

Objective social outcomes index (SIX): a method to summarise objective indicators of social outcomes in mental health care

Priebe S, Watzke S, Hansson L, Burns T. Objective social outcomes index (SIX): a method to summarise objective indicators of social outcomes in mental health care.

Objective: No method has yet been established to summarise different objective indicators of social outcomes into one score. The study aimed to develop and test a simple, brief and meaningful index of social outcomes that can be used across a broad range of mental health studies and is potentially obtainable from routine documentation.

Method: An index capturing employment, accommodation and living situation (range from 0 to 6; SIX) was devised and tested in three longitudinal datasets of patients with severe mental illness from Germany, Sweden and the UK.

Results: SIX showed an almost normal distribution cross-sectionally in all three datasets. Between 58 and 78% of patients changed scores over time. Change scores were weakly associated with change scores of symptoms, quality of life, global functioning and disability.

Conclusion: A simple method to summarise different indicators of social outcomes provides meaningful results. It can be widely used in research and routine care.

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Key words: symptoms; quality of life; global functioning; disability

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Accepted for publication April 28, 2008

Significant Outcomes

- Objective indicators of social outcomes can be usefully combined in one overall index (SIX). The index can be widely applied in research and routine care and be used for benchmarking.
- SIX is easy to establish with a low risk for error in assessment and documentation.
- SIX captures relevant changes over time that are distinct from those assessed on more traditional outcome instruments.

Limitations

- SIX is only a ranking scale and the distribution found in the three samples in the study may not be replicated in different samples and settings.
- Although the score is simple, the precise definition of each individual step might become complicated.
- The definition of the domains and categories is not value free.

Introduction

In severe mental illness, the burden of disease has continued to grow internationally despite improved symptom control with modern treatments (1). The central role of community functioning in major mental illness is now the source of intensive research, but its measurement is neither

consistent nor well developed, with a plethora of different instruments in use (2). A recent review identified 301 articles reporting social functioning in the outcome of schizophrenia with 87 potentially relevant measures (3). While there is considerable conceptual overlap in these various measures there is a wide range of domains, variables assessed, definitions and methods of collecting the variables.

There are no developed algorithms for deriving scores from one to the other to make comparisons across studies or permit meta-analyses.

One potential way forward is to identify objective indicators of social functioning and outcome that are less dependent on scale construction and administration and can be used across studies and populations to enable benchmarking and comparisons. An example for this approach is the worldwide use of the APGAR score introduced into Obstetrics in 1953 (4). Each new-born is rapidly rated from 0 to 2 on five simple observable criteria, skin colour, heart rate, reflexes, muscle tone and respiration to yield a score from 0 to 10. As well as having immediate clinical value, the APGAR score has contributed substantially to research into the long-term effects of respiratory functioning.

Objective indicators of social outcomes in mental health care capture aspects of the social situation that can be assessed by an independent observer. These include whether patients have employment, independent accommodation and a partner. Such outcomes are widely regarded as important in mental health care and have a high appeal to all stakeholder groups. Their use in research and service evaluations has tended to be specific to the intervention being tested (e.g. employment in vocational rehabilitation studies, accommodation in evaluation of teams for homeless patients).

Whilst there is broad consensus about the need for 'real world' measures of objective outcomes (2, 5, 6), there is little agreement on how these individual outcomes are defined – is an admission to a tenancy or a minimum period of tenancy the appropriate outcome for an intervention for homeless people? Is the single day's open employment used in supported employment trials (7, 8) a meaningful outcome?

Wider usage of objective indicators in mental health evaluations and research has been hindered by the lack of an overall index summarising different indicators into one score (9). Examining the different domains separately has several well-recognised difficulties:

- i) Using several indicators to assess the effectiveness of an intervention in the absence of specific hypotheses requires statistical adjustment for multiple testing, reducing the power of studies.
- ii) Using a single indicator risks insufficient variance and insufficient change over time to establish an intervention effect.
- iii) Using a single domain indicator is likely to be associated with floor and ceiling effects

(depending on the scaling) as patients are rarely disadvantaged in all domains.

Traditional approaches to develop instruments assessing social outcomes are based on classical or psychological test theory. Such theory, as well as the more recently used response theories (10), assumes that scales assess one underlying construct. Objective indicators of social outcomes in different life domains are, however, not sufficiently correlated to reflect one underlying construct according to test theory. A method that summarises different objective indicators of social outcomes can therefore not use test theory. Subsequently, the criteria and terminology of conventional test theory will not be appropriate to capture the value of such an instrument. An alternative approach is to sum up different indicators, which may or may not be independent of each other as in the APGAR score, into one index with overall significance. Such an index will still have to fulfil quality criteria: It should have a sufficient distribution to identify differences between groups, capture changes over time to assess the potential effect of interventions and carry a low risk of error in assessment and documentation so that scores remain stable in the absence of real change.

Aims of the study

We aimed to devise and test an overall index of objective social outcomes. The index was intended to be both brief and easy to administer and understand so that it can be widely used in mental health service research and routine care. In addition, it needs to fulfil the quality criteria above and – taking the APGAR score as a model – yield a whole number score from a straightforward addition of meaningful component items.

Material and methods

Our approach was in two stages. The first involved agreeing the constituent items for the index and their scoring. The second involved testing the performance of the index against three databases from longitudinal mental health studies.

Deriving the index

The form of the objective social outcomes index (SIX) was derived by expert consensus and a non-systematic, but thorough review of the literature on social outcomes in mental health by the authors (9). This was linked to reviews focusing on quality of life (11), social functioning (3) and social

exclusion (12). It also considered the traditional approaches of Bosch and Ciompi in the German literature (13–15). Their groups used a one item ‘axis’ for assessing each the housing and working situation of patients in the evaluation of long-term rehabilitation programmes. Each axis had categories ranging from full institutional protection to none at all. Based on the literature, we decided to complement the two domains of work and housing through a third one on social life and focus the index on these three essential domains only. We concluded that the index should be brief and reflect in equal measures three main domains: work/employment, accommodation/housing and social life. While the first two domains were considered to be unitary, ‘social life’ combines both day-to-day activities and an enduring social framework in which people conduct their existence. Consequently, SIX has only four items: employment (none, 0; voluntary/protected/sheltered work, 1; regular employment, 2), accommodation (homeless or 24 h supervised, 0; sheltered or supported accommodation, 1; independent accommodation, 2), partnership/family (living alone, 0; living with a partner or family, 1) and friendship (not meeting a friend within the last week, 0; meeting at least one friend in the last week, 1). The resulting score of SIX ranges from 0 to 6.

Applying the index

We analysed SIX using three mental health datasets from Germany, Sweden and the UK. All three datasets contain longitudinal data with two points of measurement for patients with severe mental illness in some form of community mental health care. The intervals between the two assessments were between 18 and 24 months. Each data set contained other structured and validated outcomes permitting the association of SIX with these established scales to be tested both cross-sectionally and longitudinally.

The samples

The German sample was from an out-patient programme for a 12-month vocational rehabilitation intervention (16) with assessments at baseline and 21 months later. The Swedish sample received case management in the community over an 18-month period (17). The UK sample was the UK 700 trial, which compared intensive case management (caseloads 1 : 12–1 : 15) with standard case management (caseloads 1 : 30–1 : 35) in psychotic patients with assessments at baseline and after 24 months. (18–20).

We selected all patients for whom all data to complete SIX at baseline and follow-up was available. The German sample comprised 106 patients (62 women, 44 men; mean age = 33.1 years, SD = 9.2). Twenty-seven patients had a primary diagnosis of schizophrenia or schizoaffective disorder, 29 patients had a mood disorder, 29 patients had an anxiety, obsessive–compulsive, adjustment disorder, somatoform or eating disorder, three patients had substance abuse disorder and 18 patients had personality disorder. The Swedish sample comprised 93 patients (53 women, 40 men; mean age = 40.2 years, SD = 10.2). Forty-four patients had a primary diagnosis of schizophrenia, delusional or schizoaffective disorder, 12 patients had a mood disorder, 10 patients had an anxiety disorder, three patients had substance dependence and 24 patients had personality disorder. The UK sample comprised 417 patients (202 women, 215 men; mean age = 38.6 years, SD = 11.2). 359 patients had a primary diagnosis of schizophrenia, delusional or schizoaffective disorder, 34 patients had mood disorders and 24 patients had other diagnoses. In the UK sample, 213 patients were white, 122 patients were African-Caribbean and 82 patients were of other ethnic groups. The German and Swedish samples were ethnically homogeneous.

Testing associations

SIX was determined in each dataset at baseline and follow-up. Associations of gender and age with baseline SIX scores were established. Baseline scores and change scores were tested for their correlation with other outcome criteria. In the three samples, different scales were used to assess these other outcomes.

In the German sample, we tested the associations of SIX with symptom levels (Brief Psychiatric Rating Scale, BPRS; 21), functional impairment (Range of Impaired Functioning Tool, LIFE-RIFT; 22) and quality of life (WHO-Quality of Life Questionnaire-bref, WHOQOL-bref, 23). In the Swedish sample, we tested the associations of SIX with self-rated symptoms (Symptom Checklist 90 – revised, SCL-90R, 24), global functioning (global assessment of functioning, GAF; 25) and subjective quality of life (Lancashire Quality of Life Profile, LQLP; 26). In the UK sample, we tested the associations of SIX with symptom scores (Comprehensive Psychopathological Rating Scale, CPRS; 27), disability (Disability Assessment Schedule, DAS; 28) and subjective quality of life (LQLP).

Correlation coefficients were computed to explore association of sociodemographic variables

and other outcome criteria with baseline SIX scores, and associations of SIX change scores with change scores of other outcome scales. Non-parametric methods were used to compute correlations (i.e. Spearman's rho), as SIX may represent a ranking scale. All correlations between outcome criteria were assessed with partial correlations controlling for gender, age, diagnostic group, and (in the UK 700 sample) for ethnic group and intervention vs. control group.

Results

SIX scores

Baseline and follow-up scores as well as change scores in each sample are shown in Table 1.

Cross-sectionally, SIX shows an almost normal distribution with different skews in each of the samples. Over the 18–24 months intervals, 67.9% in the German sample, 58.2% in the Swedish sample and 78.4% in the UK sample showed changes of one or more points in either direction. Between 9 and 29% changed by two or more points in the three samples. In the UK 700 sample, but not in the other groups, there is a small ceiling effect with 11 patients (2.6%) having a maximum score of 6 at both baseline and follow-up.

Table 1. Baseline and follow-up scores of SIX in three samples

Follow-up	Baseline							Total
	0	1	2	3	4	5	6	
German vocational rehabilitation programme (interval 21 months)								
0	0	0	0	0	0	0	0	0
1	0	0	1	1	0	0	0	2
2	0	0	9	11	1	1	0	22
3	0	1	7	14	13	5	0	40
4	0	0	3	4	9	4	0	20
5	0	0	0	10	5	2	0	17
6	0	0	1	0	2	2	0	5
Total	0	1	21	40	30	14	0	106
Swedish case management programme (interval 18 months)								
0	1	0	0	1	0	0	0	2
1	0	0	2	2	0	0	0	4
2	0	1	17	7	1	0	0	26
3	0	0	14	15	10	1	0	40
4	0	1	3	4	4	1	0	13
5	0	0	0	3	2	2	1	8
6	0	0	0	0	0	0	0	1
Total	1	2	36	32	17	4	1	93
UK 700 study (interval 24 months)								
0	0	0	0	0	0	0	0	0
1	1	0	4	3	0	0	1	9
2	1	0	8	5	4	0	1	19
3	2	3	30	17	9	3	2	66
4	3	2	41	97	41	10	9	203
5	2	2	5	30	33	13	11	96
6	0	0	0	2	5	6	11	24
Total	9	7	88	154	92	32	35	417

Associations between baseline scores in the three dimensions of SIX, i.e. employment, accommodation and social life, at baseline were between $r = 0.03$ and $r = 0.17$ in the German sample, between $r = -0.12$ and $r = 0.12$ in the Swedish sample, and between $r = -0.07$ and $r = 0.14$ in the UK 700 study.

In the pooled total sample of 616 patients, the distributions of the constituent items were on employment 0 = 456, 1 = 64 and 2 = 96; on accommodation 0 = 35, 1 = 10, and 2 = 571; on partnership/family 0 = 348 and 1 = 268; and on friendship 0 = 292 and 1 = 324.

Associations with SIX scores at baseline

Age was significantly and positively correlated with SIX baseline scores in the German sample ($r = 0.33$; $P < 0.001$) but not in the Swedish ($r = -0.15$, $P = 0.15$) or UK ($r = -0.08$, $P = 0.11$) groups. Gender was significantly associated with SIX scores at baseline in the UK 700 sample ($r = -0.17$ indicating less favourable scores in men, $P < 0.001$). The German sample showed a similar tendency ($r = -0.17$, $P = 0.08$), while there was no significant correlation in the Swedish sample ($r = -0.03$, $P = 0.81$).

In the German sample, baseline scores of SIX were significantly correlated with LIFE-RIFT ($r = -0.37$; $P < 0.001$) but not with BPRS ($r = -0.09$; $P = 0.36$) or WHO-QOL ($r = 0.08$, $P = 0.43$). In the Swedish group, SIX baseline scores were significantly associated with GAF scores ($r = 0.40$, $P < 0.001$) but not SCL 90R ($r = -0.10$, $P = 0.32$) or LQLP ($r = 0.11$, $P = 0.29$). Finally, in the UK sample SIX scores at baseline were negatively correlated with level of psychopathology as assessed on the CPRS ($r = -0.23$, $P < 0.001$) and disability measured on the DAS ($r = -0.30$, $P < 0.001$), and positively with quality of life on the LQLP ($r = 0.15$, $P = 0.003$).

Cross-sectional correlations with other outcome criteria at baseline either fail to establish a significant association or indicate weak to moderate ones with higher SIX scores being linked with more favourable scores of other outcome criteria.

Association of change scores

Change scores of SIX showed weak or no correlations with change scores of other outcome criteria. In the German sample, change scores of SIX were not significantly associated with changes on BPRS ($r = -0.14$; $P = 0.17$) and WHO-QOL ($r = -0.04$; $P = .68$) and weakly with changes on

LIFE-RIFT ($r = -0.243$; $P < 0.05$). In the Swedish sample, the partial correlations were $r = -0.15$ ($P = 0.17$) with SCL 90R, $r = 0.16$ ($P = 0.16$) with GAF and $r = 0.04$ ($P = 0.71$) with LQLP. In the UK sample, change scores of SIX were weakly correlated with change scores of CPRS ($r = -0.14$; $P = 0.004$), DAS ($r = -0.11$; $P = 0.03$) and LQLP ($r = 0.13$; $P = 0.03$). Thus, when significant correlations were found between changes scores of SIX and other outcome criteria, an improvement on SIX went along with improvement on other criteria, but the strength of the correlations was weak.

Discussion

There are probably several reasons for why an overall index summarising different objective indicators has not yet been developed and established. One reason has been an increasing emphasis on patient views over the last decades, which has prompted researchers to focus more on subjective indicators reflecting patients' feelings, thoughts and appraisals rather than objective data.

Another reason may be the dominance of test theories that do not allow for the combination of different indicators that are relatively independent into one index (29). As this study shows in line with the existing literature, indicators for different life domains are only moderately correlated with each other. SIX does not test a construct, and we therefore did not apply classical test theory or more modern alternatives such as item response theories. We defined important indicators of social situations that can be objectively assessed and summed them up into one overall index on social outcomes. The score is meant to be meaningful and informative. It is not a direct measure of complex concepts of social situations such as quality of life (30) or social inclusion (12), but may be used to inform the assessment of such concepts. Like the APGAR score, the SIX score combines very different items and the total score is only a global reflection of social outcomes. For a more detailed understanding of results of the total score and an analysis of what aspects of social outcomes are particularly relevant in a specific study, a profile score of the four constituent items may often be required.

The index does meet required quality criteria: in the three samples it showed almost normal distribution, and the risk for assessment and documentation error is low. Despite the absence of major assessment and documentation error, SIX did capture substantial change over time in each tested sample. Between 58 and 78% of patients

changed during the observation periods ranging from 18 to 24 months.

Cross-sectionally and longitudinally SIX showed some statistically significant correlations with other outcome criteria. All these correlations indicate a positive association of SIX scores with more favourable results of other outcome criteria. However, most of the tested associations failed to reach statistical significance and the significant correlations were only weak to moderate. The low associations of SIX as an index of objective aspects of the social situation with subjective outcome criteria are in line with the literature. For example, numerous studies have shown only limited links between objective living conditions and subjective quality of life (11).

The low correlations between SIX and other outcomes suggest that SIX is measuring something different to either symptoms or quality of life and, indeed, adds a different and new dimension to outcome assessment in mental health care.

Limitations

While we would argue that SIX has considerable potential in both clinical and research contexts, such a brief and simple score also has limitations:

- i) SIX should be seen as a ranking scale. For instance, there is no evidence that the difference between a score 1 and 2 is of the same magnitude as that between 3 and 4. As a consequence, it will require non-parametric tests in statistical analyses.
- ii) The normal distribution found in the three samples in this study may be sensitive to different cultural settings. All three databases used were from studies of individuals with severe mental illnesses and, consequently, heavily disadvantaged. The scale needs to be tested in a broader range of studies to see whether it maintains its performance in other samples and settings.
- iii) Although the score is simple, the precise definition of each individual step could become complicated. For instance, there are various forms of part-time work that are difficult to classify. It is unclear whether increasingly detailed definitions of how to score SIX would increase its value or deprive it of its simplicity and usefulness. This is an empirical question that can only be resolved by further field work.
- iv) Although the score can be objectively assessed, this does not mean it is value-free. Patients might opt to live on their own or not work as a

life style choice and prefer their situation to that of having a partner or being employed.

- v) SIX applies only to samples in working age. The application to old-age populations would require significant modifications.
- vi) The items in SIX are unlikely to change dramatically within a few weeks or months. Thus, SIX will be of limited value in short-term studies.

Strengths

Despite these limitations, SIX does have features that recommend its further use and testing. As an outcome measure, it shows a reasonable distribution in the samples analysed in this study and captures changes over time. SIX has several specific strengths listed below:

- i) It is based on objective indicators only, which can be reliably assessed and documented by any observer or rater. The low risk for error in assessment and documentation is a particular advantage for an outcome criterion. As tests for statistical significance analyse observed differences against the chance variance in the studied groups, the elimination of a measurement error increases the power of statistical testing and makes it much more likely to detect statistically significant differences.
- ii) The required information is likely to be relatively easily obtained retrospectively in most research studies and easy to collect in future ones as well as from routine care documentations. This allows the construction of large databases of SIX scores to benchmark the level of social outcomes in different patient samples at various phases of their illness and also average changes achieved with defined interventions. Such benchmarking would make possible the evaluation of specific interventions and care practices in situations where traditional randomised controlled trials would be either impossible or excessively expensive or disruptive. Accumulating large databases of SIX outcomes over defined periods of time would also permit the selection of appropriately matched subsamples to use as 'controls' in treatment trials or service evaluation. While marginally less powerful than randomised controlled trials (31), such an approach would vastly reduce the cost and time to obtain practically useful findings and promote longer, more clinically relevant, studies.
- iii) No substantial floor or ceiling effects were found.

- iv) The simplicity of the score should appeal to user groups and the public. A difference of one point on SIX is always meaningful and reflects a significant step towards a more or less favourable social outcome.
- v) The low association with other outcome criteria enables researchers to use it as an outcome criterion along side established scales, possibly to test separate hypotheses (32).
- vi) Although developed for evaluating mental health care and tested in samples of patients with mental illness, it is generic in nature and may be used to compare samples across very different groups of the population. This can include a comparison of mentally ill patients with other disadvantaged groups.

SIX was conceptually defined and has not been modified empirically. Nevertheless, it proved useful in samples in three different countries. It can be used widely to assess the level and variation of social outcomes in people with mental illness. It is not meant to replace instruments assessing specific aspects of social outcomes when such specific assessment is appropriate. Rather, it complements the existing range of options to establish social outcomes. Particularly for longer longitudinal studies and evaluation in routine care, SIX may be an important new instrument providing information that is distinct from that delivered by more traditional outcome scales.

Acknowledgements

We thank Craig Morgan, Ray Fitzpatrick and Vanessa Pinfold for their comments on the development of the index.

Funding

The research was supported by a grant from the Research Methodology Programme of the Department of Health.

Declaration of interest

None.

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