**Does collaborative care improve participative social function in adults with depression? The application of the WHO ICF framework and meta-analysis of outcomes**

**Running title: Collaborative care and participative social function**

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**Abstract**

**Background**

Collaborative care has proven efficacy in improving symptoms of depression, yet patients value improvements in their participative social function also. We used the World Health Organisation’s International classification of functioning, disability, and health (WHO ICF) to robustly identify measures of social function and explored whether collaborative care interventions improve participative social functioning using meta-analysis.

**Methods**

We performed a secondary data analysis on studies identified from our previous Cochrane review of collaborative care interventions for depression and search update (December 2013). The WHO ICF framework was applied to identify studies that included self-report measures of participative social function. Outcomes were extracted at short-term (6 months) and medium-term (≥7 months) and analysed using random-effects meta-analysis. The relationship between improvements in depression outcomes and improvements in participative social function was also explored using bivarable meta-regression.

**Results**

Eighteen trials were identified that measured participative social function and met our remaining inclusion criteria. Collaborative care was associated with small improvements in participative social function in the short (Standardised Mean Difference, SMD=0.23, 95% confidence interval 0.12 to 0.34) and medium term (SMD= 0.19, 95% confidence interval 0.09 to 0.29). Improvements in depressive symptoms were associated with moderate improvements in participative social function (ß=-0.55, 95% confidence interval -0.82 to -0.28) but cross-sectionally only.

**Limitations**

The small number of studies (N=18) prevented more complex analyses to explore moderators of participative social function outcomes.

**Conclusions**

Collaborative care improves participative social function but the mechanisms through which this occurs are unknown. Future depression interventions need to consider a person’s degree of participative social function equally alongside their depressive symptoms.

***Keywords:*** *Collaborative care, Depression, Participative Social Function, Systematic review*

**Introduction**

*Depression and functioning*

Depression is the second most common cause of disability globally ([Ferrari, et al., 2013](#_ENREF_13)), and is associated with substantial losses in economic productivity ([Simon, 2003](#_ENREF_35)). These impacts have led to calls for health service re-organisation to better manage depression. The chronic care model is a health service delivery framework outlined by Wagner et al. ([1996](#_ENREF_42)), designed to facilitate improvements in the quality and effectiveness of care provided to people with long-term conditions. In the context of depression, the chronic care model is typically referred to as *collaborative care*, which includes the provision of a multi-professional approach to depression management, structured treatment plans, regular scheduled patient follow-ups, and continual supervision of health care workers ([Gunn, et al., 2006](#_ENREF_16)). A Cochrane review of 79 randomised controlled trials (RCTs) of collaborative care interventions for the management of depression and anxiety found that collaborative care substantially improves depressive symptoms both in the short (SMD -0.34, 95% CI -0.41 to -0.27; 6 months) and long term (SMD -0.35, 95% CI -0.46 to -0.24; up to 24 months) ([Archer, et al., 2012](#_ENREF_3)). Over and above improvements in mood, people with depression prioritise returning to normal interactions with their usual environment and regaining the ability to participate in social roles such as work and recreational activities ([Bosc, 2000](#_ENREF_5)), which has been defined as ‘participative social function’ ([Abrantes, et al., 2011](#_ENREF_1); [Zimmerman, et al., 2006](#_ENREF_54)). While there is robust evidence that collaborative care models improve depressive symptoms, it is less clear if these benefits translate to improvements in participative social function also. To explore the effectiveness of depression treatment interventions on participative social function, we need a robust method for identifying participative social function and differentiating it from other aspects of functioning.

 *A framework for conceptualising and identifying measures of participative social function*

Part one of the World Health Organisation’s (WHO) international classification of functioning, disability, and health (ICF) ([World Health Organisation, 2001](#_ENREF_53)) provides a useful framework for conceptualising functioning. The ICF defines functioning using two broad components:

1. Body- including both functions (e.g. physiological systems) and structures (e.g. anatomy)
2. Activities and Participation-whereby “activities” represent the implementation of a task or action by a person whilst “participation” represents engagement in a life situation

Accordingly, functioning is considered an overarching term for “body functions, activities and participation” (p3, World Health Organisation, 2001) and has a neutral non-problematic stance (i.e. focuses on what a person can do).

Each of the two components of functioning is further divided into a number of sub-domains (see Figure 1). Nine sub-domains are defined in relation to the “Activities and Participation” component. Users of the ICF are encouraged to operationalise these nine sub-domains flexibly to accommodate their theoretical and professional disciplines. Previous depression studies have acknowledged the value of exploring the multi-dimensional nature of functioning because of its potential to identify tailored treatment targets, in addition to the monitoring of personalised health outcomes ([Greer, et al., 2010](#_ENREF_15); [Trivedi, et al., 2010](#_ENREF_38); [Ware, 2003](#_ENREF_45); [Wells, et al., 1989](#_ENREF_50)). Thus we opted to distinguish between the concepts of ‘activities’ and ‘participation’.

Our approach promotes a standardised method of conceptualising measures of participative social function. We defined the participation component as representing participative social function. We mapped ICF subdomains exclusively onto the participation component if its content described normative tasks that i) require social interaction with others and/or ii) are implemented in line with expected social norms. Our definition of participative social function was substantially informed by the theoretical and empirical work of the Medical Outcomes Study ([Stewart, 1992](#_ENREF_37)). All sub-domains that did not conform with this definition were mapped to the “activities” component. We consider subdomains mapped to the activities component as representing aspects of physical ([Stewart, 1992](#_ENREF_37)) or cognitive function ([Greer, et al., 2010](#_ENREF_15)).

Accordingly, the following four domains were mapped onto ‘participation’:

1. community, social and civic involvement (e.g. participating in events outside the family)
2. major life areas (e.g. taking part in education, work and economic actions)
3. inter-personal relationships (e.g. co-operating with others in a socially acceptable way)
4. domestic life (e.g. acquiring and maintaining an appropriate household) (See Figure 1).

Likewise, the following five domains were mapped to the ‘activities’ component:

1. self-care (e.g. caring for physical body parts)
2. mobility (ability to move body and objects)
3. communication (comprehension of verbal and written information)
4. general tasks and demands (e.g. initiating and organising single or multiple tasks)
5. learning and applying knowledge (e.g. cognitive tasks: problem solving, decision making) (See Figure 1).

In this paper, we performed a secondary data analysis on studies identified from our previous Cochrane review of the effectiveness of collaborative care interventions on depression and anxiety outcomes ([Archer, et al., 2012](#_ENREF_3)). We identified measures of participative social function using the framework described above, , and and sought to answer the following three questions:

1. How do functional outcomes in collaborative care studies map to the activities and participation components of the ICF framework?
2. What is the impact of collaborative care on participative social function?
3. Does the magnitude of effectiveness on participative social function outcomes vary as a function of the size of effect observed for depression outcomes?

**Methods**

We report a secondary data analysis of functioning outcomes from RCTs of collaborative care interventions that were identified as part of our previous Cochrane Review of collaborative care for depression and anxiety problems ([Archer, et al., 2012](#_ENREF_3)) and subsequent search update ([Coventry, et al., 2014](#_ENREF_8)). We adhere to the Preferred Reporting Items for Systematic Reviews (PRISMA; See eTable 1 in the supplementary online material) ([Moher, et al., 2009](#_ENREF_25)).

**Information sources**

We searched the Cochrane Collaboration Depression, Anxiety and a Neurosis Group (CC-DAN) trial registers (references and studies) on the 9th February 2012 as part of our original Cochrane review. The CC-DAN database includes studies recorded in MEDLINE, EMBASE, PsycINFO, CENTRAL, World Health Organisation’s trials portal (ICTRP), Clinicaltrials.gov, and CINAHL. See Archer et al ([Archer, et al., 2012](#_ENREF_3)) for search strategy. We updated our search in December 2013 using the CENTRAL database only ([Coventry, et al., 2014](#_ENREF_8)).

**Inclusion/exclusion criteria**

We included trials if they:

1. Had a RCT or cluster RCT design, which evaluated collaborative care interventions delivered in primary care or community settings.

1. Recruited adults (≥ 18 years) with a primary diagnosis of depression or mixed anxiety and depression.
2. Tested collaborative care by comparing it with usual or enhanced usual care. Collaborative care was conceptualised according to 4 components outlined by Gunn et al ([Gunn, et al., 2006](#_ENREF_16)) (See Table 1).
3. Measured change in depressive status using either self-report outcome measures or diagnostic clinical interviews, defined as either a continuous or binary outcome (i.e. remission or a reduction in depressive symptoms by ≥ 50%).

*And* the additional criteria below were applied specifically for this secondary data analysis:

1. Measured change in participative social function using a valid self-report measure (full or specific subscales) expressed as a continuous or binary outcome. Please see analysis section below for details on how participative social function outcomes were identified.

**Study selection**

Studies were identified for inclusion from the 84 RCTs included in the Cochrane review of collaborative care for depression and anxiety ([Archer, et al., 2012](#_ENREF_3)) and the search update ([Coventry, et al., 2014](#_ENREF_8)). Two authors screened studies against our inclusion criteria (JH and PC). Discrepancies were resolved by a third author (PB or JA).

**Data extraction**

The following study characteristics were double extracted: socio-demographic characteristics, clinical characteristics, collaborative care intervention content, and usual care intervention content. The outcome measures: i) participative social function and ii) depression were extracted at two time points: zero to six months (short term) and seven months or more (medium term).

**Assessment of risk of bias in individual studies**

The Cochrane risk of bias tool was used to evaluate bias for each individual study ([Higgins and Green, 2008](#_ENREF_19)). We rated all criteria stipulated in the Cochrane tool as either low, unclear, or high risk of bias. In addition we evaluated the implementation integrity of intervention (e.g. degree of adherence to protocol) and other sources of bias identified.

**Analysis**

*How do functional outcomes in collaborative care studies map to the ICF framework?*

First, we identified studies that included secondary outcome measures related to functioning (e.g. quality of life, and wellbeing). Disease specific measures of quality of life were excluded. Second, we performed a content analysis on identified measures. Each questionnaire item or subscale (dependent on measure length) was mapped onto:

1. one of the nine subdomains from the activities or participation component outlined in the ICF framework (See Figure 1).
2. the body functions and structures component (e.g. items/subscales about energy, sleep, pain).

We included a measure in the meta-analysis of the effects of collaborative care on participative social function if ≥80% of the questionnaire items/subscales mapped onto any one of the four subdomains included in our conceptualisation of the participation component of the ICF. Two authors completed the content mapping exercise (JH and PC).

*What is the impact of collaborative care on participative social function (defined as self-report measures which map onto one or more of the four participation sub-domains of the ICF outlined in Figure 1)?*

We used STATA’s (Version 12 for Windows) *meta-eff* ([Kontopantelis and Reeves, 2009](#_ENREF_23))command to convert depression and participative social function outcome measures into standardised mean differences and standard errors. We performed a DerSimonian-Laird ([DerSimonian and Laird, 1986](#_ENREF_9)) random effects meta-analysis with 95% confidence intervals using STATA’s *metan (*[*Harris, et al., 2008*](#_ENREF_18)*)* command. Participative social function scales were recoded where necessary so high scores indicate better participative social function. For cluster RCTs we used the “effective sample size” procedure ([Higgins, et al., 2008](#_ENREF_19)) using an intraclass correlation coefficient (ICC) of 0.02 ([Adams, et al., 2004](#_ENREF_2)).

*Sensitivity analyses*

We performed sensitivity analyses using ICC adjustments of 0.00 and 0.05 ([Donner and Klar, 2002](#_ENREF_10)).We estimated the degree of statistical heterogeneity using the I² index. High I² scores indicate the presence of substantial statistical heterogeneity ([Higgins, et al., 2008](#_ENREF_19)).We explored the impact of risk of bias, specifically allocation concealment, on meta-analysed findings. We compared studies with low risk of bias to those with high risk of bias for allocation concealment. This index quality criterion was selected because Pildal et al ([2007](#_ENREF_31))showed that effect size estimates were inflated in studies with an inappropriate allocation concealment method.

*Risk of bias across studies*

We explored the potential for “small study bias” statistically using Eggers statistical test ([Egger, et al., 2008](#_ENREF_11))and visually using funnel plots at six months follow-up only. A non-statistically significant Eggers test indicates the absence of “small study bias”. Likewise a symmetrical funnel plot shows that studies with a smaller sample size are just as likely to be published as those with a larger sample size ([Higgins, et al., 2008](#_ENREF_19)).

*Does the magnitude of effectiveness on participative social function outcomes vary as function as the size of effect observed for depression outcomes?*

We tested whether the degree of improvement in participative social function was proportional to the degree of improvements observed in depressive symptoms. We used the *meta-reg (*[*Harbord and Higgins, 2008*](#_ENREF_17)*)* STATA command to generate a regression coefficient with 95% confidence intervals. We performed this analysis with cross-sectional data (i.e. six month outcome data) and over time (i.e. do improvements in depressive symptoms at six months explain variance in improvements in participative social function at ≥7 months).

**Results**

*How do functional outcomes in collaborative care studies map to the ICF framework?*

Of the 84 collaborative care RCTs identified by our original Cochrane review and search update, 58 unique studies had one or more secondary outcome measure related to the ICF framework (See supplementary material eResults 1 for a reference list of all 84 identified studies). A total of 25 studies included a measure of participative social function because their content (whole scale scores or specific subscales within a measure) mapped exclusively onto the participation component of the ICF framework. These included the following six measures:

1. Short Form 36: SF-36 (role-emotional and social functioning subscales) ([Ware and Kosinski, 2001](#_ENREF_44); [Ware, 2004](#_ENREF_46); [Ware Jr and Sherbourne, 1992](#_ENREF_48))
2. Medical Outcomes Study 20: MOS-20 (role-emotional and social functioning subscales) ([Stewart, et al., 1988](#_ENREF_36))
3. Short Form 12: SF-12 (role-emotional and social functioning subscale) ([Ware, et al., 2007](#_ENREF_43); [Ware Jr, et al., 1996](#_ENREF_49))
4. Sheehan disability scale ([Sheehan, et al., 1996](#_ENREF_34))
5. Work and social adjustment scale ([Mundt, et al., 2002](#_ENREF_28))
6. World Health Organisations Disability Assessment Schedule: WHO DAS II (life activities, participation in society, and getting along subscales) ([Üstün, et al., 2010](#_ENREF_39)).

Please see Table II and supplementary material; eFigures 1-6 for the findings of our content mapping exercise. A further 30 studies used the SF-36, SF-12, and WHO DAS II, but reported outcomes according to either: i) whole scale scores of global functioning, ii) mental and physical function total scores, or iii) the pain subscale (SF-36). Thus the impact of collaborative care interventions on participative social function could not be isolated. See Table III and supplementary material; eFigures 1, 3, and 6.

Eight other measures were identified across 14 studies, whose items or subscales mapped onto the ICF framework; but less than 80% of their content mapped onto the participation component. Seven of the eight measures had content that mapped “across” two or more of ICF components and thus provide an overall measure of function. The eighth measure, The Stanford Health Assessment questionnaire ([Bruce and Fries, 2005](#_ENREF_6)) had content whereby 88% of its content mapped onto the activities component of the ICF framework and can be considered a measure physical function. See Table 3, supplementary material eFigures 7 to 14.

Two studies included either the scale of disability and prognosis in long-term mental illness or the EQ-5D ([EuroQol, 1990](#_ENREF_12)) visual analogues scale. These questionnaires were non-specific and could not be mapped to the ICF framework because they asked participants to rate their overall health. A further five studies used long-term condition specific measures of quality of life which did not meet our inclusion criteria. A total of 26 out of the 84 RCTs identified had no measure of disability. See Table III.

*What is the impact of collaborative care on participative social function?*

*Characteristics of included studies*

After screening the 58 unique collaborative care trials identified as having one or more measure that mapped onto the ICF framework, eighteen studies met our remaining inclusion criteria. Please see Figure II for flowchart of included studies. The characteristics of the eighteen included studies are described in Table IV.

*Meta-analysis of the effect of collaborative care on participative social function*

At short term follow-up (up to six months), across 15 RCTs (N= 4754) collaborative care was associated with a small but statistically significant improvement in participative social function (standardised mean difference, SMD=0.23, 95% confidence interval 0.12 to 0.34, I²=67.6%, p=0.000; See Figure III).The effects of collaborative care on participative social function decreased minimally at longer term follow-up (7 months or more) across 11 RCTs (N=3797; SMD= 0.19, 95% confidence interval 0.09 to 0.29, I²=45.9%, p=0.047. Please see Figure IV.

*Sensitivity analyses: ICC adjustment*

Meta-analysis findings changed minimally (±0.02) when sensitivity analyses of ICC 0.00 and 0.05 were used.

*Sensitivity analyses: Impact of risk of bias for allocation concealment*

Seven studies were rated as low risk of bias for allocation concealment at six months follow-up. When the meta-analysis was restricted to these studies there was a small increase in the effect of collaborative care on participative social function (SMD=0.30, 95% confidence interval 0.12 to 0.47, I²=76.8%, p=0.000). Equally when limiting the longer-term follow-up analysis to only those studies rated as low risk of bias for allocation concealment (n=5), the effect size marginally increased compared with the total pooled analyses (SMD= 0.25, 95% confidence interval 0.14 to 0.36, I²=42.1%, p=0.14).

*Risk of bias across studies*

Egger’s statistical test was performed on the six months analyses and was statistically non-significant indicating an absence of statistical asymmetry (p=0.81). Visual inspection of the funnel plot confirmed this finding as it had a relatively symmetrical distribution suggesting the absence of small study bias.

*Does the magnitude of effectiveness on participative social function outcomes vary as function as the size of effect observed for depression outcomes?*

At short-term follow-up, improvements in depressive symptoms were associated with improvements in participative social function (ß=-0.55, 95% confidence interval -0.82 to -0.28, p=0.000. Improvements in depressive symptoms at six months did not explain any statistically significant variance in improvement in participative social function outcomes at seven months or more follow-up (ß=-0.40 95% Confidence Interval -0.83 to 0.03, p=0.067).

**Discussion**

*Summary of Findings*

The ICF framework provides an appropriate theoretical model for discriminating between measures of participative social function, physical function, cognitive function, and global measures of functioning. Collaborative care interventions for depressive symptom management were able to demonstrate improvements in participative social function relative to usual care, at short term (6 months) and medium term follow-up (7 months or more). The effects of collaborative care on participative social function outcomes were small but demonstrated that improvements can occur across the participation domains outlined in the ICF including: work, domestic life, leisure time, and communicative relationships. Our cross-sectional meta-regression analyses at six months indicated that improvements in depressive symptoms were associated with corresponding improvements in participative social function. This finding is consistent with others who have reported a contemporaneous relationship between change in depressive symptoms and associated changes in participative social function ([Ormel, et al., 1993](#_ENREF_29); [Verboom, et al., 2012](#_ENREF_41)). However when we explored the explanatory effects of depressive symptoms at six months on participative social function at seven months or more (i.e longitudinally) this relationship became statistically non-significant.

*Strengths and Limitations:*

Our review is based on a large and comprehensive dataset of collaborative care interventions for the management of depression identified from a previous Cochrane review ([Archer, et al., 2012](#_ENREF_3)) and search update ([Coventry, et al., 2014](#_ENREF_8)). Our study identification and data extraction procedures adhered to Cochrane’s robust methodological procedures and involved more than one researcher at each stage, thus allowing greater confidence in the validity and reliability of our review findings. The degree of reliability at our study identification stage was further enhanced through the application of the ICF theoretical model which provided a coherent framework for identifying measures of participative social function. We consider the moderate levels of heterogeneity observed in our review a strength given that between study variability can often go undetected ([Kontopantelis, et al., 2013](#_ENREF_24)). Thus we appropriately applied a random effects model to account for this variability ([Kontopantelis, et al., 2013](#_ENREF_24)). Nonetheless, there were likely a number of moderating variables that accounted for between study variance including: socio-economic factors, physical co-morbidity, type of treatments received for depression, and baseline levels of social function influencing the degree of change observed. Because the number of studies included in our review was relatively small it was statistically inappropriate to perform subgroup analyses to explore the role of these moderators. In addition, the reporting of these characteristics across studies was inconsistent. Similarly our medium term analyses were performed on an even smaller number of studies (n=11). The absence of a relationship between depressive symptoms and participative social function over time may be an artefact of an absence of statistical power to detect this relationship and not absence of effect.

*Implications for research, policy and practice*

We found that almost one third of the trials included in our original Cochrane review and search update did not measure functioning outcomes, and of those that did the majority could not be mapped onto our current understanding about the core components related to participative social function. Patients prioritise a return to participative social function over improvement in symptoms and it is therefore imperative that trials measure this important outcome. However, to do this well, we need a clear framework that elaborates on what participative social function is. We showed that the ICF framework ([World Health Organisation, 2001](#_ENREF_53)) provides a clear conceptualisation of global functioning. Equally, the ICF framework can be used to discriminate between measures which assess specific aspects of functioning (e.g. physical, cognitive or participative social function) or conversely whether scales represent a global measure of function (e.g. its item or subscale content maps across two or more of the ICF components). To promote a better understanding of how functioning changes in response to treatment we need to be consistent in our approach to measuring functional outcomes. The ICF framework can be used by researchers at the study design stage to inform decisions about measurement in trials, and also by systematic reviewers to inform decisions about inclusion of studies that measure functional outcomes.

Collaborative care interventions can improve participative social function outcomes both in the short and medium term. However the size of effect is small and lower than the moderate effect size (Hedges g = 0.40) reported in a meta-analytic review of standalone psychotherapeutic interventions for depression on participative social function outcomes ([Renner, et al., 2014](#_ENREF_32)). It is possible that psychotherapy interventions have greater potential for targeting variables that have direct effects on participative social function. For example, behavioural activation ensures that a person maintains both pleasant and reinforcing events (e.g. leisure time) alongside necessary and routine tasks and demands (e.g. domestic life/work). Indeed, we have shown previously that when collaborative care interventions include psychological treatments (either alone or in combination with pharmacotherapy) greater improvements are observed in patients depressive symptoms compared with pharmacotherapy alone ([Coventry, et al., 2014](#_ENREF_8)). In contrast, seven of the eighteen studies included in our meta-analysis used medication management only. This might suggest that the mode of action and/or the pace at which antidepressants affect participative social function is sufficiently different to psychotherapy. But equally, collaborative care frameworks may bring about change in participative social function by improving the confidence of individuals to use and navigate health services ([Coventry, et al., 2015](#_ENREF_7)), for example, through re-engaging with depression care earlier to prevent relapse.

At six months, we demonstrated cross-sectionally that improvements in depressive symptoms were associated with corresponding improvements in participative social function outcomes. However this effect was not maintained over time (7 months or more). Our cross-sectional findings are consistent with others who have shown that the degree of impairment in participative social function corresponds directly with a person’s severity of depressive symptoms ([Judd, et al., 2000](#_ENREF_21); [Ormel, et al., 1993](#_ENREF_29); [Verboom, et al., 2012](#_ENREF_41)). However, whether improvements in participative social function outcomes are a cause or consequence of improvements in depressive symptoms remains unclear because studies examining this association have typically used cross-sectional designs. Indeed, our longitudinal meta-regression analyses showed no effect of improvements in depressive symptoms on participative social function over time. But this is likely a consequence of a lack of statistical power in our analyses and/or the time frames of included studies being too brief or long to detect change. Indeed, it is highly likely that the relationship between depression and participative social function is bi-directional ([Ormel, et al., 1993](#_ENREF_29); [Wiersma and Becker, 2010](#_ENREF_51)).

Others have shown that despite depressive symptoms remitting, impairments in participative social function persist ([Ormel, et al., 2004](#_ENREF_30); [Rhebergen, et al., 2010](#_ENREF_33)). Modifiable factors in addition to depression severity contribute to participative social function outcomes ([Rhebergen, et al., 2010](#_ENREF_33); [Verboom, et al., 2011](#_ENREF_40); [Verboom, et al., 2012](#_ENREF_41)). Indeed, part II of the ICF Framework formally recognises the important moderating role of contextual factors on a person’s ability to function. It lists potential environmental factors that can interact with a person’s execution of a task. These are grouped into physical, social, and attitudinal factors. Thus when appraising a person’s functional ability it is important to contemporaneously define the environmental context in which the appraisal occurred. Specifically in relation to the “Activities and Participation” component the ICF endorse the use of two qualifiers:

1. Performance-scoring a person’s execution of a task (0 to 4) in their current environment
2. Capacity-scoring a person’s execution of a task (0 to 4) in a standardised environment, whereby environmental moderators are controlled and adjusted for.

These two qualifiers help to identify specific environmental contexts for interventions that will improve a person’s functional performance (e.g. flexible working hours by employers). However, self-report measures typically used in trials are not able to capture the complex yet subtle differences between capacity and performance. Indeed, we consider the self-report measures of participative social function included in our review as capturing a person’s degree of performance (i.e. their degree of functioning in their current lived environment).
To better understand these issues and to inform the design of interventions that can benefit both depression and participative social function it is likely that we need to go beyond just trials and meta-analyses. Approaches that employ qualitative process evaluations of interventions, individual patient data meta-analysis, and longitudinal cohort studies can contribute to better intervention design, improved understanding about hypothesised mechanisms of effect and their environmental moderators, and help to refine existing theoretical models about the onset and maintenance of depression and its broader psychosocial outcomes ([Moore, et al., 2015](#_ENREF_26)).

**Conclusion**

Collaborative care improves depression and can also improve participative social function, but the effects are small (and appear to diminish after 6 months), and the mechanism is unclear. It is plausible that specific types of (psychotherapeutic) depression treatments are more likely to bring about change because they directly target explanatory variables of participative social function. Future depression treatment interventions need to give equal attention to the explanatory and contextual variables that facilitate improvements in participative social function alongside improvements in depression.

**Table 1: Four components of collaborative care according to Gunn et al (**[**2006**](#_ENREF_16)**)**

|  |
| --- |
| **Four components that constitutes collaborative care**  |
| 1. At least two health professionals involved in patient care of which one MUST include a primary care provider (e.g. general practitioner, family physician).
 |
| 1. A defined treatment plan, with a structured approach to patient management in accordance with evidence based guidelines. This could include pharmacotherapy, psychological therapy or both, usually delivered by health professionals other than the primary care provider (case managers).
 |
| 1. Planned patient follow-ups. One or more scheduled patient follow-ups delivered either face to face or via the telephone/internet.
 |
| 1. Enhanced communication between health professionals (e.g. team meetings, shared electronic note systems, case manager supervision with a specialist)
 |

**Table II: Self-report measures of disability identified where ≥80% of the scale/subscale content maps onto the participation construct of the ICF**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure (subscales)** | **Rationale** | **Figure in SDC** | **Studies** |
| SF-36 (Role-emotional and social functioning)([Ware, et al., 2001](#_ENREF_44); [Ware, 2004](#_ENREF_46); [Ware and Sherbourne, 1992](#_ENREF_47)) | -Measure includes eight subscales of which three map onto the participation componenti) Role-emotional ii) Role-physical1. Social functioning

 -Role-physical includes two items which overlap in content with role-emotional. It provides a qualifying statement asking the user to rate the extent to which their **physical** health impairs the attainment of specific tasks. A person’s environment may have a more limiting effect in this instance (e.g. absence of assistive devices). Therefore only role-emotional is used | See eFigure 1 | Araya 2003 Bogner 2012Fritsch 2007Hilty 2007 Katon 1999 Katon 2001 Rojas 2007 Roy-Byrne 2001 (Anxiety)Rubenstein 2002 Vera 2010  |
| MOS-20 (Role-emotional and social functioning) ([Stewart, et al., 1988](#_ENREF_36)) | -Six subscales across 20 items of which two map onto the participation component: i) Role functioningii) Social functioning | See eFigure 2 | Ell 2007 Katzelnick 2000  |
| SF-12 (Role-emotional and social functioning) ([Ware, et al., 2007](#_ENREF_43); [Ware Jr, et al., 1996](#_ENREF_49)) | -Measure includes eight subscales/items of which three map onto the participation componenti) Role-emotional ii) Role-physical1. Social functioning

 -Role-physical includes one item which overlaps in content with role-emotional. It provides a qualifying statement asking the user to rate the extent to which their **physical** health impairs the attainment of specific tasks. A person’s environment may have a more limiting effect in this instance (e.g. absence of assistive devices). Therefore only role-emotional is used. | See eFigure 3 | Chaney 2011 Piette 2011 Wells 2000 (role limitations across mental and physical) |
| Sheehan Disability Scale | A 3 item measure whose content maps onto the participation domain.  | See eFigure 4 | Ell 2010Hedrick 2003Katon 1999Katon 2001Katon 2010Kroenke 2010Lobello 2010Roy-Byrne 2010 (Anxiety)Unutzer 2002 |
| Work and social adjustment scale ([Mundt, et al., 2002](#_ENREF_28)) | All five items map onto the participation domain | See eFigure 5 | Buszewicz 2010Menchetti 2013 |
| WHO DAS II (35 item measure) ([Üstün, et al., 2010](#_ENREF_39)) | Provides an overall measure of disability across six subscales. Three subscales map onto the participation component and can be used when reported individually. | See eFigure 6 | Uebelecker 2011(Social, Work and Household) |

**Table III: Self-report measures of disability identified where <80% of the scale/subscale content mapped onto the participation construct of the ICF**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure (subscales)** | **Rationale** | **Figure in SDC** | **Studies** |
| SF-36: Mental health scale (MHS) and/or physical health scale (PHS) ([Ware, et al., 2001](#_ENREF_44); [Ware, 2004](#_ENREF_46); [Ware, et al., 1992](#_ENREF_47)) | Presented data for MHS and/or PHS scale of the SF-36. No subscale specific level data reported. <80% of the MHS and PHS subscales mapped onto participation component. | eFigure 1 | Adler 2004Bartels 2004Cole 2006Gensichen 2009Gjerdingen 2009Hedrick 2003Richards 2008Richards 2013Rollman 2009 |
| SF-36 (Pain subscale only) ([Ware, et al., 2001](#_ENREF_44); [Ware, 2004](#_ENREF_46); [Ware, et al., 1992](#_ENREF_47)) | Only the pain subscale from the SF-36 reported. This maps onto the body functions and structures component of the ICF | eFigure 1 | Dietrich 2004 |
| SF-36: Single item measure of general health ([Ware, et al., 2001](#_ENREF_44); [Ware, 2004](#_ENREF_46); [Ware, et al., 1992](#_ENREF_47)) | A single item measure which asks users to rate their overall health. This cannot be mapped to any domains of the ICF | eFigure 1 | Gjerdingen 2009 |
| SF-12: Mental health scale (MHS) and/ or physical health scale (PHS) ([Ware, et al., 2007](#_ENREF_43); [Ware Jr, et al., 1996](#_ENREF_49)) | Presented data for MHS and/or PHS scale of the SF-12 and not subscale specific level data. <80% of the MHS and/or PHS subscales mapped onto participation construct. | eFigure 3 | Asarnow 2005Clarke 2005Ell 2008Ell 2010Davidson 2013Fortney 2007Huffman 2011Hunkeler 2011Kroenke 2010Landis 2007Pynne 2011Rollman 2005Ross 2008Roy-Byrne 2005Roy-Byrne 2010Unutzer 2010 |
| SF-12 Whole scale ([Ware, et al., 2007](#_ENREF_43); [Ware Jr, et al., 1996](#_ENREF_49)) | Reported data on the whole SF-12 subscale of which only 3/8 subscales mapped onto the participation component | eFigure 3 | Datto 2003 |
| WHO DAS II (35 item measure) ([Üstün, et al., 2010](#_ENREF_39)) | Reported data on the total score of the WHO DAS II based on six subscales of which only three mapped onto the participation component. | eFigure 6 | Katon 2010 |
| WHO DAS II (12 item measure) ([Üstün, et al., 2010](#_ENREF_39)) | Provides an overall measure of disability once items are summed. Only 5/12 items mapped onto the participation component.  | eFigure 7 | Patel 2010 |
| The Stanford Health Assessment Questionnaire: Short HAQ ([Bruce, et al., 2005](#_ENREF_6)) | -Eight subscales across 20 items. -Only 1/8 subscales mapped onto the participation component | eFigure 8 | Chew-Graham 2007McMahon 2007 |
| Older Americans Resources and Services Questionnaire (OARS) ([Fillenbaum, 1988](#_ENREF_14))  | -Measure includes 15 items (one qualifying question related to continence) which make up two subscales: i) Instrumental activities in daily living and ii) Activities in daily living. -4 items from the instrumental activities subscale mapped onto the participation construct however a further 3 items also mapped onto activities component of the ICF.  | eFigure 9 (Items in italics are from the instrumental subscale of the OARS) | Cole 2006Unutzer 2010 (Instrumental subscale only) |
| A scale of disability and prognosis in long-term mental illness ([Morgan and Cheadle, 1974](#_ENREF_27)) | Described in paper as a single item measure, with a 5 point Likert scale response whereby participants rate their disability as ranging from absent to severe | No figure provided | Finley 2003 |
| Social Adaptation social evaluation scale (SASS) ([Bosc, et al., 1997](#_ENREF_4)) | A 21 item scale of which only three items mapped onto the participation component.  | eFigure 10 | McMahon 2007 |
| WHO 5 Wellbeing index ([World Health Organisation, 1998](#_ENREF_52)) | A five item measure of which only one item mapped onto the participation components | eFigure 11 | Lobello 2010Roy-Byrne 2005 |
| The Duke Activity State Index ([Hlatky, et al., 1989](#_ENREF_20)) | Provides an overall measure of disability across 12 items of which only four items (potentially five as one item was coded as unclear) mapped onto the participation component | eFigure 12 | Rollman 2009 |
| EQ-5D ([EuroQol, 1990](#_ENREF_12)) | Five item measure plus overall health rating visual analogue scale. Only one of the five items mapped onto the participation component | eFigure 13 | Gensichen 2009Smit 2006 |
| EQ-5D Visual analogue scale ([EuroQol, 1990](#_ENREF_12)) |  | NA | Buszewicz 2010 |
| Index of wellbeing ([Kaplan, et al., 1976](#_ENREF_22)) | Four subscales of which only one mapped onto the participation construct | eFigure 14 | Fortney 2007Pynne 2011 |
| Disease specific quality of life measures  | Did not meet our inclusion criteria. No mapping exercise performed | NA | Ciechanowski 2004 (Cancer)Ciechanowski 2010 (Epilepsy)Dwight-Johnson 2005 (Cancer)Ell 2008 (Cancer)Strong 2008 (Cancer) |
| No self-report measure of disability identified in the study  | NA | NA | Blanchard 1995Bruce 2004Capoccia 2004Dwight-Johnson 2010Dwight-Johnson 2011Morgan 2013Huijbregts 2013Katon 1995Katon 1996Katon 2004Ludman 2007Mann 1998McCusker 2008Oslin 2003Rost 2001Simon 2000Simon 2004Simon 2011Swindle 2003Vlasveld 2011Waitzkin 2011Wilkinson 1993Williams 2007Yeung 2010Zatrick 2001Zatrick 2004 |

**Table IV. Characteristics of included studies**

| **Author** | **Measure of social functioning (subscale included in analysis)** | **Baseline reported N (% female)** | **Mean Age** | **Ethnicity(% white)** | **Country** | **Severity of depression**  | **Co-morbid physical LTC**  | **Intervention group**  | **Control group**  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Araya 2003 | SF-36 (Social Functioning) | 240 (100)  | 42.6 | 0 | Chile  | Major | None | Both | Usual care |
| Buszewicz 2010 | Work and social adjustment scale | 558 (75)  | 48.3 | 88.2 | UK | All  | None | Both | Usual care |
| Chaney 2011 | SF-12 (Role emotional)  | 546 (4) | 64.2 | 87.1 | US | All  | None | Medication management | Usual care |
| Ell 2007 | MOS-20 (Social Functioning) | 311 (72) | ≥65 | NR | US | All  | None | Both | Usual care  |
| Ell 2010 | Sheehan Disability Scale | 387 (82) | ≥18 | NR | US | All  | Diabetes  | Both | Enhanced-patient education materials |
| Fritsch 2007 | SF-36 (Social Functioning) | 345 (100)  | 37.4 | 0 | Chile  | Major | None | Medication management | Usual care |
| Hedrick 2003  | Sheehan Disability Scale | 354 (5) | 57.2 | 79.7 | US | All  | None | Both | Enhanced-consultation liaison  |
| Katon 1999 | Sheehan Disability scale | 228 (75) | 47 | 80.3 | US | All  | None | Medication management | Usual care |
| Katon 2001 | Sheehan Disability Scale  | 386 (74) | 46 | 90.2 | US | Subthreshold | None | Both | Usual care |
| Katon 2010 | Sheehan Disability Scale | 214 (52) | 56.8 | 78.5 | US | All  | Diabetes and/or coronary heart disease | Both | Usual care |
| Kroenke 2010 | Sheehan Disability Scale | 405 (68) | 58.8 | 79.5 | US | All  | Cancer | Medication management | Usual care |
| Lobello 2010 | Sheehan Disability Scale | 520 (73) | 44.5 | 87.3 | US | Major | None | Medication management | Usual care |
| Piette 2011 | SF-36 (Social Functioning) | 291 (52) | 56 | 84 | US | All  | Diabetes | Psychological therapy | Enhanced-patient education materials |
| Rojas 2007 | SF-36 (Social Functioning) | 230 (100) | 26.6 | 0 | Chile  | Major | None | Both | Usual care |
| Rubenstein 2002 | SF-36 (Social Functioning)  | 567 (59) | 48.2 | 76 | US | Major | None | Medication management | Usual care |
| Uebelacker 2011 | WHODAS II (Household) | 38 (95) | 39.1 | 0 | US | All | None  | Both  | Usual care |
| Unutzer 2002 | Sheehan Disability Scale | 1801 (65) | 71.2 | 77 | US | All  | None | Both | Usual care |
| Vera 2010 | SF-36 (Social functioning) | 179 (76)  | 55 | NR | Puerto Rico | All  | Multiple chronic conditions  | Medication management | Usual care |

**Key:** Both includes medication management and/or psychological therapy

**Figure 1. Conceptualisation of social functioning using the ICF as a theoretical framework**

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1Subdomains associated with body functions and structures are not shown in the Figure.

*Figure legend:* Directional arrows leading from activities and participation components indicate their associated subdomains from the ICF

**Figure II: Flow chart of included studies** (Adapted from Coventry et al, 2014)

Figure legend: Represents the study identification process

3620 records identified through database searching in original Cochrane review by Archer et al (Feb 2012)

163 Records identified in CENTRAL search update Dec 2013

47 additional records identified through other sources (14 were studies that were identified in an earlier review of collaborative care or through separate searches of databases/journals; 30 were companion papers to studies found by the search strategy

66 full-text articles excluded:

26 studies had no measure of participative social function

33 measure of social function did not meet our inclusion criteria

5 studies included a measure of participative social function but findings were reported in an unusable format

2 measured anxiety and not depression

3001 records excluded

192 full-text articles excluded:

30 did not meet study design criteria

101 did not meet intervention criteria

18 did not meet diagnostic criteria

43 were companion papers of excluded studies

18 RCTs included in meta-analysis of participative social function

84 RCTs (cited across 440 separate references) assessed for eligibility against present reviews inclusion criteria

632 full-texts articles assessed for eligibility

3633 records screened

3633 records after duplicates removed

**Figure III: Forest plot of the effects of collaborative care on participative social functioning outcomes at short term follow-up (up to six months)**

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*Figure legend: Meta-analysis of randomised controlled trials and pooled effects. Random effects model used. 95% CI = 95% confidence intervals*

**Figure IV: Forest plot of the effects of collaborative care on participative social functioning outcomes at longer term follow-up (seven months or more)**

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*Figure legend: Meta-analysis of randomised controlled trials and pooled effects. Random effects model used. 95% CI = 95% confidence intervals*

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**Table legends:**

*Table I: Provides a definition of each of the four components that collectively make up collaborative care interventions*

*Table II: Summarises the rationale for measures of participative social function identified*

*Table III: Summarises the rationale for excluding these measures as scales of participative social function*

*Table IV: A brief description of the socio-demographic, clinical characteristics and intervention content for meta-analysed studies*