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Development and validation of the solution-focused inventory

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Solution-focused coaching and solution-focused therapy are strengths-based approaches which emphasize people's resources and resilience and how these can be used in the pursuit of purposeful, positive change. The Solution-focused Inventory (SFI) is a 12-item scale with three subscales: Problem Disengagement, Goal Orientation and Resource Activation. Three studies in this article provide support for the validity of the SFI as a measure of solution-focused thinking. The SFI negatively correlated with psychopathology and positively correlated with measures of well-being, resilience and perspective taking. Test–retest reliability over 16 weeks was 0.84. Cronbach's α for the 12-item scale was 0.84. It also demonstrates sensitivity to purposeful change in that participation in a leadership development coaching intervention was associated with significantly increased scores on the SFI, whilst scores for the control group did not change.

Keywords: solution-focused; coaching; positive psychology; brief solution-focused therapy

Introduction

The solution-focused approach is a strengths-based approach which emphasizes people's resources and resilience and how these can be used in the pursuit of purposeful, positive change. It is now widely incorporated into a range of coaching and therapeutic methodologies (e.g. Iveson, George, & Ratner, 2012; Roeden, Maaskant, Bannink, & Curfs, 2011). Indeed, a recent large-scale US-based study of family therapists found that more than half of all family therapists listed solution-focused therapy as one of the three most common interventions used along with cognitive behavioural therapy and Bowen's family systems theory (Bradley, Bergen, Ginter, Williams, & Scalise, 2010).

Solution-focused approaches are attracting increasing interest in the scientific literature. A search of PsycINFO in January 2012 revealed over 450 publications on solution-focused approaches. Of these, 126 involved quantitative data drawn from both therapeutic and general populations, covering all age groups and many industry sectors. The majority of these studies suggest that the solution-focused approach is an effective means of producing change (for a formal review, see Stams, Dekovic, Buist, & de Vries, 2006).

Despite this growing interest and practical application, there has been little research into the mechanisms by which solution-focused approaches operate. One of the likely reasons for this is that there has not yet been developed a validated theoretically grounded, multifactorial instrument capable of reliably measuring the key psychological mechanisms thought to underpin solution-focused change. This article reports the development and validation of an instrument (the Solution-focused Inventory; SFI) designed to fill this gap.

Theoretical foundations to the solution-focused approach

At its core, the solution-focused approach is deceptively simple. It assumes that people possess the resources necessary to resolve their difficulties or problems, and that time in the coaching or therapy session is better spent identifying the desired solution state and focusing on pathways to achieve that state, rather than exploring the origins of the presenting problem or the patterns of thought that create and maintain it (Jackson & McKergow, 2002). Theoretically, the solution-focused approach holds that change is constrained or enabled by the way in which the client (and therapist or coach) think and talk about events. In other words, problems and solutions are not things necessarily given in reality, but are constructed in the discourse between the client and others in the client's world (Cavanagh & Grant, 2010; de Shazer, 1988; O'Connell, 1998).

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Solution-focused thinking can be contrasted with problem-focused approaches. A problem-focused approach assumes that by understanding the causal structure of a person's difficulty, effective pathways to action will emerge. In contrast, the solution-focused approach eschews exploration of causal aetiology, focusing instead directly on how to create the desired change. Indeed, it holds that the complexity of life means that a search for causal aetiology may well be futile, and could even lead to a narrowing of possible actions, eventual undermining of self-efficacy and reductions in motivation and resilience (Cavanagh, 2006; Cavanagh & Grant, 2010; McKergow & Jackson, 2005; McKergow & Stellamans, 2011).

At its extreme, problem-focused thinking may even lead to a debilitating cycle of rumination – a persistent cognitive focus on one's problems, along with attempts to identify the causes, meanings and consequences of those experiences or problems (Nolen-Hoeksema & Morrow, 1991; Trapnell & Campbell, 1999). Rumination has been found to pose a risk factor for both the onset of depression and depressive relapse (Nolen-Hoeksema, 2000), and to negatively predict subjective well-being and life satisfaction (Brown & Ryan, 2003; Takano & Tanno, 2009), as well as leading to reduced concentration, biased negative memory retrieval and impaired problem-solving skills (Lyubomirsky & Nolen-Hoeksema, 1995).

In contrast, solution-focused cognitive processing is characterized by a style of thinking that eschews excessive focus on problems and their causes. It focuses on identifying approach goals and unnoticed resources and finding multiple pathways to achieving those goals (Cavanagh & Grant, 2010; Grant, 2001). By doing so it enlarges the range of potential actions open to the client.

Thus a solution-focused thinking style can be expected to be associated with well-being and positive affect. This is because reflecting on one's goals and thinking about ways to attain those goals tends to stimulate pathways thinking (Snyder, Rand, & Sigmon, 2002) and increases self-efficacy (Bandura, 1982), both of which are frequently associated with well-being (Peterson, 2000; Sheldon, Elliot, Kim, & Kasser, 2001; Sheldon, Kasser, Smith, & Share, 2002). Furthermore, actively working on developing solutions in the pursuit of personally valued goals is likely to build self-efficacy, resilience and psychological flexibility (Beasley, Thompson, & Davidson, 2003; Kashdan & Rottenberg, 2010; Peterson, 2006). By focusing on goals, resources and pathways, the solution-focused approach attempts to facilitate disengagement from problem-focused thinking and break the debilitating cycles of rumination that often keep clients focused on weakness and deficits (for further discussion on these points see Robinson & Tamir, 2011; Cavanagh & Grant, 2010).

As yet, there is no reliable measure that is specifically designed to assess the psychological factors associated with solution-focused approaches. Given the widespread and growing importance of solution-focused interventions, this represents a serious gap in evidence-based research. To address this issue, this article reports on the validation of a measure specifically designed to assess solution-focused processing (Grant, 2003).

Application for cognitive-behavioural and positive psychology approaches

As solution construction is a central task in many approaches to fostering change, the development of an instrument able to assess changes in orientation towards solutions, resource identification and problem-focused thinking has application beyond research into solution-focused coaching or solution-focused therapy (Grant, Franklin, & Langford, 2002). Such an instrument would be useful to assess the development of solution-focused thinking, for example, in cognitive-behavioural therapy where the therapist typically turns the clients' attention to the development of strategies aimed at building positive coping skills and personal resilience after dysfunctional or self-limiting thoughts, feelings and behaviours have been identified and addressed (Beck, 1995; Dryden, 1987; Neenan & Dryden, 2002).

Such an instrument would also be of use in assessing the psychological mechanisms underlining positive psychology interventions. Because these focus on building personal strengths and orienting the client's attention towards the construction of solutions and related constructs such as hope, subjective and psychological well-being (PWB) and psychological flexibility (Grant & Spence, 2010; Kashdan & Rottenberg, 2010; Peterson, 2006), and avoid pathology-focused diagnosis and excessive problem analysis (Biswas-Diener, 2010), they have much in common with the solution-focused approach, and may well rely on similar psychological mechanisms. Thus the development of a short, reliable instrument capable of identifying the processes involved in solution-focused thinking may prove useful in understanding some of the active components of cognitive-behavioural and positive psychology approaches to therapy and change.

Paucity of existing solution-focused measures

To the best of our knowledge, there has been only one peer-reviewed published measure specifically related to solution-focused approaches; *The Solution Building Inventory* (SBI; Smock, McCollum, & Stevenson, 2010). According to the authors, this scale attempted

to comprehensively measure all aspects of 'solution-building' by clients in brief solution-focused therapy (BSFT). Following a review of the literature, Smock et al. (2010) developed a 22-item measure based on three factors that, they argued, theoretically underpin the solution-focused approach: (a) clearly identifying the solution; (b) awareness of exceptions to the problem and (c) developing a hope in the future. Items included 'I can recognize things that I can do, even though it seems that the problem is someone else'; 'I can recognize in others when things may be going better for me' and 'There are times when I am really proud of how I am able to handle difficult situations'.

However, exploratory factor analysis (EFA) of the SBI yielded eight factors rather than the expected three (Smock et al., 2010). When this analysis was repeated with a second data set, the researchers were again unable to confirm the hypothesized three-factor model. Their data indicated the only viable model using their items was a six-item, single-factor scale that did not operationalize the proposed underlying theoretical framework. Furthermore, its psychometric properties are uncertain, and important properties such as test–retest reliability and predictive validity were not reported.

In order to further develop our understanding of solution-focused approaches and more deeply explore their utility in coaching, therapy and positive psychology, a new theoretically grounded and empirically validated measure that can assess processes central to solution-focused thinking is needed. A brief, reliable and valid measure of solution-focused thinking would have potential to contribute to the field, both in terms of assessing change in the psychological mechanisms targeted by solution-oriented interventions, and more broadly in terms of generating insight into the psychological processes central to purposeful, positive change. For such a measure to be useful to both practitioners and researchers, it needs to be theoretically grounded, simple to administer and easy to score. The aim of this study was to develop such a measure.

The SFI: Theoretical factor structure

In developing the SFI, a review of the solution-focused literature identified two broad themes. These were, firstly, an orientation towards solution construction via the use of approach goals and active self-regulation and secondly, an orientation towards noticing exceptions to the problem and utilizing resources and strengths (see Grant, 2011 for a broader theoretical and philosophical discussion of the underpinnings of solution-focused interventions and the SFI).

In addition, we hypothesized a third factor concerned with the person's capacity to disengage from problem-focused thinking. We reasoned that solution-focused thinking is more than just goal setting and resource awareness – it is also based on a mindset that orients the person towards solutions and explicitly away from problem-focused processing (see also Biswas-Diener, 2010; Dweck, 2006). Thus, in addition to assessing goal orientation (GO) and resource utilization, a valid measure of solution-focused thinking should also include items that assess the relative absence of problem-focused thinking.

The following three studies were conducted to assess the factor structure, reliability and validity of the SFI. Study one reports the exploratory and confirmatory factor analyses of the instrument. This study sought to understand whether the factor structure was stable and reflected the proposed underlying theoretical framework, and which of three models best fit the data. The models we examined were: (Model 1) a unitary factor model (which suggests a single broad latent factor underlying solution-focused behaviours); (Model 2) a three independent, yet inter-correlated factor model (e.g. solution-focused behaviours can be viewed as being underlined by three factors obtained from the correlations between original items) and (Model 3) a hierarchical model with three factors subordinate to a single higher order factor (e.g. a second-order factor is derived on a basis of correlations between first-order factors, supporting the assumption of broad tendencies underlying three conceptually related clusters of problem-focused behaviours). Study two examined the validity of the measure comparing it against a range of outcome variables. Study three assessed the test–retest reliability of the instrument as a whole and its responsiveness to change following coaching.

Study one: Internal validation of the SFI

Method

Item construction

As discussed above, we suggest there are three key factors theoretically deemed to be central to solution-focused thinking: (1) a focus towards desired goal states; (2) a focus on recognizing and utilizing strengths and resources and (3) a focus on disengaging from problems and problem-focused thinking. We named these themes GO, resource activation (RA), and problem disengagement (PD), respectively, and developed questionnaire items that reflected each theme.

Drawing on key themes reported in the solution-focused practitioner literature, questionnaire items were developed by the first and sixth authors (Grant, 2011): the GO items were designed to encapsulate the key features of goal-focused self-regulation which underpins an orientation towards solution construction (e.g. Locke & Latham, 2002). The RA items were designed to reflect the core aspects of RA widely

Table 1. Descriptive statistics (minimum and maximum scores, mean and SD) for each item of the initial 14-item version of the SFI scale in professional ($N = 242$) and university student ($N = 322$) samples.

		University students				Professional sample			
Original item no.		Minimum	Maximum	*M*	SD	Minimum	Maximum	*M*	SD
SFI01	I tend to spend more time analysing my problems than working on possible solutions®	1	6	3.98	1.20	1	6	3.21	1.16
SFI02	I tend to get stuck in thinking about problems®	1	6	3.83	1.23	1	6	2.96	1.13
SFI03	There is always a solution to every problem	1	6	4.64	1.07	1	6	4.10	1.33
SFI04	I tend to focus on the negative®	1	6	4.40	1.27	1	6	3.69	1.26
SFI05	I'm not very good at noticing when things are going well®	1	6	4.31	1.27	1	6	3.90	1.28
SFI06	There are always enough resources to solve a problem if you know where to look	1	6	4.30	1.19	1	6	4.27	1.07
SFI07	I know how to use my personal strengths	2	6	4.62	0.83	1	6	4.23	0.99
SFI08	Most people are more resilient than they realise	2	6	4.93	0.79	2	6	4.54	0.87
SFI09	When things do go wrong I try to learn from the experience	2	6	5.14	0.70	1	6	4.81	0.81
SFI10	Setbacks are a real opportunity to turn failure into success	2	6	4.67	0.84	1	6	4.31	0.99
SFI11	I imagine my goals and then work towards them	2	6	4.48	0.96	1	6	4.23	1.06
SFI12	I keep track of my progress towards my goals	1	6	4.04	1.09	1	6	3.74	1.14
SFI13	I'm very good at developing effective action plans	1	6	3.51	1.08	1	6	3.66	1.21
SFI14	I always achieve my goals	1	6	3.92	0.92	1	6	3.52	1.14

Note: ®indicates reverse-scored items.

reported in the solution-focused literature (e.g. de Shazer, 1988; Furman & Ahola, 1992). The PD items were designed to capture the key features of problem-saturated thinking which impedes goal pursuit (e.g. van Randenborgh, Huffmeier, LeMoult, & Joormann, 2010), and by reverse scoring these items, it is possible to create an analogue measure of PD. There were 14 items in the initial item pool which were scored using a six-point scale (1 = strongly disagree; 6 = strongly agree).

Participants and procedure

Data were gathered in two stages. Stage one involved the initial collection of data using a professional sample ($N = 242$; 157 females; 85 males) of members of the legal and health professions who were taking part in an intervention study on leadership coaching (mean age = 41.92 years; standard deviation (SD) = 8.92) (Cavanagh, Spence, & Atkins, 2012). To determine the factorial structure of the scale, the data from this sample were subjected to EFA using the maximum likelihood (ML) method with Promax rotation. The analysis was conducted using SPSS v17.

In stage two, a second data set was collected from a sample of undergraduate psychology students (Lakota, 2010). These students ($N = 322$; 226 females; 96 males) participated in the study for course credit (mean age = 19.8 years; SD = 4.34 years). These data were used to confirm the factorial structure found in stage one. The confirmatory factor analysis (CFA) using the ML method was conducted using AMOS v7.0 (Arbuckle, 2006).

In both samples the questionnaire was completed in small group settings, alongside other measures related to different studies. Only data relevant to this scale are reported here.

Results for stage one: EFA

Descriptive statistics and correlations for the 14-item version of the SFI

Descriptive statistics for all the 14 items of the SFI for the professional and university student samples are presented in Table 1. Whilst the student sample has slightly lower means on the items measuring PD, these differences are not statistically significant.

Table 2. Pearson product moment correlations between the initial 14 scale items in the professional (low triangle, $N = 242$) and the university student (upper triangle, $N = 322$) samples.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	0.64**	0.15**	0.46**	0.36**	0.10	0.26**	0.06	0.19**	0.20**	0.26**	0.21**	0.20**	0.20**
2	0.64**	1	0.17**	0.52**	0.38**	0.15**	0.32**	0.05	0.21**	0.20**	0.26**	0.12*	0.24**	0.31**
3	0.18**	0.20**	1	0.25**	0.22**	0.65**	0.26**	0.19**	0.26**	0.37**	0.30**	0.30**	0.32**	0.29**
4	0.50**	0.55**	0.38**	1	0.46**	0.22**	0.40**	0.16**	0.33**	0.33**	0.36**	0.27**	0.27**	0.30**
5	0.31**	0.41**	0.18**	0.45**	1	0.17**	0.33**	0.17**	0.26**	0.22**	0.19**	0.17**	0.19**	0.20**
6	0.10	0.29**	0.50**	0.33**	0.19**	1	0.26**	0.19**	0.29**	0.34**	0.28**	0.30**	0.33**	0.31**
7	0.35**	0.42**	0.17**	0.44**	0.41**	0.29**	1	0.23**	0.33**	0.28**	0.42**	0.35**	0.40**	0.40**
8	0.13	0.11	0.21**	0.26**	0.16*	0.27**	0.23**	1	0.30**	0.32**	0.19**	0.04	0.03	0.04
9	0.28**	0.22**	0.23**	0.30**	0.32**	0.24**	0.31**	0.30**	1	0.34**	0.42**	0.27**	0.29**	0.22**
10	0.29**	0.29**	0.39**	0.37**	0.30**	0.37**	0.26**	0.29**	0.57**	1	0.36**	0.27**	0.25**	0.24**
11	0.25**	0.24**	0.22**	0.26**	0.23**	0.24**	0.28**	0.20**	0.26**	0.36**	1	0.63**	0.49**	0.51**
12	0.20**	0.19**	0.16*	0.28**	0.22**	0.17**	0.26**	0.20**	0.19**	0.29**	0.72**	1	0.57**	0.50**
13	0.19**	0.21**	0.30**	0.36**	0.25**	0.27**	0.47**	0.20**	0.18**	0.22**	0.48**	0.49**	1	0.52**
14	0.16*	0.25**	0.24**	0.27**	0.19**	0.24**	0.40**	0.22**	0.20**	0.19**	0.32**	0.30**	0.50**	1

Note: *$p < 0.05$; **$p < 0.01$.

Table 2 presents correlations between all the 14 items of the original SFI scale for each sample. Correlations coefficients for the professional and student samples are summarized in lower and upper triangles, respectively.

Inspection of correlations between the 14 items of the original SFI scale suggests several robust patterns. First, the items correlate positively with each other across both samples. Second, there are several clusters present within the correlations, with some items correlating consistently higher with some group of items, but not with the others. Overall, the correlations range from 0.03 ($p > 0.05$) to 0.65 ($p < 0.01$) in the professional sample and from 0.09 ($p > 0.05$) to 0.72 ($p < 0.01$) in the student sample. Third, correlations for both samples are similar, but coefficients are slightly more homogeneous for the student sample than for the professional sample. Overall, however, these patterns are consistent with our expectations, and suggest this instrument is capturing a multidimensional construct, with a possible broad second-order factor.

EFA: Determining the structure of the SFI

An EFA analysis was performed on the professional sample. Although there were four eigenvalues higher than one, the inspection of a scree plot clearly indicated the presence of three distinct factors only. Moreover, when four factors were extracted, one factor was defined by two strong loadings only. Thus, the three-factor solution model was adopted as the most parsimonious.

Two items ('I know how to use my personal strengths' and 'When things do go wrong I try to learn from the experience') from the initial 14 items had very low factor loadings and communality estimates. As the problems with these two items were consistent across both three- and four-factor solutions, we decided to exclude them from further analysis. The EFA was then repeated on the 12 retained items and the relevant pattern matrix is presented in Table 3. Three resulting factors accounted for 30%, 9.8% and 7.4% of the variance, respectively, and this solution explained 47.2% of the total variance.

We tested the data set for univariate and multivariate normalities. According to conventional criteria (DeCarlo, 1997), all of the items were within the accepted normal distribution parameters. We also examined the suitability of the data for factor analysis by using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy (Kaiser, 1970), as well as Bartlett's test of sphericity (Bartlett, 1950). The KMO measure of sampling adequacy was 0.83, above the commonly recommended value of 0.60, and Bartlett's test of sphericity was significant ($\chi^2(91) = 1167.06$, $p < 0.01$). Interpretation of this model is as follows.

Factor 1: PD

This factor is defined by items that reflect a tendency towards becoming enmeshed in, and over-emphasizing, negative thinking about problems. These items were reversed-coded creating an analogue measure of PD and preserving the unidirectional nature of the overall scale.

Factor 2: GO

Salient loadings on this factor are from the items that reflect the tendency to envisage one's goals, to set up action plans to achieve them and to monitor progress – aspects central to the solution-focused approach. It should be noted that item 12 ('I always achieve my goals') is the only item that assesses the actual goal-related outcome, and it loaded least strongly than the other GO factor items.

Table 3. Pattern matrix for the EFA (ML with Promax rotation) and item–total correlations (for each subscale) of the SFI ($N = 242$).

Items	PD	GO	RA	h^2	Item–total correlation
1. I tend to spend more time analysing my problems than working on possible solutions®	0.830	0.004	−0.151	0.587	0.47
2. I tend to get stuck in thinking about problems®	0.884	−0.062	−0.066	0.688	0.53
3. There is always a solution to every problem	−0.039	−0.071	0.749	0.490	0.45
4. I tend to focus on the negative®	0.556	0.007	0.281	0.551	0.64
5. I'm not very good at noticing when things are going well®	0.421	0.069	0.112	0.274	0.45
6. There are always enough resources to solve a problem if you know where to look	−0.085	−0.054	0.764	0.493	0.43
7. Most people are more resilient than they realize	−0.011	0.105	0.347	0.161	0.33
8. Setbacks are a real opportunity to turn failure into success	0.152	0.137	0.404	0.338	0.52
9. I imagine my goals and then work towards them	0.005	0.824	−0.009	0.675	0.54
10. I keep track of my progress towards my goals	−0.037	0.942	−0.114	0.775	0.48
11. I'm very good at developing effective action plans	0.009	0.485	0.231	0.401	0.53
12. I always achieve my goals	0.068	0.268	0.237	0.225	0.43
Factor correlations					
		1	0.421	0.507	
			1	0.476	

Notes: ®indicates reverse-scored items. The authors permit free use of this scale for research, training and educational purposes.

Table 4. Descriptive statistics (minimum and maximum scores, mean and SD) and Cronbach's α reliability estimates for the three subscales and the global SFI scale in the professional ($N = 242$) and the university student ($N = 322$) samples.

	No. of items	*M* (SD)	Minimum	Maximum	Skewness	Kurtosis	Cronbach's α
Professional sample							
Total SFI scale	12	51.01 (7.64)	32	67	−0.140	−0.490	0.83
PD	4	16.52 (3.87)	6	24	−0.070	−0.367	0.78
GO	4	15.95 (3.14)	8	24	−0.384	0.336	0.78
RA	4	18.55 (2.80)	9	24	−0.141	−0.486	0.68
University student sample							
Total SFI scale	12	46.14 (8.03)	21	69	−0.004	−0.157	0.83
PD	4	13.77 (3.75)	4	24	0.195	−0.217	0.78
GO	4	15.16 (3.68)	6	24	−0.35	−0.028	0.82
RA	4	17.21 (3.08)	4	24	−0.198	−0.181	0.68

Factor 3: RA

This factor is defined by items that reflect positive thinking about solutions and the perceived availability of solutions.

Table 3 also displays correlations between the three factors. Not surprisingly, the factors are positively correlated (*r*'s range between 0.42 and 0.53), which suggests the presence of common, higher order factor.

Descriptive statistics for the total 12-item SFI scale

Descriptive statistics and Cronbach's α reliability estimates for the final 12-item SFI and the three subscales are presented in Table 4.

Cronbach's α estimates for the overall 12-item scale were good across both samples ($\alpha = 0.83$), and within an acceptable range for each facet. That is, α's of 0.78 and 0.68 were observed for PD and RA, respectively (for both samples), whilst the GO α's were 0.78 and 0.82 for the professional and student samples, respectively. A range of item–total correlations (from three reliability analyses for each subscale) was found to be relatively homogeneous (ranging between 0.33 and 0.64).

There was a good overall distribution for the total score (i.e. 32–64 for the professional sample; 21–69 for the student sample) and each of the subscales (range = 6–24), with a slight tendency towards negative skewness and kurtosis. Overall, however, the data were

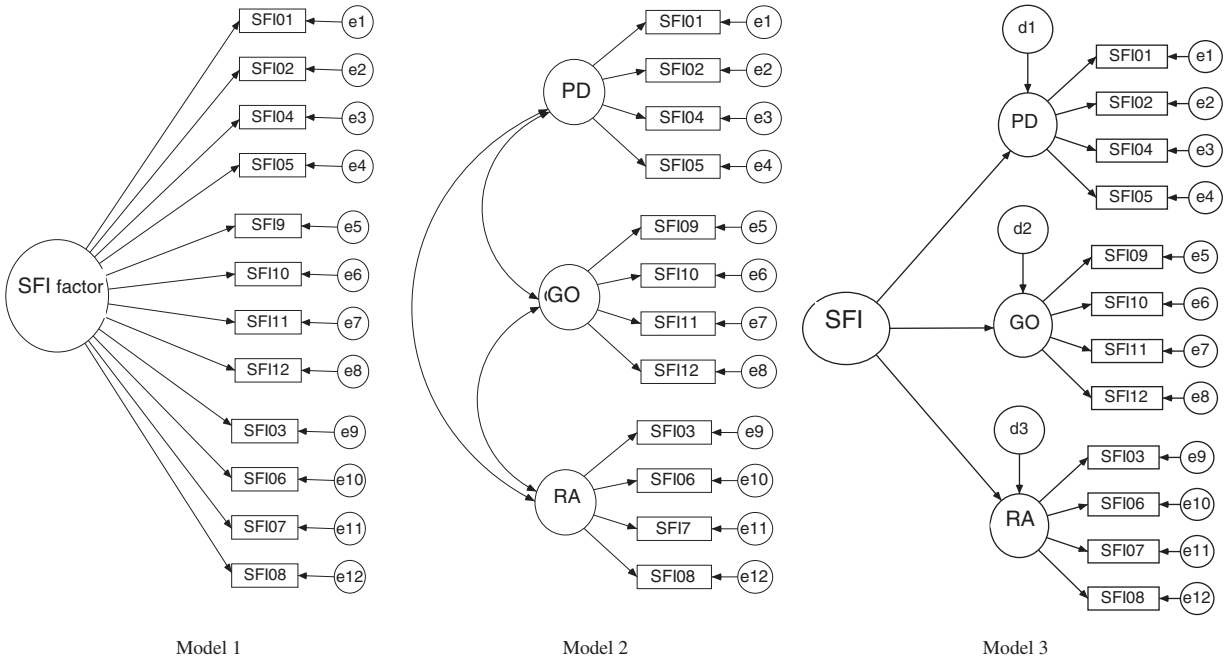

Figure 1. Graphical representation of Models 1–3.
Notes: In these diagrams, large circles represent latent factors, small circles represent error terms, single-headed straight arrows index hypothesized factor loading and double-headed curved arrow index covariances/correlations between the factors. SFI = Solution-focused Inventory; PD = problem disengagement; GO = goal orientation; RA = resource activation.

distributed normally and no significant differences were observed on the basis of gender. When both data sets were combined, a small but a statistically significant positive correlation was observed between age and scores on the SFI ($r = 0.18$; $p < 0.05$). The correlation between age and scores on the SFI for the university student sample was ($r = 0.21$; $p < 0.05$), but there was no significant correlation between age and scores on the SFI for the professional sample ($r = 0.03$; ns).

In summary, the initial factor analysis using a professional sample suggests that the SFI has good psychometric properties and the emergent three factors represent the underlying theoretical framework derived from key themes from the literature on purposeful positive change and BSFT (Miller, Hubble, & Duncan, 1996). The next step was to examine its factorial stability.

Stage two: CFA using the university student sample

CFA was performed to determine whether the factorial structure revealed in the EFA on the professional sample would emerge using the student sample. To examine the latent dimensionality of the SFI, three models were compared. The models reflect three alternative views of the solution-focused tendencies (Figure 1). First, we postulated a one-factor broad model (this was Model 1), reflecting a possibility that the SFI captures a unidimensional construct. Second, we postulated a three-correlated-factor model with GO, RA and PD correlated factors (this was Model 2). This model is based on the results received earlier using EFA on the professional sample and it implies that the SFI captures a multidimensional construct with three first-order factors which capture relationships between solution-focused behaviours. The results of the EFA performed on the professional sample (a pattern of robust correlations between three factors) suggested, however, a possibility of a hierarchical model with three first-order factors subordinate to a single higher order factor. Thus, a two-level hierarchical model with one second-order factor indexing broad solution-focused thinking strategies and the three first-order factors as in Model 2 were postulated (this was Model 3).

Relevant fit indices are summarized in Table 5. Chi-square (χ^2) is one of the most commonly used indexes of fit. Here small values relative to the degrees of freedom are indicative of statistically non-significant differences between the actual and the implied matrixes, indicating that there is no discrepancy between the hypothesized model and the data. As this statistic is sensitive to sample size, in line with the current best practice we used the root-mean-square error of approximation (RMSEA) and its 90% confidence interval (CI) to gauge approximate goodness of

Table 5. Fit statistics for the different models proposed to underlie the university student sample ($N = 322$).

	Fit statistics						
Model	χ^2	df	χ^2/Δdf	GFI	TLI	CFI	RMSEA (90% CI)
1	511.58	54	9.474	0.765	0.551	0.633	0.162 (0.150–0.175)
2	147.31	51	2.888	0.925	0.900	0.923	0.077 (0.062–0.091)
Diff χ^2	364.27	3	121.42				
3	147.31	51	2.888	0.925	0.900	0.923	0.077 (0.062–0.091)

Note: GFI =goodness-of-fit index; CFI=comparative fit index; TLI= Tucker–Lewis index; RMSEA= root mean square error of approximation.

model fit in the population. Values lower than or closeto 0.06 are taken to indicate good fit (Hu & Bentler, 1999) and a narrow CI indicates good precision (MacCallum, Browne, & Sugawara, 1996). We have also reported the relative likelihood ratio of χ^2 to degrees of freedom (χ^2/df) statistic. It should be noted that values of less than three are taken to indicate good fit (Kline, 1998) when the sample size is large. In addition, we used goodness-of-fit index (GFI) to reflect a relative amount of covariance accounted for by the model. Here, values greater than 0.90 suggest a reasonable-to-good fit (Kline, 1998). Finally, we use the Tucker–Lewis index (TLI), an incremental fit index, because it has been shown to be relatively independent of sample size (Fan, Thompson, & Wang, 1999; Marsh, Balla, & McDonald, 1988). Values greater than 0.90 are required, however, and Hu and Bentler (1999) suggest a cut-off value of close to 0.95.

Models 1 and 2 are nested, thus χ^2 will be used to statistically compare the fit of the solutions. A difference in the chi-squared test ($\Delta\chi^2$) was used to evaluate alternative nested models. A statistically significant value suggests that a less parsimonious model is a significantly better fit than the initial model. Models 2 and 3, however, would produce identical-fit statistics as these are mathematically identical solutions, and the preference of one model over the other will be based on a conceptual basis.

Model 1, the one-factor model, had the poorest fit to data: $\chi^2_{54} = 511.579$; $\chi^2/\text{df} = 9.474$, the RMSEA equals 0.162 (its 90% CI is 0.15–0.18). The TLI is 0.551 and the GFI 0.765 (see Table 5). Model 2, the three-interrelated-factors model, had a substantially better fit (diff $\chi^2_3 = 364.27$, $p < 0.001$), and, overall this model fits data reasonably well: $\chi^2_{51} = 147.31$; $\chi^2/\text{df} = 2.89$, the RMSEA equals 0.077 (its 90% CI is 0.062–0.091). The TLI is 0.90 and the GFI 0.925. Replicating the results of the previous study, three factors share consistent positive correlations: 0.33 (PD and RA), 0.44 (PD and GO) and 0.53 (GO and RA). Based on a pattern of these correlations and theory articulated earlier, the two-level hierarchical model (Model 3) with one second-order factor indexing broad tendencies towards solution-focused thinking underlying the three first-order factors (PD, GO and RA) was postulated. Despite having the same fit indices as for Model 2, Model 3 was accepted as the model which best reflected current data and theory for solution-focused tendencies.[1]

The results are summarized in Table 6 and graphically represented in Figure 1.

Factor 1: PD

As with the previous EFA analysis, this factor captures four negative thinking items which were reversed-coded. Similar to the results obtained in the professional sample analysis, these four items have solid loading on this factor (ranging from 0.533 to 0.798).

Factor 2: GO

As with the previous EFA analysis, only items that reflect positive tendencies towards achieving one's own goals load on this factor. All four items have solid loading on this factor (ranging from 0.685 to 0.766). In the previous analysis using the professional sample, item 12 ('I always achieve my goals') had a somewhat lower loading on this factor (0.268). Within the student sample, this item has a loading of 0.685, suggesting that the low loading observed in the professional sample may have been due to the characteristics of the initial sample, rather than this item's low content validity. Further research is needed to confirm this proposition.

Factor 3: RA

As with the professional sample, this factor is defined by the four items that reflect an orientation towards seeking and utilizing resources. However, as with the results of the EFA analysis conducted using the professional sample, item seven ('Most people are more resilient than they realize') had a lower loading on this factor (0.274) and a much lower communality estimate than the other items (0.075). This suggests

Table 6. Results of the CFA (ML) for the final 12 items of the SFI ($N = 322$).

First stratum	PD	GO	RA	h^2
1. I tend to spend more time analysing my problems than working on possible solutions®	0.743	–	–	0.552
2. I tend to get stuck in thinking about problems®	0.798	–	–	0.636
3. There is always a solution to every problem	–	–	0.807	0.652
4. I tend to focus on the negative®	0.682	–	–	0.465
5. I'm not very good at noticing when things are going well®	0.533	–	–	0.284
6. There are always enough resources to solve a problem if you know where to look	–	–	0.776	0.602
7. Most people are more resilient than they realise	–	–	0.274	0.075
8. Setbacks are a real opportunity to turn failure into success	–	–	0.496	0.246
9. I imagine my goals and then work towards them	–	0.766	–	0.587
10. I keep track of my progress towards my goals	–	0.777	–	0.603
11. I'm very good at developing effective action plans	–	0.711	–	0.505
12. I always achieve my goals	–	0.685	–	0.469
Second stratum				
Solution-focused thinking	0.524	0.837	0.636	

Notes: PD = problem disengagement; GO = goal orientation; RA = resource activation.
®indicates reverse-scored items. The authors permit free use of this scale for research, training and educational purposes.

that this item reflects a somewhat different construct than the one captured by this factor's other three items. When this item was omitted from the model, the GFIs improved, but only very slightly: $\chi^2_{41} = 112.551$; $\chi^2/\mathrm{df} = 2.745$, the RMSEA equals 0.074 (its 90% CI is 0.058–0.090). The TLI is 0.920 and the GFI 0.938. Given that the content of this item holds some theoretical importance and the fact that its omission does not improve the model substantially, the decision was made to retain it. One reason for this relatively low loading may be that it is the only item that seeks an opinion about 'most people' – a global statement – rather than asking respondents to express an opinion about one's self.

Descriptive statistics for the total 12-item SFI scale and its three subscales

Descriptive statistics and Cronbach's α reliability estimates for the total 12-item SFI and the three subscales are presented in Table 4. Cronbach's α estimates are across both samples ($\alpha = 0.83$ for the overall 12-item scale), and are within an acceptable range for all three factors. The α's for GO are slightly higher for the student sample compared with the professional sample (0.82 vs. 0.78) and are a result of the improved factor loading pattern for this subscale. As with the professional sample, there was a good overall distribution for the total score (ranging from 21 to 69) and each of the subscales (ranging between 4 and 24) with a slight tendency towards negative skewness and kurtosis. Overall, however, the data were distributed normally.

Study one: Discussion

Taken together our results suggest that the overall SFI scale and its three subscales (PD, GO and RA) possess adequate-to-good psychometric properties. In the original professional sample, the three factors that emerged were consistent with previous literature and make good theoretical sense. For example, goal progression – moving towards a solution – requires purposeful movement away from the undesirable outcome or problem and the identification of, and progression towards, a preferred outcome or solution (for discussion on the implications of avoidance and approach goals in purposeful positive change, see Elliot, Sheldon, & Church, 1997; Locke, 1996). Such purposeful change requires that the individual sets goals, develops effective action plans and then monitors and evaluates progress towards those goals, adapting and changing action in line with feedback. The monitor–evaluate–modify steps of this process constitute a 'cycle' of self-regulated behaviours theorized as important for successful behaviour change (Carver & Scheier, 1998). The results of both factor analyses and correlations between the factors (see Table 3) support such propositions and suggest that the processes of problem identification, resource identification and goal pursuit are discrete, but related at the higher level processes.

The PD subscale consisted of the items such as 'I tend to spend more time analysing my problems than working on possible solutions' and 'I tend to get stuck in thinking about problems' (reverse scored). Such items capture the essence of 'problem saturation' often

referred to in the solution-focused literature (O'Connell, 1998), and aspects of rumination and negative attentional bias often emphasized in the cognitive-behavioural literature (Lyubomirsky, Tucker, Caldwell, & Berg, 1999; Mathews, Ridgeway, & Williamson, 1996). In contrast, RA items such as 'There is always a solution to every problem' and 'There are always enough resources to solve a problem if you know where to look' reflect optimism, resource identification, resilience and positive reframing that typify the solution-focused approach (O'Hanlon, 1998). Finally, the GO subscale items (e.g. 'I imagine my goals and then work towards them' and 'I keep track of my progress towards my goals') appear to reflect the core components of the goal-striving process – being able to develop a clear image of a goal, developing action plans, tracking progress and self-efficacy – that are necessary for creating purposeful positive change (Schmuck & Sheldon, 2001).

In summary, the initial factor analyses suggests that the SFI has good psychometric properties and the emergent three factors indeed represent the theoretical framework deemed to underpin solution-focused approaches to creating purposeful positive change (Miller et al., 1996), and that the use of a single aggregated score is in line with the model structure indicated by Model 3. The next step was to explore convergent validity.

Study two: Convergent validity

Method

In order to explore convergent validity, responses to the SFI were correlated with responses to established, related measures. In line with the model structure suggested by Model 3, a total SFI score was calculated by summing the scores of the three SFI subscales.

Satisfaction with life (SWL) was measured using the SWL scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985); PWB was assessed using the PWB scale (PWBS; Ryff & Keyes, 1995); resilience was assessed using the Cognitive Hardiness scale (CHS; Nowack, 1990); perspective taking (PT) using the Perspective-taking scale (PTS; Davis, 1980) and the Depression, Anxiety and Stress scale (DASS; Lovibond & Lovibond, 1995) was used as a measure of psychopathology.

We chose these measures because a solution-focused mindset is characterized by a focus on positive possibilities and a belief that goals, talents and abilities can be developed through persistence. Because the attainment of such outcomes is associated with well-being (Sheldon & Elliot, 1999; Sheldon, Ryan, Deci, & Kasser, 2004), we expected that people holding a solution-focused mindset would experience greater life satisfaction and PWB.

In addition, as people work to attain their goals, they frequently have to overcome setbacks and develop new pathways to their preferred outcome. Such processes tend to develop resilience (Maddi, 2005), and empirical research in coaching seems to support such propositions (Grant, Curtayne, & Burton, 2009). The development of a number of different solutions also requires that the individual have the ability to distance themselves from problems and view their circumstances from a different perspective. As such, a solution-focused mindset should also be associated with PT capacity – the ability to generate and hold different perspectives of self, others and the world. Finally, we reasoned that people with low solution-focused mindsets would be more prone to depression, anxiety and stress. In short, we hypothesized that the SFI would be positively correlated with SWL, PWB and PT, and would be negatively correlated with the DASS.

Participants and procedure

Data were drawn from the professional sample reported in Study one. These participants ($N = 242$) were volunteers from the legal and health professions who were taking part in an intervention study on leadership in high-stress workplaces (Mean age = 41.92 years (SD = 8.92); 157 females; 85 males). Questionnaires were completed in small group settings.

Measures

SWL was assessed with SWLS (Diener et al., 1985), which is a five-item scale that includes items such as: 'The conditions of my life are excellent' and 'So far I have gotten the important things I want in life'. The SWLS is one of the most widely used measures of well-being, with good psychometric properties and a reported α of 0.80 (Diener et al., 1985). Cronbach's α for this study was 0.86.

PWB was assessed with a 36-item version of the PWBS (Ryff & Keyes, 1995). The PWBS measures well-being on six subscales: autonomy, environmental mastery, purpose in life, personal growth, self-acceptance and positive relations with others. Internal consistency (α) coefficients for the original six three-item scales range are reported to range from 0.82 to 0.90 (Schmutte & Ryff, 1997) and; when the three-item scales are summed to form a global PWB scale, internal consistencies have been found to exceed 0.8 (Keyes & Ryff, 1998). Cronbach's α for this study was 0.85.

Resilience was assessed using a 15-item of the CHS (Nowack, 1990). This scale based on Kobasa's (1979) work measures the individual's sense of personal control, their propensity to rise to meet challenges and their commitment to action. Nowack (1990)

Table 7. Correlations between SFI and other convergent variables ($N = 242$).

	SFI	SWL	PWB	RES	DASS
SWL	0.38**	–	–	–	–
PWB	0.66**	0.55**	–	–	–
RES	0.65**	0.46**	0.69**	–	–
DASS	−0.44**	−0.38**	−0.47**	−0.61**	–
PT	0.33**	0.04	0.43**	0.16*	−0.07

Notes: SFI = Solution-focused Inventory; SWL = Satisfaction with life; PWB = psychological well-being; RES = resilience; DASS – depression, anxiety and stress; PT = perspective-taking.
** and * indicate correlation significant at the 0.01 (two-tailed) and 0.05 (two-tailed) levels.

reports an internal consistency of 0.83. Cronbach's α for this study was 0.78.

Psychopathology was assessed using a composite score from the DASS (Lovibond & Lovibond, 1995). The DASS-21 comprises three subscales measuring depression, anxiety and stress and is designed to be used with both clinical and non-clinical populations. Internal consistency and test–retest reliability have been found to be acceptable ($r = 0.71$–0.81; Brown, Chorpita, Korotitsch, & Barlow, 1997). Cronbach's α for this study was 0.89.

PT was assessed using the PTS which is a seven-item subscale of The Empathy Questionnaire (Davis, 1980). Example items from this scale include: 'I believe that there are two sides to every question and try look at them both' and 'I sometimes find it difficult to see things from the 'other guy's' point of view' (reverse scored). Davis (1980) reports α coefficients between 0.75 and 0.78, and a test–retest reliability of 0.62. Cronbach's α for this study was 0.77.

Study two: Results and discussion

The results of the correlational analysis are presented in Table 7. As hypothesized, the SFI was negatively correlated with psychopathology as measured by the DASS ($r = -0.44$; $p < 0.001$) and was positively correlated with measures of well-being as measured by SWLS ($r = 0.38$; $p < 0.001$) and PWBS ($r = 0.66$; $p < 0.001$) and also positively correlated with resilience as measured by CHS ($r = 0.65$; $p < 0.001$). The SFI also positively correlated with PT as measured by the PTS ($r = 0.33$; $p < 0.001$). In short, the convergent validity of the SFI appears to be good.

Whilst the correlations between the SFI and SWLS, PWBS, PTS and the DASS were as expected, the relative magnitude of these correlations is of some interest. The SFI was highly positively correlated with both PWB ($r = 0.66$; $p < 0.001$) and resilience ($r = 0.65$; $p < 0.001$), and both of those correlations were greater than the correlation between the SFI and the PTS ($r = 0.33$; $p < 0.001$). Indeed, using a Fisher r-to-z transformation to assess the significance of the difference between these correlation coefficients (Hinkle, Wiersma, & Jurs, 1994), it was found that that the difference between the correlation between the SFI and PWB ($r = 0.66$) was significantly greater than the correlation between the SFI and the PTS ($r = 0.33$) ($z = 4.96$; $p < 0.001$). In addition, the difference between the correlation for SFI and resilience ($r = 0.65$) was greater than the difference between the SFI and the PTS ($z = 4.77$; $p < 0.001$).

From these data, it would seem that solution-focused thinking is indeed significantly related to PT, but that the constructs of PWB and resilience are more closely aligned with solution-focused thinking than PT.

One explanation for this finding may be PT is important at certain points during the goal-striving process (e.g. during solution generation and action planning), but may not be as important as PWB and resilience over a longer period of time when one is actively striving for goal attainment. For example, resilience – the ability to recover from setbacks and preserve in the face of adversity – is more strongly related to solution-focused thinking than PT. This may reflect the greater importance that resilience has for dealing with and overcoming the various hassles and on-going problems of daily life. Similarly, key facets of PWB (e.g. autonomy, purpose in life, personal growth, environmental mastery; Ryff & Keyes, 1995) also appear to be more important than PT and may be critical for the successful enactment of positive purposeful change.

Whilst these interpretations are somewhat speculative, this discussion illustrates that the SFI scale reported here may prove to be a useful tool for our further understanding of the nature and processes underlying solution-focused thinking. One avenue for future research could be to explore the convergent validity of the SFI with a range of other related measures such as hope (Snyder et al., 1996), optimism (Scheier, Carver, & Bridges, 1994) and cognitive flexibility (Martin & Rubin, 1995).

Study three: Test–retest reliability and responsiveness to coaching

Method

In order to explore the test–retest reliability of the SFI and its sensitivity to change we utilized a subset of data ($N = 129$) extracted from the same large leadership development and coaching study used in Study one (Cavanagh et al., 2012). This intervention study used a between-subjects design with participants from three

Table 8. Descriptive statistics for the SFI for coaching and control groups ($N = 129$).

	Time 1		Time 2	
	M	SD	*M*	SD
Group 1 (coaching)	50.98	7.12	54.05	6.84
Group 2 (control)	52.17	8.58	52.86	6.90

cohorts randomly assigned to either an intervention group (Group 1; $n = 72$) or a waitlist control group (Group 2; $n = 57$). The data used in this study was taken from the first cohort of participants.

The intervention consisted of a four-day leadership development training workshop, followed by eight sessions of leadership coaching over a time period of 16 weeks. The leadership development intervention used a constructive developmental approach based on a four-factor model of leadership (Cavanagh, 2008), which sought to develop leaders working within complex, stressful environments (i.e. public health and legal professions). Facets of leadership emphasized in this model included the need for leaders to take complex integrative perspectives, to be mindful, to act purposefully towards valued goals and to create positive organizational contexts (Cavanagh, 2008). Both the model and the training were informed by positive psychology and solution-focused coaching approaches, and the training consisted of a variety of didactic and interactive learning activities (e.g. video-taped dialogue sessions). The SFI measure was completed at Time 1 and Time 2 (i.e. 20 weeks later), along with a number of other measures that are not reported here.

As the intervention was targeting constructs associated with solution-focused thinking, we hypothesized that participation in the leadership training and coaching intervention would be associated with increased scores on the SFI and that the scores for the control group would not change.

Study three: Results and discussion

A repeated-measures ANOVA for the SFI showed a significant time (Time 1, Time 2) by group (Group 1, Group 2) interaction effect, $F(1, 127)$; 6.17, $p < 0.05$, indicating that Group 1 (coaching) indeed had higher scores on the SFI at the completion of the coaching intervention at Time 2 compared to Group 2. Planned contrasts indicated that scores for Group 2 did not differ significantly from Time 1 to Time 2, $t(56) = -1.11$; ns. In addition, a significant correlation was found between SFI scores at Time 1 and Time 2 for Group 2 ($r = 0.84$; $p < 0.001$), indicating good test–retest reliability, see Table 8 for means and SDs for coaching (Group 1) and control groups (Group 2).

In sum, participation in the leadership coaching intervention was associated with significantly increased scores on the SFI, whilst the scores on the SFI for the control group did not change. Whilst these findings indicate the SFI has good test–retest reliability and is responsive to interventions designed to increase solution-focused thinking, this will need to be confirmed by future research.

Final discussion

Our aim in these studies was to develop a brief, reliable measure of solution-focused thinking that would allow practitioners and researchers to assess the extent to which an individual's thinking was oriented towards solution construction. Such an instrument would represent a useful contribution to the field, both in terms of assessing outcomes of solution-focused interventions and in providing a means of better understanding the psychological processes central to purposeful positive change across a variety of behaviour change settings. These studies provide initial support for the reliability and validity of the SFI as a measure of solution-focused thinking.

Two factorial analyses resulted in a final 12-item scale comprising three subscales that we labelled PD, GO and RA. These subscales demonstrated reasonable-to-good internal reliability, and the scale as a whole demonstrated good internal reliability. In addition, convergent validity and test–retest reliability were also acceptable. Notably, the SFI appears to be sensitive to changes following a leadership development intervention.

Future research

The fact that the SFI comprises three subscales may prove to be useful to researchers and practitioners seeking to understand the differential impacts of problem-focused or solution-focused thinking in the change process. For example, the SFI could be used to track changes in thinking styles as individuals engage in the goal-striving process through participation in a coaching or therapeutic programme. The general expectation within the solution-focused literature is that individuals engaged in solution-focused goal-striving activities would naturally increase their levels of solution-focused thinking (O'Connell, 1998), an expectation that was supported by the findings reported in Study three. Future research should extend this line of enquiry and explore the links between solution-focused thinking and degree to which participants in such coaching programmes attain their goals. The solution-focused literature (e.g. O'Hanlon, 1998), and to some extent the positive psychology literature (e.g. Fredrickson, 2005), generally assumes

that solution-focused thinking is a good thing and is almost invariably associated with positive outcomes in terms of well-being and goal attainment. We suspect that this may be an over-simplistic view, and that problem-focused thinking may have an important role to play in purposeful positive change. However to date little research has explored these issues.

In the only study we are aware of to explore the differential impact of problem-focused versus solution-focused coaching questions, Grant and O'Connor (2010) found that the issues may be more complex than often assumed. The Grant and O'Connor (2010) study found that both the problem-focused and the solution-focused conditions were effective at the enhancing goal approach. However, the solution-focused group experienced significantly greater increases in goal approach compared with the problem-focused group. Problem-focused questions were found to reduce negative affect and increase self-efficacy but did not enhance positive affect. In contrast, the solution-focused approach increased positive affect and self-efficacy, decreased negative affect, whilst also increasing participants' insight and understanding of the nature of the problem. We believe that this area is ripe for future research.

Limitations

When interpreting the findings reported in this article, it should be remembered that the data were collected from a cohort of public health and legal professionals, who were participating in a leadership development study, and psychology undergraduates, who were taking part in this research as part of their course requirements. As such, these findings may be somewhat idiosyncratic and not representative of other populations of interest (e.g. clinical populations or the broader community). Furthermore, we used the data collected from the same populations for the various factor analyses, convergent validity tests and reliability tests presented in this article. Future research that focuses on other populations is recommended for the further validation of the SFI, both to establish its relevance for a broader cross-section of the population and to permit further scale validation using independent samples.

Summary

The data reported in this article provide preliminary evidence that the SFI is a reliable measure of solution-focused thinking. This has the potential to help practitioners and researchers assess the extent to which an individual's thinking is oriented towards solution construction, and may also be a useful outcome measure for coaching and positive psychology interventions. Future research using the SFI has the potential to contribute to our understanding of both solution-focused approaches and the broader positive psychological enterprise. We hope that the SFI will prove to be a useful tool in the development of such knowledge and look forward to future developments in this area.

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Note

1. To improve fit indices, two *post hoc* modifications were considered. Two items were allowed to cross-load on different factors; item four was allowed to also load on PD (loading = 0.195, $p < 0.01$), while item 10 was allowed to also load on RA (loading = 0.163, $p < 0.05$). However, these *post hoc* loadings were low ($\chi^2_{49} = 126.98$; GFI = 0.935, TLI = 0.916, RMSEA = 0.07 (0.005–0.086)), and this model resulted in only marginal improvement. Thus, Model 3 was accepted as the final model.

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