evaluated. Sub-total scores from such
subindices would, reasonable, be more valid, more sensitive and more reli-
able than the standard summary scores.

Although these features definitely are on the positive side, there is also a
negative side to ad hoc defined subindices. First, it may be difficult to define
fitting subindices. The selection of items is of course limited to the 22 avail-
able in the CAN, and there might also be overlaps of objectives and targets
among services or among programmes, obstructing a reasonable distribution of items over clearly-defined subindices. Second, if the definitions of subindices would vary among studies, which is not unlikely, difficulty in comparisons between studies would arise.

MNI – a Metric for Long-term Evaluation

The MNI index is rather easy to calculate. However, it requires considerable computing power to estimate the bootstrap confidence intervals, particularly with large samples. It should also be pointed out that the number of consecutive assessments on which the calculation is based will influence the variance of the MNI. This is readily recognised from Figure 1, where the size of the mean number of applicable transitions shown to the right, clearly corresponds to the width of the confidence intervals for the estimated indices. It is reasonable to assume that the length of the intermission is likely to have a similar impact on the variance. Thus, the number of consecutive assessments and the length of the intermissions in between should be roughly the same when comparing MNI indices.

The strength of the MNI index is that it may be estimated over any number of consecutive assessments of need, and therefore feasible for assessing long-term ongoing needs. It is a continuous, normally distributed metric, which can be estimated and used at any level of the mental health service system. Furthermore, the MNI index is based on the reasonable assumption that outcome is a combined function of starting level and change, as explicated by Sainsbury.63 Each assessment of outcome is made conditional on a previous state of need. The MNI is therefore a true longitudinal measure.

Suggestions for the Use of CAN in Outcome Assessment

The main conclusion to be drawn from this thesis is that the standard summary scores should be avoided for the CAN to be more favourable in outcome assessment. Instead, either sub-total scores from properly defined subindices or the new MNI index measured at the domain level of the CAN might be considered as viable options. The use of subindices may be fitting when measures are taken at only two time points, before and after an intervention, granted that proper and clearly-defined subindices is used.

The MNI may be particularly useful for continuous monitoring of outcomes from a management perspective. CAN data collected at the patient level can be aggregated in many different ways – by patient characteristics, by duration of care, by programme or programme component, by type of service, by service unit, by geographical area, etc. – and the MNI index estimated for each aggregate. By way of graphically displayed MNI indices, service deficits may easily be identified as demonstrated in Paper IV. Furthermore, this
will help the management to prioritise actions for service improvement, and
to identify areas in which the process of service delivery needs to be scruti-
nized. This way of using the CAN from a management perspective is, in
fact, almost analogous to the intention of the CAN at the patient level: to
highlight those areas where there seems to be problems requiring further
assessment, and let the others be until further notice. This is also very much
in the spirit of the Thornicroft-Tansella matrix model, being ‘a pragmatic
guide to improve [mental health] services’.32 p.263
Acknowledgements

The present studies were carried out at the Department of Neuroscience, Psychiatry, Ulleråker at Uppsala University in collaboration with the Clinic for Psychosis and Rehabilitation at the University Hospital in Uppsala. Many people contributed to this work, most of them anonymously and unknowingly. I thank them all. In particular, my thanks:

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Appendix
## Hygien

### Har personen svårigheter att sköta sin hygien?

_Har Ni besvär med att klara Er egen hygien t.ex att tvätta Er, klippa naglar eller att klä Er? Behöver Ni hjälp_

<table>
<thead>
<tr>
<th></th>
<th>INGA PROBLEM</th>
<th>MÅTTLIGA PROBLEM TACK VARE PÅGÅENDE</th>
<th>ALLVARLIGA PROBLEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Ex: Sköter sin hygien och är snygg klädd</td>
<td>Ex: Behöver och får tillsyn med hygienen</td>
<td>Ex: Mycket dålig personlig hygien. Kan ej tvätta eller klä sig själv</td>
</tr>
<tr>
<td>1</td>
<td>INGA / MÅTTLIGA PROBLEM TACK VARE PÅGÅENDE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ALLVARLIGA PROBLEM</td>
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<td></td>
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<tr>
<td>3</td>
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<td></td>
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</tr>
<tr>
<td>9</td>
<td>EJ KÄNT</td>
<td></td>
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</tbody>
</table>

OM SKATTNINGEN ÄR 0 ELLER 9 FORTSÄTT TILL OMRÅDE 5

### Hur mycket hjälp med den personliga hygienen får personen från vänner eller anhöriga?

<table>
<thead>
<tr>
<th></th>
<th>INGEN</th>
<th>LITET</th>
<th>MÅTTLIG</th>
<th>MYCKET</th>
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<td>Ex: Tillfälliga uppmaningar att byta kläder</td>
<td>Ex: Fyller badkar eller sätter på dusch och insisterar på att de används. Daglig uppmaning</td>
<td>Ex: Ger daglig tillsyn; t ex klädtvätt, påklädnad, badning</td>
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<td>1</td>
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<td>EJ KÄNT</td>
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</table>

### Hur mycket hjälp med den personliga hygienen får personen från lokala vård- eller serviceorgan?

### Hur mycket hjälp med den personliga hygienen be- höver personen från lokala vård- eller serviceorgan?

<table>
<thead>
<tr>
<th></th>
<th>INGEN</th>
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<th>MYCKET</th>
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</thead>
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<td>Ex: Tillfälliga uppmaningar</td>
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<td>Ex: Hjälp med hygienen i flera avseenden, deltar i träningsprogram (ADL) för bättre hygien</td>
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<tr>
<td>9</td>
<td>EJ KÄNT</td>
<td></td>
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</tbody>
</table>

### Får personen rätt sorts hjälp med den personliga hygienen?

_(_0 = NEJ _1 = JA _9 = EJ KÄNT_)

### Är personen generellt nöjd med den mängd hjälp han / hon får med den personliga hygienen?

_(_0 = NEJ _1 = JA_)
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