Contemporary perspectives on goal setting in rehabilitation

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My co-authors...

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Acknowledgements

The Cochrane CCR Group, especially...

• Megan Prictor
• John Kis-Rigo

• Rebecca Ryan
• Sophie Hill

... and all the peer-reviewers and participants
Different purposes of goal setting

- Meeting contractual requirements
- Providing direction
- Evaluating progress and outcome
- Building a team approach
- Building a working relationship

Levack et al. (2006a)

Content

Exploration of 3 issues in goal setting for rehab:
- Evidence of effect on health outcomes
- Use of goals as an outcome measure
- Use of goals to enhance human performance
Effects of goal setting on health outcomes

Summary of some key findings from a Cochrane review

Aim of review

• To assess the best evidence of the effects of goal setting, and activities to enhance goal pursuit, for improving health outcomes in adults with acquired disability participating in rehabilitation.
Background

• Prior systematic reviews of goal setting in rehabilitation have shown:
  – Some evidence that goals could influence immediate patient performance on set tasks & adherence to treatment regimes
  – No consistent evidence for any generalizable effects on patient outcomes
    Levack et al. (2006b)
  – Findings reproduced by
    Rosewilliam et al. (2011)
    Sugavanam et al. (2013)

What’s different about this review?

• Published protocol: a priori analysis plan
  (Levack et al. 2012)

• Search more comprehensive
  – 9000+ titles & abstracts screened; including non-English and grey literature; including unpublished theses; quasi-RCTs

• Categorisation of studies by comparison type
  – e.g. control = no goal setting VERSUS control = ‘usual care’ goal setting

• Meta-analysis of outcome data
Results (n=39)

Heterogeneity of populations...

People with:
• Musculoskeletal & pain conditions
• Cardiac conditions
• Respiratory conditions
• Mental health conditions
• Age-related disability

Receiving:
• PT
• OT
• Nursing
• Psychology
• Vocational
• MDT

Results (n=39)

Variance in goal setting methods...
• Patient involvement in goal setting (prescribed → negotiated → self-selected)
• Development of an implementation plan
• Degree of written or oral feedback progress towards goals
• Goal approach (e.g. GAS, COPM, GMT, etc)
• Underlying goal theory
Results: Comparison groups

1. Structured goal setting +/- goal pursuit strategies vs. no goal setting (n = 18)

2. Structured goal setting +/- goal pursuit strategies vs. ‘usual care’ goal setting
3. Goal pursuit strategies vs. no goal pursuit strategies
4. One structured goal setting approach vs. another
Goal setting versus no goal setting

• Meta-analysis of HRQOL & self-reported emotional status outcomes

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Goal setting Mean</th>
<th>SD Total</th>
<th>N</th>
<th>No-goal setting Mean</th>
<th>SD Total</th>
<th>N</th>
<th>Std. Mean Difference (SMD)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buri 1991</td>
<td>-1.373</td>
<td>0.021</td>
<td>53</td>
<td>-1.864</td>
<td>0.796</td>
<td>36</td>
<td>14.7%</td>
<td>0.548 (0.06, 1.03)</td>
</tr>
<tr>
<td>Crewe 2012</td>
<td>-2.02</td>
<td>1.23</td>
<td>26</td>
<td>-2.28</td>
<td>1.119</td>
<td>20</td>
<td>13.7%</td>
<td>0.496 (0.14, 1.23)</td>
</tr>
<tr>
<td>Duncan 2003</td>
<td>-25.4</td>
<td>21.8</td>
<td>7</td>
<td>-35.5</td>
<td>22.6</td>
<td>7</td>
<td>7.2%</td>
<td>1.340 (0.72, 2.04)</td>
</tr>
<tr>
<td>Evans 2003</td>
<td>14.66</td>
<td>2.71</td>
<td>13</td>
<td>11.7</td>
<td>3.29</td>
<td>16</td>
<td>11.5%</td>
<td>1.118 (0.50, 1.42)</td>
</tr>
<tr>
<td>Frederburgh 2003</td>
<td>12.08</td>
<td>26.1</td>
<td>15</td>
<td>7.4</td>
<td>28.02</td>
<td>15</td>
<td>16.1%</td>
<td>6.301 (0.42, 1.22)</td>
</tr>
<tr>
<td>Harvard 2012</td>
<td>-14.6</td>
<td>10.4</td>
<td>26</td>
<td>25.1</td>
<td>10.11</td>
<td>33</td>
<td>14.4%</td>
<td>1.049 (0.30, 1.21)</td>
</tr>
<tr>
<td>Self 2004</td>
<td>25.02</td>
<td>3.63</td>
<td>15</td>
<td>10.78</td>
<td>4.48</td>
<td>24</td>
<td>11.3%</td>
<td>0.955 (0.20, 1.08)</td>
</tr>
<tr>
<td>Sewell 2015</td>
<td>0.62</td>
<td>4.41</td>
<td>83</td>
<td>0.09</td>
<td>1.29</td>
<td>50</td>
<td>15.1%</td>
<td>1.533 (0.45, 0.64)</td>
</tr>
</tbody>
</table>

Total (69% CI) 0.53 (95% CI 0.17 to 0.88)

Goal setting versus no goal setting

• Meta-analysis of activity outcomes

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
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<th>SD Total</th>
<th>N</th>
<th>No-goal setting Mean</th>
<th>SD Total</th>
<th>N</th>
<th>Std. Mean Difference (SMD)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duncan 2003</td>
<td>1.476</td>
<td>1.192</td>
<td>7</td>
<td>6.803</td>
<td>314.4</td>
<td>1</td>
<td>9.2%</td>
<td>0.115 (0.04, 1.29)</td>
</tr>
<tr>
<td>Harvard 2012</td>
<td>17.6</td>
<td>6.3</td>
<td>26</td>
<td>19.3</td>
<td>33.31</td>
<td>31</td>
<td>31.3%</td>
<td>-0.919 (0.30, 0.41)</td>
</tr>
<tr>
<td>Self 2004</td>
<td>46.5</td>
<td>17.1</td>
<td>13</td>
<td>49.9</td>
<td>91.6</td>
<td>6</td>
<td>7.4%</td>
<td>-0.211 (10.70)</td>
</tr>
<tr>
<td>Sewell 2015</td>
<td>40.93</td>
<td>131.9</td>
<td>93</td>
<td>28.15</td>
<td>58.56</td>
<td>50</td>
<td>59.1%</td>
<td>0.110 (0.28, 0.40)</td>
</tr>
</tbody>
</table>

Total (69% CI) 0.04 (95% CI -0.22 to 0.31)
Goal setting versus no goal setting

• Meta-analysis of self-efficacy outcomes
  
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Goal setting</th>
<th>No goal setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Capstick 2012</td>
<td>25.81</td>
<td>2.23</td>
</tr>
<tr>
<td>Evans 2002</td>
<td>29.54</td>
<td>2.73</td>
</tr>
<tr>
<td>O’Shea 2013</td>
<td>3.6</td>
<td>0.34</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>66</td>
<td>160.0</td>
</tr>
</tbody>
</table>

  Test for overall effect: Z = 4.20 (p = 0.03001)

SMD 1.07 (95% CI 0.64 to 1.49)

Goal setting versus no goal setting

• Meta-analysis of motivation, adherence, & engagement measures

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Goal setting</th>
<th>No goal setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Basset 1999</td>
<td>76.73</td>
<td>22.28</td>
</tr>
<tr>
<td>Basset 2003</td>
<td>148.6</td>
<td>168.1</td>
</tr>
<tr>
<td>Mee 1971</td>
<td>13.7</td>
<td>1.58</td>
</tr>
<tr>
<td>Evans 2002</td>
<td>59.6</td>
<td>15.86</td>
</tr>
<tr>
<td>O’Shea 2013</td>
<td>79.62</td>
<td>11.98</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>183</td>
<td>165</td>
</tr>
</tbody>
</table>

  Test for overall effect: Z = 1.59 (p = 0.11)

SMD 0.30 (95% CI -0.07 to 0.66)
Discussion

• Some (weak) evidence that any goal setting in rehab (compared to no goal setting) results in improved HRQOL or emotional status
• No evidence re. improvements in activity
• Some evidence re. improvement in self-efficacy
• Equivocal results re. impact on patient engagement in rehabilitation
• Insufficient studies to undertake subgroup analysis

Discussion

• Different reasons for using goals, and different rehabilitation contexts, will required different approaches to goal setting in clinical practice.
• One person in one rehab context may well benefit from more than one approach to goal setting.
Hardwood et al. 2012

- Maori & PI people with stroke
  - Grp 1. ‘Take Charge’ session (goal group)
  - Grp 2. Inspirational DVD
  - Grp 3. ‘Take Charge’ session plus DVD
  - Grp 4. Usual care
- The ‘Take Charge’ session resulted in significant improvements in SF-36 (physical) and less dependency on others.

Sewell et al. 2005

- People with COPD in pulm rehab.
  - Grp 1. Exercise based on COPM-derived goals (goal group)
  - Grp 2. Generic exercise (control)
- Both groups improved dramatically on HRQoL and exercise capacity, but...
- No signif. diff. between groups
Using goal achievement as an outcome measure

Primarily a discussion of Goal Attainment Scaling (GAS)

<table>
<thead>
<tr>
<th>Score</th>
<th>Individual scale items</th>
<th>Standardised scale items</th>
</tr>
</thead>
<tbody>
<tr>
<td>+2</td>
<td>Walk up and down a flight of 12 steps six times in two minutes without use of a stick.</td>
<td>Greatly exceed expected outcome</td>
</tr>
<tr>
<td>+1</td>
<td>Walk up a flight of 12 steps without use of a stick</td>
<td>Slightly exceeded expected outcome</td>
</tr>
<tr>
<td>0</td>
<td>Walk up a flight of 12 steps independently with aid of stick</td>
<td>Walk up a flight of 12 steps independently with aid of stick</td>
</tr>
<tr>
<td>-1</td>
<td>Walk up a flight of 12 steps with assistance of one person and stick</td>
<td>Not quite achieved expected outcome</td>
</tr>
<tr>
<td>-2</td>
<td>Not be able to walk up a flight of 12 steps even with maximal assistance</td>
<td>Nowhere near the expected outcome</td>
</tr>
</tbody>
</table>
T-Scores

Overall GAS Score = 50 + \frac{10 \sum (W_i X_i)}{\sqrt{(0.7 \sum W_i^2 + 0.3(\sum W_i^2)}}

Where:
- \(i\) = no. of goal for an individual patient
- \(X_i\) = the GAS score for each goal
- \(W_i\) = the weighting assigned to each goal
- \(\Sigma\) = means the ‘sum of’

(Kiresuk & Sherman, 1968)

Drivers of goal achievement as an outcome

Since the 1970’s
- Desire for individualised outcome measures to address heterogeneity in rehab populations.
- Dissatisfaction with the sensitivity of standard outcome measures.
- A move in the 80’s towards healthcare as a business rather than a service, in need of KPIs
### GAS in the UK

- Reporting on GAS outcomes now a contractual requirement in UK neurorehab services
- Used for benchmarking service performance  

Should we be doing the same in NZ?  
How valid is GAS as an outcome measure?

### GAS as an measure of service performance

(Some) of my reservations:  
- GAS T-scores assume GAS data is interval data when it is not  
- GAS scales are not necessarily unidimensional  
- GAS scores are difficult to interpret clinically  
- GAS scores are open to observer bias  
- Using goals for outcome evaluation may impact on other possible uses for goal setting
**Ordinal vs interval data**

**Interval data**
- 7.8s
- 9.5s
- 9.6s

**Ordinal data**
- 3
- 2
- 1

**Interval data:**
- Has a **numerical value**
- Is in a **specific order**, and
- The **difference** between each value on the measure is the **same**.

When data is *treated* as interval data, we assume these characteristics to be **true**.
Ordinal data:

- Has a **numerical value**
- Is in a **specific order**, and
- The **difference** between each value on the measure is **not** the **same**.

Limitations of ordinal data

- Imagine an ‘ordinal ruler’...

  - The **order** of numbers on this ruler would *mean something*, but **not** the relative values on this ruler.
Limitations of ordinal data

• Imagine an ‘ordinal ruler’…

• 3 + 3 on does not necessarily equal 6

• A change of 2 points on one part of this ruler (e.g. from 7 to 9) might be smaller than a 1 point change on another part of the ruler (e.g. from 10 to 11)
Limitations of ordinal data

This means:
• Adding, multiplying, dividing scores
• Means
• Standard deviations etc...

... are inappropriate with ordinal data

T-Scores do all these things!

Overall GAS Score = 50 + \frac{10 \Sigma (WiXi)}{\sqrt{(0.7 \Sigma Wi^2 + 0.3(\Sigma Wi^2)}}

Where:
- \(i\) = no. of goal for an individual patient
- \(Xi\) = the GAS score for each goal
- \(Wi\) = the weighting assigned to each goal
- \(\Sigma\) = means the ‘sum of’

• In 15% of simulated data, the maths of T-scores produces clinically important difference where no different should exist

(Tennant, 2007)
### Unidimensionality & GAS?

<table>
<thead>
<tr>
<th>Score</th>
<th>Individual scale items</th>
</tr>
</thead>
<tbody>
<tr>
<td>+2</td>
<td>Able to go to the zoo by him/herself</td>
</tr>
<tr>
<td>+1</td>
<td>Able to eat candy floss</td>
</tr>
<tr>
<td>0</td>
<td>Able to sit independently in chair for 1 hour</td>
</tr>
<tr>
<td>-1</td>
<td>Able to stay awake in bed for 1 hour</td>
</tr>
<tr>
<td>-2</td>
<td>Mostly dead</td>
</tr>
</tbody>
</table>

### Clinical interpretation of GAS

[Diagram with a GOAL marker]
Clinical interpretation of GAS

GOAL

-2 -1 0 +1 +2

Clinical interpretation of GAS

GOAL

-2 -1 0 +1 +2
Clinical interpretation of GAS
Clinical interpretation of GAS

What do GAS scores mean?

- If done 100% correctly, all GAS scores should be ‘0’ (i.e. the expected outcome)
- If teams consistently score over ‘0’, this may be evidence of ‘attempts to inflate their results by setting goals over-cautiously’

(Turner-Stokes, 2009, p. 364)

Impact of GAS goals on other possible uses for goal setting

Goals and patient motivation
What is motivation?

- ‘Motivation’ is:
  ‘... Mental functions that produce the incentive to act; the conscious or unconscious driving force for action.’
  (World Health Organisation, 2001, p. 51)

Motivation in rehab?

- A personality trait? (inside the individual)
- A behaviour influenced by environmental or social variables?
- A result of interaction between the two?
  (Maclean and Pound, 2000)

- However, motivation is not the only purpose of goal setting, and...
- Goal setting is not the only influence on motivation
Motivational theories

- Drive reduction theories
- Affective-arousal theories
- Needs theories
- Cognitive theories

- Cognitive dissonance theory
- Interest theory
- Need Achievement theory
- Needs Hierarchy theory...
  ...
  etc

i.e. Goal planning is not the only way to influence motivation

Mechanisms of motivation via goal planning (& evidence)

Input

Output
Hypothesised mechanisms of motivation via goal setting

1. Skinner’s Operant Conditioning
2. Bandura’s Social Learning Theory
3. Locke & Latham’s Goal Setting Theory
4. Carver & Scheier’s Self-regulation Theory

Goals create drive
Because it was there

Locke and Latham’s Goal Setting Theory

**Moderators:**
- Goal commitment
- Self-efficacy
- Feedback etc...

**Goal**  
Specificity  
Difficulty

**Performance**  
Productivity, Cost  
improvement

**Satisfaction**  
with Performance  
and Rewards

**Willingness to commit to change**

**Mechanisms:**
- Attention
- Effort
- Persistence

(Locke and Latham, 2002)

Locke and Latham’s GST

**Relationship between goal difficult & task performance**

- Limits of ability reached or commitment to goal lapsed

Task performance →

Increasing goal difficulty →
Locke and Latham’s GST

**Effect size**

- Effect size associated with high goal difficulty:
  
  SMD 0.52 to 0.82 (see [Cohen’s d](https://en.wikipedia.org/wiki/Cohen%27s_d))

- Effect size associated with specific difficult goals vs ‘do you best’ instructions:
  
  SMD 0.42 to 0.82

  (Locke & Latham, 1990)
Because it was there

**Strategies:**
- Set specific, challenging goals
- Inform patients about these goals
- Encourage patients to believe they could achieve their goals
- Inform patients about their progress toward the goals, encouraging them to try harder

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**One additional implication:**
- Need to evaluate outcome on the basis of actual achievements rather than on goal attainment
Because it was there

Discourse:
‘Goals influence the choice (direction), intensity, and persistence of behavior. Therefore, goal-setting has a motivational aspect for both patients and team members.’

(Gauggel and Hoop, 2004, p. 445)

Because it was there

Discourse:
‘...it has also been shown that perceived authority is a very powerful determinant of goal commitment; goals assigned by authority figures typically affect individuals’ personal goals.’

(Gauggel and Hoop, 2004, p. 441)
Because it was there

**Evidence:**
- Some RCT-level evidence that specific, difficult goals \(\uparrow\) motivation on simple cognitive or motor tasks – at least for patient with acquired brain injury (Levack et al., 2006b)
  
  **HOWEVER...**
- No consistent evidence that specific, difficult goals result in better rehab outcomes
  
  (Levack et al., 2015)

Example

Gauggel, Hoop, and Werner (2001)
- RCT, 87 patients with brain injury
- Simple arithmetic task on computer
- Pt randomly assigned to one of three groups
  1. Specific, high goal (120% of first performance)
  2. Personal goal has to be stated
  3. “Do your best” condition
Mean number of correct solutions following goal-setting

Discussion

- T-scores are probably meaningless
- Better to use non-parametric methods with raw GAS data
- Better again to use standardised outcome methods or even other individualised outcome measures than GAS
- Using goal attainment as an outcome impact on goal setting for other reasons
- However... the process of using GAS goals may have other benefits – such as discussing expectation with patients and families
SUMMARY POINTS

• Increasingly we are finding that goal setting in rehabilitation is not as simple as we once thought.
• Different approach to goal setting are required in different contexts for different people.
• Different reasons for using goal setting in clinical practice may also required different approaches.

SUMMARY POINTS

• The future of goal setting in rehabilitation will be characterised by:
  – Increasing diversification,
  – Increasing specification, and
  – Increasing sophistication.
• Watch this space! 😊
Where to find more


Where to find more

- Podcast: [www.cochrane.org/podcasts/10.1002/14651858.CD009727.pub2](http://www.cochrane.org/podcasts/10.1002/14651858.CD009727.pub2) (or: [http://tinyurl.com/ha5rjdq](http://tinyurl.com/ha5rjdq))

@WilliamLevack