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Beliefs around luck: Confirming the empirical conceptualization of beliefs around luck and the development of the Darke and Freedman beliefs around luck scale

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ABSTRACT

The current study developed a multi-dimensional measure of beliefs around luck. Two studies introduced the Darke and Freedman beliefs around luck scale where the scale showed a consistent 4 component model (beliefs in luck, rejection of luck, being lucky, and being unlucky) across two samples ($n = 250$; $n = 145$). The scales also show adequate reliability statistics and validity by ways of comparison with other measures of beliefs around luck, peer and family ratings and expected associations with measures of personality, individual difference and well-being variables.

1. Introduction

A number of explanations of belief in luck have been advanced within the research literature and linked to a range of individual difference variables.

The traditional explanation views luck to be akin to chance, in that it is external to the individual and an unpredictable influence upon events. Thus, belief in luck is a perception that individual events are externally triggered, uncontrollable, irrational and have little influence on future expectations (e.g. Rotter, 1966). The majority of the literature supporting this perspective has been undertaken within the context of attribution theory, and research has shown that individuals making external attributions (i.e. seeing events as being due to luck) are less mentally healthy (Rotter, 1966; Weiner et al., 1971).

A more recent explanation posits that some individuals believe luck to be a personal attribute, which is internal, stable, predictable and controllable (Darke & Freedman, 1997a). Within this explanation luck is distinguished from chance (Wagenaar & Keren, 1988). A distinction is made between those who consider themselves to be lucky or unlucky, with perceptions of being lucky being associated with better mental health, while perceptions of being unlucky are associated with poorer mental health (Darke & Freedman, 1997a, 1997b).

Some research within this area frames belief in good luck as adaptive, in that the positive illusions surrounding luck (even in situations where the individual has little control on future expectations) can lead to feelings of confidence, control and optimism (Darke & Freedman, 1997a). This view is theoretically supported by research findings which found dispositional optimism to be a crucial variable in understanding good luck: for example optimism mediates the relationship between belief in good luck and mental health (Day & Maltby, 2003). Wiseman (2004) found that lucky people tended to find hidden messages in scripts pertaining to a reward whereas unlucky people did not. He interpreted this as suggesting that individuals who considered themselves to be lucky unintentionally created opportunities for themselves, whilst those who believed themselves to be unlucky tended to overlook opportunities for themselves. However, there is evidence to suggest that belief in good luck may extend beyond a positive illusion and represent more realistic expectations and ambitions. Day and Maltby (2005) found belief in good luck to be related to positive goal orientated behaviour (i.e. hope). Furthermore, they found that belief

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in good luck was perceived as an important factor when individuals were planning their goals, alongside their intention to work towards a goal, their own abilities and motivation regarding reaching a goal. These findings suggest that belief in good luck may influence cognitions associated with planning goals.

Despite the emergence of different theoretical and empirical contexts within which to consider beliefs around luck, there is an absence of a measure that captures the possible different dimensions concerning beliefs around luck. Currently, a dominant measure being used is the Belief in good luck scale (Darke & Freedman, 1997b) which comprises 12 items used to indicate belief in personal good luck. However, it does not include items reflecting belief in bad luck. Andre (2006) developed a four component model of belief in luck and fortune suggesting that belief in good luck and belief in bad luck comprise two separate components. However, Andre's 3-item measures do not encapsulate all aspects of attitudes and beliefs around luck contained in the Belief in good luck scale. Furthermore, there is little evidence to support the conclusion that a belief in being personally lucky or unlucky is the same as an acknowledgement of the presence of good and bad luck in the world. More importantly there is no measure for a general belief in luck (whether it be belief in good or bad luck) and no current data that relate general beliefs in luck to belief to being lucky or unlucky.

The aim of the two studies reported here was, first, to develop a multi-dimensional measure of beliefs around luck (Study 1). The second was to establish adequate reliability and validity of the measure (Study 2) through expected associations based upon previous findings with measures of personality, irrational beliefs, positive thinking, attribution style and well-being.

2. Study one

2.1. Method

2.1.1. Participants

Participants were 250 adults (118 males, 132 females) aged from 18 to 62 years, (Mean Age = 30.35 years, SD = 10.1) from workplaces and community groups from the South Yorkshire area of the United Kingdom. The ethnicity of the majority of respondents was White (n = 138).

2.1.2. Questionnaire

Twenty-two items (see Table 1) were constructed by the authors, based upon original items from the Belief in good luck scale, and designed to reflect 6 aspects of beliefs concerning luck; a general belief in luck (e.g. item 22), a rejection of a belief in luck (e.g. item 13), general belief in good luck (e.g. item 19), general belief in bad luck (e.g. item 20) belief in personally being lucky (e.g. item 9) and belief in personally being unlucky (e.g. item 1). As with the Beliefs in good luck scale responses are scored on a scale from *Strongly disagree* (1) through *Strongly agree* (6). We suggest the name of Darke and Freedman Beliefs Around Luck Scale for these 22 items and also suggest that users of the scale also cite Darke and Freedman (1997b).

In addition to completing these items, all of the respondents took part in one of four further studies to which they were allocated randomly until a quota of 60 (or 70 in the case of one study) was achieved. Respondents were not asked to complete all measures due to possible attrition from the study arising from being asked to perform multiple tasks.

The first two studies examined the test-retest reliability of the 22 items over a 2 week period (Sample 1; 29 males, 31 females), and a 4 week period (Sample 2; 28 males, 32 females). A further sample (Sample 3; 25 males, 35 females) received elicited ratings of themselves for each of the items from one peer and one family member.

The final 70 respondents (Sample 4; 36 males, 34 females) completed the existing 12-item belief in good luck scale (Darke & Freedman, 1997a) and the 3-item good luck/bad luck scales (Andre, 2006).

2.2. Results

The first step of the analysis was to determine the factor structure of the data. We submitted the 22 items to principal components analysis (Kaiser–Meyer–Olkin measure of sampling adequacy = .849; Bartlett's Test of sphericity, $x^2 = 2684.14$, $df = 231$, $p < .001$).

The decision on the number of factors to retain was based on parallel analysis of Monte Carlo simulations (Horn, 1965) that allow the comparison of the eigenvalues to those that might be

Table 1
Principal components analysis with oblimin rotation of all the belief in good luck items

	2 factor		4 factor			
	1	2	1	2	3	4
1. I consider myself to be an unlucky person	.15	*.80*	*.83*	−.12	.04	.05
2. I consistently have bad luck	*.30*	*.74*	*.80*	−.16	.06	.12
3. Even the things in life I can control in life don't go my way because I am unlucky	.28	*.64*	*.79*	.05	−.07	.06
4. Luck works against me	.30	*.64*	*.67*	−.20	.07	.27
5. I often feel like it's my unlucky day	.26	*.53*	*.65*	.09	−.11	−.02
6. I mind leaving things to chance because I am an unlucky person	*.33*	*.52*	*.63*	−.23	.05	.24
7. Even the things in life I can't control tend to go my way because I'm lucky	*.39*	−*.72*	−.01	*.79*	.08	.10
8. I consistently have good luck	*.38*	−*.71*	−.05	*.77*	.09	.07
9. I often feel like it's my lucky day	*.42*	−*.68*	.11	*.71*	−.22	−.15
10. Luck works in my favour.	*.44*	−*.67*	−.24	*.71*	.01	.19
11. I consider myself to be a lucky person	*.41*	−*.53*	−.36	*.65*	−.09	.05
12. I don't mind leaving things to chance because I'm a lucky person	*.50*	−*.41*	−.07	*.59*	.08	.20
13. It's a mistake to base any decisions on how unlucky you feel	−*.47*	−.20	−.09	−.01	*.70*	.04
14. Being unlucky is nothing more than random	−*.42*	−.11	.08	.16	*.68*	−.27
15. It's a mistake to base any decisions on how lucky you feel	−*.40*	−.07	−.22	−.32	*.68*	.23
16. Being lucky is nothing more than random	−*.50*	−.04	.24	.19	*.58*	−.41
17. Some people are consistently lucky, and others are unlucky	*.73*	.10	.16	.06	.08	*.78*
18. Some people are consistently unlucky, and others are lucky	*.74*	.09	.15	.05	.05	*.76*
19. There is such a thing as good luck that favours some people, but not others.	*.72*	−.11	.21	.04	−.16	*.60*
20. There is such a thing as bad luck that affects some people more than others.	*.73*	−.13	.20	.15	−.13	*.59*
21. Luck plays an important part in everyone's life	*.73*	−.10	.02	.19	−.04	*.58*
22. I believe in Luck	*.60*	−.02	.01	.15	−.34	*.52*
Cronbach's alpha (Study 1)	.85	.71	.88	.85	.68	.85
Cronbach's alpha (Study 2)			.85	.87	.69	.89

expected from purely random data with no structure, and on inspection of the Scree Plot (Cattell, 1966). In the parallel analysis the fifth eigenvalue (5.66, 4.69, 1.56, 1.36, and 1.09) failed to exceed the fifth mean eigenvalue (1.58, 1.48, 1.40, 1.32, and 1.28) which calculated from 1000 generated datasets with 250 cases and 22 variables, suggesting a 4 factor solution in the present data. However, the use of the Scree Plot (Fig. 1) produced an ambiguous interpretation with a possible 'elbow' appearing after the 2nd and 4th eigenvalue.

Consequently, principal components analysis was performed on the 22 items for two and four factor solutions. These factors were then subjected to oblique (oblimin) and varimax (orthogonal) rotation with delta set to 0. For interpretation purposes, factor loadings of above.3 were considered as relevant to the factor (Kline, 1986). Both rotation methods produced similar solutions but it was the oblimin rotation that produced the clearest loadings on the factors (See Table 1 for the pattern matrices).

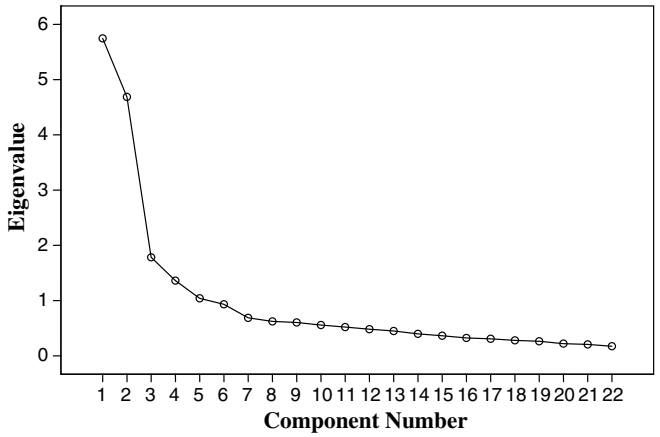

Fig. 1. Scree plot of eigenvalues of the 22 beliefs around luck items.

Table 2
Correlations between the components of the 4 factor solution with Pearson product moment correlations between the four subscales derived from the 4 factor solution in brackets

	2	3	4
1. Belief in being unlucky	−.23 (.32**)	−.13 (−.12)	.24 (.32**)
2. Belief in being lucky	–	−.21 (−.21**)	.23 (.30**)
3. Rejection of belief in luck		–	−.29 (−.35**)
4. General belief in luck			–

* $p < .05$.
** $p < .01$.

For the two factor solution, the overall variance accounted for by the model was 47.42%. The first component reflects a belief in luck dimension with belief in luck items loading highest and positively on this component and rejection of luck items loading negatively on this component. However, in addition to these loadings a number of statements about being lucky and unlucky load positively on this component. The second component reflects a belief in a good/bad luck dimension with statements about being unlucky loading positively on this component, and statements about being unlucky loading negatively. A concern here is that there are a number of cross-loadings of above .3 on both factors suggesting a failure to find evident simple structure with this solution The correlation between the two components was $r = .01$ (with a correlation of $r = .01$ for the two subscales derived from the two factor solution).

The overall variance accounted for by the 4 factor solution was 59.93%. The first component reflects a *belief in being unlucky*. The second component reflects a *belief in being lucky*. The third component is a *rejection of belief in luck*. The final component is a *general belief in luck*. Table 2 shows the correlations between the components, with Pearson product moment correlations between the four subscales derived from the 4 factor solution in brackets. Here the highest correlation is $r = .35$ suggesting the components or subscales share no more than 13% of the variance.

Cronbach's alpha (Cronbach, 1951) was computed for each of these sets of items with all subscales showing adequate internal reliability (see Table 1), based on the criterion of $\alpha > .7$ (Kline, 1986), with the exception of the rejection of belief in luck which falls below the aforementioned criterion.

Table 3 shows the correlations between the four subscales of the Darke and Freedman beliefs around luck scale and the additional measures administered across the four samples, calculated for both the two factor (with higher scores measuring beliefs around being lucky and a belief in luck) and four factor solution subscales. Findings from samples 1 and 2 suggest that all subscales show satisfactory test-retest reliability over both a 2 week and 4 week period, with Pearson product moment correlation coefficients ranging from $r = .48$ to $r = .80$. Reasonable validity is shown for each of the scales, with satisfactory correlations between each of the subscales corresponding to peer and family member rating, with Pearson product moment correlation coefficients ranging from $r = .42$ to $r = .56$. Finally the validity of the various versions of the belief in luck and belief in being lucky and unlucky subscales are supported by expected significant product moment correlation coefficients with both the Beliefs in Good Luck Scale and Andre's Luck scales, though the effect sizes of these correlations are noticeably larger for the four factor solution subscales.

Table 3
Correlation statistics for the different dimensions of belief around luck in regards to test re-test reliability, peer and family rating and other luck scales

	Sample 1 ($n = 60$)	Sample 2 ($n = 60$)	Sample 3 ($n = 60$)		Sample 4 ($n = 70$)		
	Test–retest over 2 weeks	Test–retest over 4 weeks	Peer rating	Family rating	Belief in good luck	Good luck (Andre, 2006)	Bad luck (Andre, 2006)
Two factor subscales							
Belief in luck	.75**	.54**	.41**	.43**	.04	.02	−.04
Belief in good luck	.71**	.53**	.43**	.43**	.44**	.36**	−.34**
Four factor subscales							
Belief in being unlucky	.80**	.52**	.40**	.46**	−.03	−22*	.69**
Belief in being lucky	.64*	.55**	.42**	.40**	.76**	.75**	−.08
Rejection of belief in luck	.78**	.58*	.43**	.45**	.32**	.15	.36**
General belief in luck	.71**	.48**	.44**	.41**	−.26**	−.05	−.25**

* $p < .05$.
** $p < .01$.

3. Study two

The purpose of this study was to gather data for a confirmatory factor analysis of the Darke and Freedman Beliefs around luck scale, and to examine its validity through correlates with measures of personality, irrational beliefs, positive thinking, attribution style and well-being.

3.1. Method

3.1.1. Participants

Participants were 145 adults (64 males, 81 females) aged from 18 to 56 years (Mean age = 25.42 years, SD = 8.5) from workplaces and community groups from the Leicestershire area in the United Kingdom. The ethnicity of the majority of respondents was White (n = 78).

3.1.2. Questionnaires

In addition to the 22 items of the Darke and Freedman Beliefs Around Luck scale developed in Study 1, respondents were administered the following scales:

1. *Ten-item personality inventory* – (Gosling, Rentfrow, & Swann, 2003). This is a 10-item measure of the five-factor model dimensions; extraversion, agreeableness, conscientiousness, neuroticism and openness to experience.
2. *The belief scale* (Malouff & Schutte, 1986; Boelen & Baars, 2007). This is a 20-item measure of irrationality, representing 10 irrational beliefs which are listed in Table 5.
3. *The life orientation test – revised* (Scheier, Carver, & Bridges, 1994). This 10-item measure contains 6 items that measure optimism with four filler items.
4. *The trait hope scale* (Snyder et al., 1991). This scale consists of two 4-item subscales that tap two components of hope; an Agency subscale measuring the degree to which an individual has the perceived motivation to move toward his or her goals and a Pathways subscale measuring the degree to which an individual has the perceived ability to generate workable routes to goals.
5. *Attribution style questionnaire* (Peterson et al., 1982). This measures the tendency to attribute events to causes that are internal versus external, stable versus unstable and global versus specific. Respondents make causal interpretations of 12 hypothetical situations of events. Half of the hypothetical situations are positive and half are negative. In the present study, attributions for positive and negative events were separated out.
6. *Internal control index* (Duttweiler, 1984). The Internal Control Index contains 28 statements that are used to measure an internal versus external locus of control.
7. *Scales of psychological well-being* (Ryff, 1989). These were used to measure six aspects of psychological well-being; autonomy, environmental mastery, positive relations with others, personal growth, purpose in life and self-acceptance. On this occasion the 3-item versions of the scales were used.
8. *Positive and negative affect scales*(PANAS; Watson, Clark, & Tellegen, 1988). This is a 20-item scale that comprises two subscales to reflect positive and negative mood states.
9. *Satisfaction with life scale* (Diener, Emmons, Larsen, & Griffin, 1985). This 5-item scale measures global judgments about life satisfaction.

3.2. Results

Confirmatory factor analysis was performed on the beliefs around luck items to explore whether the two or four factor model solution represented a good fit of the data. Table 4 shows the Goodness-of-fit indices for both models and statistics for comparison of the models. The four factor model yielded a reasonable fit to the data. The two factor model provided a poor fit of the data. Additionally, direct nested comparison of χ^2 values showed that the four factor model provided a significantly better fit than the one

Table 4
Results from the confirmatory factor analysis

χ^2	SRMR	CFI	AIC	RMSEA (95% CI)	NFI	ECVI
Four factor model						
397.12	.07	.88	497.12	.08 (.07 –.09)	.78	3.45
Two factor model						
760.58	.17	.65	850.58	.14 (.13 –.15)	.58	5.91
$\Delta\ \chi^2$			p			Δ AIC
Model comparison						
363.46			<.001			353.46

Table 5
Pearson product moment correlations between beliefs around luck and personality, individual differences and well-being variables

	Belief in being unlucky	Belief in being lucky	Rejection of belief of luck	General belief in luck
Personality				
Extraversion	–.23**	.09	–.16	.02
Agreeableness	.09	–.02	.08	.14
Conscientiousness	–.02	–.06	.12	.07
Neuroticism	.34**	–.15	–.11	.09
Openness	–.26**	.22**	–.11	.02
Irrational beliefs				
Need for approval	.11	.01	–.09	.13
Need for achievement	.13	–.17*	.01	.04
Demands about others	.34**	.03	–.05	.12
Awfulising	.44**	–.17*	.01	.20*
Emotional externally caused	.50**	–.07	–.09	.29**
Usefulness of being concerned	.30**	–.04	.02	.11
Problem avoidance	.43**	–.03	–.11	.19*
Importance of the past	.24**	.03	–.11	.24**
Demands about life	.47**	–.29**	–.05	.18*
Discomfort anxiety	.34**	–.34**	.07	.02
Positive thinking				
Optimism	–.67**	.46**	–.08	–.14
Hope pathways	–.48**	.30**	–.01	–.01
Hope agency	–.41**	.35**	–.06	.05
Attribution style				
External attributions to positive events	–.06	.18*	–.08	.15
External attributions to negative events	.05	–.06	.04	.04
Stable attributions to positive events	–.42**	.27**	–.05	.01
Stable attributions to negative events	.03	.02	–.11	–.03
Global attributions to positive events	–.33**	.25**	–.07	.03
Global attributions to negative events	.15	–.03	–.13	.02
Internal locus of control	–.09	–.06	.19*	–.28**
Psychological well-being				
Autonomy	–.22**	–.01	.02	–.05
Environment mastery	–.43**	.29**	–.04	–.02
Personal growth	–.46**	.13	.03	–.10
Positive relations with others	–.39**	.27**	–.06	–.03
Purpose in life	–.12	.01	–.05	–.07
Self acceptance	–.53**	.39**	–.08	–.05
Subjective well-being				
Satisfaction with life	–.50**	.35**	–.03	–.08
Positive affect	–.39**	.20*	–.04	–.07
Negative affect	.36**	–.29**	–.05	.05

* p < .05.
** p < .01.

factor model. On this basis the two factor model was rejected, with subsequent analysis just carried out with the four factor model. The Cronbach's alpha for the four factor subscales are also provided in Table 1.

Table 5 shows the Pearson product moment correlation coefficients between the four luck subscales and measures of personality, irrational beliefs, positive thinking, attribution style and well-being.

Belief in being unlucky shares a statistically significant positive association with neuroticism, all aspects of irrational beliefs (with the exception of need for approval and need for achievement) and negative affect, and a statistically significant negative association with extraversion, openness, optimism, both hope pathways and hope agency, stable and global attributions to positive events, all the indices of psychological well-being (with the exception of purpose in life) and satisfaction with life and positive affect.

Belief in being lucky shares a statistically significant positive association with openness, optimism, both hope pathways and hope agency, external, stable and global attributions to positive events, environmental mastery, positive relations with others, self-acceptance, satisfaction with life and positive affect, and shares a statistically significant negative association with demands about life and discomfort anxiety irrational beliefs and negative affect.

The rejection of belief in luck subscale shows a significant positive association with internal locus of control. The general belief in luck subscale shows a positive correlation with awfulizing, emotion externally caused, problem avoidance, importance of the past and demands about life irrational beliefs and a significant negative association with internal locus of control.

4. Discussion

The current studies support the use of a multi-dimensional measure of beliefs around luck; belief in being unlucky, belief in being lucky, rejection of belief in luck and a general belief in luck, with Exploratory and Confirmatory Factor Analysis supporting a four factor, rather than a two factor, structure. However, the Confirmatory Factor Analysis statistics reported suggest the four factor model provides only a reasonable fit to the data. It could be argued that due to the number of variables this lowers the probability of there being a good fit of data to a suggested model; however, the current finding is that the goodness of fit statistics lie within acceptable limits. Each of the scales shows adequate internal reliability, with only the rejection of belief in luck scale falling just below an acceptable level (therefore suggesting further consideration of this subscale). Each of the scales shows stability over time, and their validity is established by adequate correlations with peer and family ratings. Moreover, the belief in being lucky and unlucky subscales show satisfactory correlations with other current measures of these constructs.

The four factor model may seem counter-intuitive or possibly attributable to an artefact of scoring, given that beliefs around luck form two closely conceptually related pairs. However, similar structures arise elsewhere, for example, in the measurement of subjective well-being Positive and Negative Affect form separate measures (Watson et al., 1988). More specifically, in the psychology of religion literature a similar phenomena has been observed in the relationship between Intrinsic and Extrinsic religiosity, originally thought to be bi-polar constructs. The relationship between the two was found to differ depending on the salience of religion to the sample, with positive correlations between the dimensions representing non-religiousness versus religiousness in samples where respondents were not necessarily religious (Donahue, 1985). A similar explanation could be presented in the current study with the association between the subscales changing depending on the salience of belief in luck to a sample. As the current sample contained both people who believed and did not believe in luck the positive correlations between a belief in luck and belief in being lucky and unlucky may represent a general dimension of belief in luck (being it good, bad or just luck) versus non-belief in luck. Some definitive studies are needed to test this explanation by examining correlations between the subscales comparing samples where luck has differing significance.

The second study focused upon the theoretical and empirical considerations of beliefs around luck. The finding that belief in being unlucky is associated with neuroticism, lower extraversion and lower openness, higher levels of irrational beliefs, less positive thinking, poorer psychological and subjective well-being and belief in being lucky is associated with openness, lower levels of irrational beliefs, more positive thinking and better psychological and subjective well-being is consistent with the distinction within the literature that perceptions of being lucky may be adaptive and perceptions of being unlucky may be maladaptive (Darke & Freedman, 1997a, 1997b; Ellis, 1971). However, there are differences between these two constructs in terms of their relationship to personality which suggest the need to consider beliefs in being lucky and unlucky separately. While beliefs in being lucky and being unlucky are related to openness, belief in being unlucky is additionally related to higher neuroticism and lower extraversion. This suggests that within personality space these constructs may be the result of different traits, and therefore may require separation so they may be studied in different psychological contexts.

Additionally, the development of the belief in luck subscale focuses on a particular aspect of luck as it is only statistically significantly related to some of the irrational belief measures and an external locus of control. This scale supports Rotter's (1966) emphasis on belief in luck resulting from irrational beliefs and beliefs that events are outside the person's control. Further support for this assertion comes from the association of the rejection of belief in the luck subscale with an internal locus of control. These differences in association, and absence of association (in terms of both significance and effect size) with other psychological measures included in the study, suggest the differential properties of each of the four luck subscales.

The current study presents a new measure of beliefs around luck. This scale shows both reliability and validity, particularly in terms of its theoretical and empirical context. Moreover, the scale improves on existing measures as it provides multi-dimensional measures of both belief in being lucky and unlucky, and general beliefs in luck. Previous research has examined the role of belief in luck in relation to gambling, decision making, counterfactual thinking and goal orientated behaviour (Andre, 2006; Darke & Freedman, 1997a). This new scale provides an opportunity to extend this research by examining which of the different dimensions of beliefs around luck are associated with behaviour in these different areas.

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