Psychology of Well-Being
a SpringerOpen Journal

RESEARCH Open Access

Psychological well-being and psychological distress: is it necessary to measure both?

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Abstract

Background: The objectives of the study were to explore a self-report measure for psychological well-being and to investigate the relationship between psychological well-being and psychological distress.

Method: Telephone interviews of a representative sample of adults (N = 1933) collected information about sociodemographic variables, a standardised measure of psychological distress, and three brief existing scales to assess aspects of psychological well-being: Positive Relations with Others, Environmental Mastery, and Satisfaction with Life. The total of these three scales was also computed and explored as a measure of overall well-being.

Results: Variables positively associated with psychological well-being were negatively associated with psychological distress and vice versa. For example low psychological well-being and high psychological distress were associated with being the only adult in the household, speaking a language other than English at home, being divorced or separated, having no educational qualifications beyond secondary school, being unable to work, having a low income, renting one's accommodation, and receiving a pension.

Conclusions: The measure of well-being shows psychometric promise for community surveys. Psychological well-being is not exactly the opposite end of the continuum to psychological distress, but more debate is needed about whether and when, research participants need to be asked questions about both.

Keywords: Psychological well-being, Measurement, Life satisfaction, Psychological distress

Background

The positive psychology movement and corresponding social capital/new economics perspectives in public health, exemplified by the Foresight Mental Capital and Well-being Project (2008), draw attention to the desirability of developing reliable and valid standardised scales to measure psychological well-being (PW). As summarised in the WHO report (Freidli 2009, p.2): "a growing number of longitudinal studies confirm their [i.e. well-being scales] power to predict outcomes, for example, longevity, physical health, quality of life, criminality, drug and alcohol use, employment, earnings and pro-social behaviour (e.g. volunteering)". In much the same way that we have accepted the need to measure physical health and well-being rather than being restricted to

measures of illness and dysfunction, we need psychometrically sound assessment tools for psychological well-being. Unless these two attributes are perfectly negatively correlated – just opposite ends of the same continuum - attending only to distress risks leaves important gaps in our understanding of health, well-being, quality of life and resilience. This paper reports an apparently useful measure of PW and takes the opportunity in a large representative sample of adults, to contribute to the debate around the bipolar or bivariate nature of PW and psychological distress or dysfunction (PD).

Psychological well-being is usually conceptualised as some combination of positive affective states such as happiness (the hedonic perspective) and functioning with optimal effectiveness in individual and social life (the eudaimonic perspective) (Deci & Ryan 2008). As summarised by Huppert (2009, p.137): "Psychological well-being is about lives going well. It is the combination of feeling good and functioning effectively." By definition therefore, people with high PW report feeling happy, capable, well-supported, satisfied with life, and so on; Huppert's (2009) review also claims the consequences of PW to include better physical health, mediated possibly by brain activation patterns, neurochemical effects and genetic factors. Data in this area are necessarily correlational rather than experimental, but a report highlighting the value of assessing positive emotional states is that by Xu and Roberts (2010), using longitudinal data (1965 to 1993) from the Alameda County Study (N = 6856). After controlling for age, sex, education, baseline health and social networks, longevity was predicted by positive emotions but not by negative. The effect held for both younger and older age-groups and was particularly clear for healthy adults. The authors called for more focus on positive emotions as a potential promoting agent for population longevity and health. Boehm et al. (2011) report similarly, based on a 5-year follow-up of 7942 participants in the Whitehall II cohort, an association between psychological well-being and a modest but consistent reduction in risk of incident CHD.

Measurement of psychological well-being utilises various instruments without any having gained dominance as a "gold standard". Life satisfaction is often a component (Diener et al. 1985; Diener et al. 2000; Diener et al. 2003; Lucas et al. 1996). Ryff's PW scales (Ryff 1989; Ryff and Singer 1996) offer a richer, multidimensional view including Autonomy, Environmental Mastery, Personal Growth, Positive Relations with Others, Purpose in Life, and Self-Acceptance. The 14-item Warwick-Edinburgh Mental Well-being Scale (Tennant et al. 2007) offers promise at the population level but its sensitivity to change requires more study. Keyes and colleagues' Mental Health Continuum-Short Form scale of 14 items (MHC-SF: Keyes 2005; Keyes et al. 2008; Lamers et al. 2011) has been developed from large South African and Dutch samples and extensively factor analysed as evidence of separate continua for mental illness and mental health. The measures used by Xu and Roberts (2010) were based on factor analyses of the Alameda County Study baseline psychological items (Berkman and Breslow 1983). These were: global life satisfaction (3 items), satisfaction with important life domains (your job, your marriage, your children), and positive affect (3 items). Boehm et al. (2011) used five items from disparate sources measuring "emotional vitality" plus one assessing optimism. The convergence of results using related but various measuring instruments can be seen as a sign of the robustness of these findings.

While philosophical and psychological theories abound concerning the nature of happiness and a good life, a question likely to interest epidemiologists is the relationship

between this experiential state and, on the one hand various socio-demographic predictors, and on the other, objective and subjective health outcomes. There is a long-standing acceptance that psychological distress (PD) in the form of anxiety, sadness, irritability, self-consciousness and emotional vulnerability is strongly correlated with physical morbidity, reduced quality and duration of life, and increased use of health services (e.g. Lahey 2009). But what if anything does measurement of psychological well-being (PW) add to public health surveys? Are these concepts (PD and PW) sufficiently different to justify adding to respondent burden by measuring both, or will one suffice for at least some research purposes?

In order to examine the relationship between PW and PD, we surveyed a community sample using a well-accepted screening test for PD, and also tested the psychometric properties of a PW scale using 16 questions about positive emotions. The latter included life satisfaction, sense of control and satisfying social relationships. The aims of the present study were:

1. To assess the psychometric properties (reliability and validity) of a collection of questions relevant to psychological well-being (PW), particularly the Diener Satisfaction with Life Scale (SWLS: Diener et al. 1985) and two of the Ryff Psychological Wellbeing scales (Environmental Mastery and Personal Relations);
2. To apply findings from the above to examine the demographic correlates of PW;
3. To examine relationships between PW and PD measured using the widely-used screening measure, the K10 (ABS 2001; Kessler et al. 2002). This was done in two ways, firstly by looking at the correlations between scores on the two sorts of measure, and secondly by examining whether predictors of the PW and PD are opposite ends of the same variables. If PD and PW are just mirror reflections of each other, high levels of factors associated with high PD might predict low PW and vice versa. On the other hand if PD and PW are independent (albeit overlapping) constructs they might be associated with different predictor variables.

Methods

Participants

All households in South Australia with a telephone connected and the telephone number listed in the Electronic White Pages were eligible for selection in the sample. Telephone numbers were selected randomly from the metropolitan and country areas. Only one interview was conducted per household. Where more than one person aged 18 or over resided in the household, the respondent was the person who was last to have their birthday. There were no replacements for non-contactable persons. A sample of 4500 was drawn of which 3325 households were eligible, losses occurring due to fax/modem connections (n = 48), automated message or number not connected (n = 994), non–residential numbers (n = 113) and deceased or otherwise ineligible (n = 18). From the eligible sample of 3325, completed interviews were conducted with 1933 persons (58.1%), nonparticipation being due to refusals (n = 812), noncontact after 10 attempts (n = 279), incapacitated (n = 135), respondent unavailable (n = 91), foreign language (n = 66), or interview terminated (n = 9).

Measures

Respondents provided information about their sex, age group, the number of adults in the household and the number of children aged under 18 years, metropolitan or rural residence, country of birth and aboriginality, language spoken at home (English or other), marital status, education, work status, gross household income, and ownership or not of their dwelling. Psychological well-being was measured using the Diener Satisfaction with Life Scale (SWLS: Diener et al. 1985), comprising five items which require respondent to indicate to what extent they agree or disagree with the statement on a seven point likert type scale with higher scores corresponding to higher life satisfaction. An example item is "In most ways my life is close to my ideal". In addition we used two subscales from the Ryff Psychological Wellbeing Inventory (Ryff 1989). These were environmental mastery (EM: 5 items) and positive (social) relations (PR: 6 items). These subscales were chosen to reflect the sense of control and the supportive social relationships which have been consistently identified as integral aspects of psychological well-being. Environmental Mastery (EM) reflects the sense of power, control and autonomy widely accepted to have stress-reducing effects (Beck 2007), and positive Personal Relations (PR) with others have similar credence as facilitatory influences on health and wellbeing. Holt-Lunstad et al. (2010) showed the significant health benefits of social support in a large recent meta-analysis, while Cohen and Lemay (2007) have convincingly described the possible mechanisms of positive effects of social support. Response categories were on a five point scale ranging from "Strongly agree" to "Strongly disagree". Both dimensions were measured with positively and negatively worded items, with reverse coding so that higher scores indicated higher levels of psychological well-being. An EM item is "I'm good at managing my many daily responsibilities" and a PR item is "I often feel lonely because I have few close friends". The value of combining these concepts into one scale was explored by summing the scores of these three measures and conducting a factor analysis of the resultant 16 items here referred to as an Overall well-being scale.

Psychological distress was measured using the 10-item screening scale K10, as used in national and state-wide surveys in Australia (ABS 2001; Kessler et al. 2002). The items are based on the level of anxiety and depressive symptoms experienced in the most recent four-week period, for example: "how often did you feel nervous" and "how often did you feel hopeless". Subjects report the frequency of each experience on a five point scale ranging from 'all of the time' to 'none of the time'. The scoring system used is based on the method developed by the Clinical Research Unit for Anxiety and Depression at the University of New South Wales. In this method, five points are given for 'all of the time' to one point for 'none' of the time. This results in individual K10 scores being restricted to a range of 10–50.

Procedure

This survey obtained ethics approval from the SA Health Human Research Ethics Committee and the University of Adelaide Human Research Ethics Committee. A letter introducing the study was sent to the household of each selected telephone number. The letter informed people of the purpose of the survey and indicated that they could expect a telephone call within a defined time frame. Before the conduct of the main

survey, the questionnaire was pilot tested (n = 50) and where appropriate, wording was amended slightly.

To correct for disproportionality of the sample with respect to the population of interest, data were weighted by age, sex and area of residence to reflect the structure of the population in South Australia aged 18 years and over and probability of selection in the household (ABS 2007). The probability of selection was calculated based on the number of adults in the household and the number of telephone number listings for that household. Frequencies of demographic and social characteristics were determined as were the mean scores of each of the measurement scales. Internal reliability was determined using Cronbach's alpha and Pearson correlations determined the direction and strength of the linear association between the scales. Finally, mean scores for each demographic characteristic were determined. Significant differences were assessed using T-tests and one-way ANOVA were used to test for significant differences between groups with all post hoc comparisons conducted using the Scheffe test. Data were analysed using SPSS Version 15.0 and the conventional five per cent level of statistical significance was used.

Below we present descriptive results followed by correlations between the different scales used and comparisons of scores by sociodemographic variables. With the goal of investigating a potential composite measure of PW, scores from the three PW tests above were added and the resultant "Overall well-being" totals subjected to factor analysis.

Results

Demographic and social characteristics of the respondent sample are shown in Table 1. Respondents comprised approximately even numbers of men and women, well-distributed across age-groups and education and income categories and raw test scores on the measures of PW and PD in Table 2.

Each scale had acceptable internal reliability and the well-being scales were positively correlated with each other and negatively with distress, as expected. Variances accounted for ranged from 18.5% (PR with K10), to 81% (SWLS with Overall well-being). The composite measure consisting of the total of scores for the two Ryff scales and the Diener SWLS scale had a similar correlation with the K10 as did the component scales.

A principal components analysis (PCA) was conducted on the sixteen items that formed the Overall well-being score. Enough of the bivariate correlations were higher than 0.30 therefore it was considered appropriate to proceed with PCA. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = 0.912) was greater than 0.6 and Bartlett's Test of Sphericity was significant ($\chi^2 = 9187.01$, $p < .001$) (Manning and Munro 2007). Communalities ranged from 0.292 (item 5, satisfaction with life scale – "If I could live my life over I would change almost nothing) to 0.669 (item 2, satisfaction with life scale – "I am satisfied with life"). There was only one variable below 0.30 (at 0.29) suggesting that a good solution is likely.

Three components were extracted with eigenvalues greater than 1, accounting in total for 51.39% of the total variance. Component 1 accounted for 24.9% of the variance. Item 1 (Q3 Diener scale), "Am satisfied with life", item 2 (Q1 Diener scale) "Life

Table 1 Demographic and social characteristics of respondents (N = 1933)

Variable	Response categories	n	%
Sex	Male	939	48.6
	Female	994	51.4
Age group	18 to 24 years	230	11.9
	25 to 34 years	306	15.8
	35 to 44 years	361	18.7
	45 to 54 years	358	18.5
	55 to 64 years	293	15.2
	65 to 74 years	190	9.8
	75 years and over	195	10.1
Household size (adults)	1 adult	294	15.2
	2 adults	1131	58.5
	3 or more adults	508	26.3
Area of residence	Metropolitan	1425	73.7
	Country	508	26.3
Number of children in household (under 18 years)	None	1208	62.5
	1 child	254	13.2
	2 children	310	16.0
	3 or more children	160	8.3
	Not stated	1	-
Country of birth	Australia	1499	77.5
	UK/Ireland	195	10.1
	Other	239	12.5
Main language spoken at home	English	1852	95.8
	Other	81	4.2
Marital status	Married/de facto	1291	66.8
	Separated/divorced	148	7.7
	Widowed	118	6.1
	Never married	375	19.4
	Refused	1	-
Highest educational qualification obtained	Secondary schooling	889	46.0
	Trade/Certificate/Diploma	618	32.0
	Bachelor degree or higher	425	22.0
Work status	Full time employed	754	39.0
	Part time/casual employment	447	23.1
	Unemployed	42	2.1
	Home duties	121	6.2
	Retired	420	21.7
	Student	58	3.0
	Unable to work because of disability/Workcover/invalid	62	3.2
	Other	24	1.2
	Refused	5	0.3
Gross annual household income	Up to $20,000	244	12.6
	$20,000 to $40,000	310	16.0

Table 1 Demographic and social characteristics of respondents (N = 1933) *(Continued)*

	$40,001 to $60,000	231	12.0
	$60,001 to $80,000	248	12.8
	Over $80,000	596	30.8
	Not stated	303	15.7
Ownership of dwelling	Owned or being purchased by the occupant	1653	85.5
	Rented from Housing Trust	58	3.0
	Rented privately	168	8.7
	Retirement village	27	1.4
	Other	22	1.1
	Refused	5	0.3
Pension or benefit	Yes	732	37.9
	No	1201	62.1
Total		1933	100.0
Aboriginal or Torres Strait Islander*	Aboriginal and/or Torres Strait Islander	15	1.0
	No	1482	98.9
	Refused	2	0.1
Total		1499	100.0

*Only asked of those born in Australia.

close to ideal" and item 3 (Q2 Diener scale) "Have excellent life conditions" all had factor loadings of > 0.7. Item 4 (Q4 Diener scale) "I have the important things in life" and item 5 (Q3 Environmental Mastery) "Able to create a lifestyle to my liking" both had factor loadings > 0.6. Item 6 (Q4 Environmental Mastery) "In charge of living situation" and item 7 (Q5 Diener scale) "If I could live my life over I would change almost nothing" had loadings of > 0.5. Item 8 (Q2 Environmental Mastery) "Difficulty arranging my life" and item 9 (Q5 Environmental Mastery) "Demands of life often get me down" had loadings of > 0.4. These last two items also have loadings on component 2 (although values are lower than those on component 1).

Component 2 explained 16.7% of the variance. Item 10 (Q2 Positive Relations) "Most people have more friends than me", item 11 (Q1 Positive Relations) "Feel lonely because have few close friends", item 12 (Q5 Positive Relations) "Not experienced warm and trusting relationships, and item 13 (Q4 Positive Relations) "Maintaining close relationships has been difficult" all had factor loadings >0.7. Component 3 explained 9.7% of the variance. Item 14 (Q3 Positive Relations) "People describe me as a giving

Table 2 Test scores and internal reliabilities of measures of psychological well-being and distress and their inter-correlations

Scale	Mean (SD) & range	Alpha coeff of internal reliability	Pearson correlations EM	PR	Overall well-being	K-10
Diener SWLS n = 1908	26.3 (5.7) 5-35	0.80	0.62	0.47	0.90	–0.47
Ryff EM n = 1915	19.5 (2.8) 7-25	0.73	-	0.52	0.81	–0.55
Ryff PR n = 1882	24.0 (3.4) 10-30	0.74		-	0.75	–0.43
Overall wellbeing n = 1849	69.9 (9.9) 28-90	0.86			-	–0.56
K10 (PD) n = 1932	15.4 (5.6) 10-50	0.85				-

Table 3 Mean Overall well-being scores by demographic characteristics

	n	Mean	SD	95% CI
Sex				
Male	895	69.6	9.7	69.0 - 70.3
Female	954	70.2	10.2	69.6 - 70.9
Age group				
18 to 24 years	227	69.4	8.3	68.4 - 70.5
25 to 34 years	300	69.3	10.3	68.2 - 70.5
35 to 44 years	356	70.5	10.3	69.4 - 71.5
45 to 54 years	339	69.3	10.8	68.2 - 70.5
55 to 64 years	279	71.2	10.5	69.9 - 72.4
65 to 74 years	174	70.6	9.7	69.2 - 72.1
75 years and over	174	69.1	8.4	67.8 - 70.3
Number of adults in household				
1 adult	277	66.5	11.4	65.2 - 68.0*
2 adults	1079	70.7	9.7	70.2 - 71.0*
3 or more adults	493	70.1	9.2	69.3 - 71.0*
Area of residence				
Metropolitan	1363	70.0	10.0	69.5 - 71.0
Regional	486	69.8	10.0	68.9 - 71.0
Children in household				
No children	1137	69.5	10.1	68.9 - 70.0*
Children	711	70.7	9.8	70.0 - 71.0*
Country of birth				
Australia	1442	69.8	10.1	69.3 - 70.0
England/Ireland	183	70.3	10.9	68.7 - 72.0
Other	224	70.4	8.5	69.2 - 71.0
Language spoken at home				
English	1780	70.1	10.0	69.6 - 71.0*
Other	68	65.8	8.5	63.8 - 68.0*
Marital status				
Married/de facto	1231	71.1	9.6	70.6 - 71.7*
Separated/divorced	140	65.1	11.9	63.1 - 67.0*
Widowed	111	68.0	9.7	66.2 - 69.8*
Never married	366	68.4	9.7	67.4 - 69.4*
Education				
Secondary	842	68.9	10.1	68.3 - 70.0*
Trade/Certificate	592	70.1	9.8	69.3 - 71.0*
Bachelor degree or higher	415	71.7	9.8	70.8 - 73.0*
Work status				
Full time employed	738	71.0	9.4	70.3 - 72.0*
Part time/casual employment	436	70.2	9.4	69.3 - 71.0*
Unemployed	39	63.3	11.5	59.6 - 67.0*
Home duties	111	68.3	11.2	66.2 - 70.0*
Retired	387	70.3	9.3	69.4 - 71.0*
Student	55	71.4	9.1	69.0 - 74.0*

Table 3 Mean Overall well-being scores by demographic characteristics *(Continued)*

Unable to work because of disability/Workcover/invalid	54	57.4	12.4	54.0 - 61.0*
Other	24	68.7	12.8	63.3 - 74.0*
Refused	5	77.0	4.7	71.5 - 82.0*
Income				
Up to $20,000	229	66.7	11.9	65.2 - 68.0*
$20,001 to $40,000	287	68.3	10.0	67.2 - 70.0*
$40,001 to $60,000	221	68.6	10.4	67.3 - 70.0*
$60,001 to $80,000	244	70.8	9.4	69.6 - 72.0*
Over $80,000	589	72.1	8.7	71.4 - 73.0*
Not stated	287	69.9	9.8	68.7 - 71.0*
Dwelling				
Owned or being purchased	1585	70.5	9.6	70.1 - 71.0*
Rent from Housing Trust	53	65.2	12.5	61.7 - 68.6*
Rented privately	162	66.0	11.9	64.2 - 67.9*
Retirement village	24	66.2	10.9	61.6 - 70.8
Other	20	68.8	6.8	65.6 - 72.0
Refused	5	73.9	6.4	65.5 - 82.2
Pension status				
No	1175	70.7	9.4	70.1 - 71.2*
Yes	674	68.6	10.7	67.8 - 69.4*
Aboriginal or Torres Strait Islander^†				
No	1428	69.8	10.1	69.3 - 70.3
Yes	12	69.5	4.8	66.9 - 72.5

Note: The weighting of the data can result in rounding discrepancies or totals not adding.
* Mean difference is significant at $p < .05$, assessed using *t*-test and Anova, post-hoc testing using the Scheffe test.
^ Don't know/refused category not included.
†Aboriginal and Torres Strait Islander status only asked of those born in Australia.

person", item 15 (Q6 Positive Relations) "Enjoy personal and mutual conversation" and item 16 (Q1 Environmental mastery) "Good at managing life responsibilities" had factor loadings of > 0.6. This last item also has a loading on component 1 (with a lower value) as does item 6 (Q4 Environmental Mastery) "In charge of living situation" (but with a higher value on component 1).

Interpreting the factor analysis, it is apparent that the rotated component 1 accounts for the highest proportion of variance. Examining the items with the highest loadings this factor seems to be representing the concept of *life satisfaction.* Component 2 is for the most part examining *negative personal relations,* and component 3 could be labelled *positive personal relations,* although it had fewer than four items uniquely loading on it.

Relations between PW and PD and sociodemographic variables

Table 3 presents significant differences in the mean Overall well-being scores according to the demographic characteristics of respondents. Significant differences in mean values existed between categories for all demographic characteristics except for sex, age group, area of residence and Aboriginal or Torres Strait Islander status.

Table 4 Summary of demographic characteristics associated with all scales

	Ryff positive relations	Ryff environmental mastery	Diener SWLS	Overall well-being	K10
Sex	$t = -3.14$, $p = 0.002$	$t = 0.28$, $p = 0.78$	$t = 0.02$, $p = 0.99$	$t = -1.28$, $p = 0.20$	$t = -4.28$, $p < 0.001$
Age	$F = 3.04$, $p = 0.006$	$F = 4.43$, $p = 0.001$	$F = 1.30$, $p = 0.25$	$F = 1.74$, $p = 0.11$	$F = 1.53$, $p = 0.17$
Household size	$F = 20.73$, $p < 0.001$	$F = 2.76$, $p = 0.06$	$F = 21.54$, $p < 0.001$	$F = 20.21$, $p < 0.001$	$F = 5.51$, $p = 0.004$
Area of residence	$t = 2.48$, $p = 0.01$	$t = -0.28$, $p = 0.78$	$t = -0.47$, $p = 0.64$	$t = 0.42$, $p = 0.46$	$t = -1.73$, $p = 0.08$
Number of children	$t = -2.54$, $p = 0.01$	$t = 1.34$,$p = 0.18$	$t = -3.83$, $p < 0.001$	$t = -2.62$, $p = 0.009$	$t = -0.37$, $p = 0.71$
Country of birth	$F = 0.30$, $p = 0.74$	$F = 1.53$, $p = 0.22$	$F = 0.52$, $p = 0.59$	$F = 0.45$, $p = 0.64$	$F = 0.15$, $p = 0.86$
Language spoken	$t = 5.61$, $p < 0.001$	$t = 3.04$, $p = 0.002$	$t = 1.82$, $p = 0.07$	$t = 3.51$, $p < 0.001$	$t = -2.37$, $p = 0.02$
Marital status	$F = 12.42$, $p < 0.001$	$F = 4.13$, $p = 0.006$	$F = 33.08$, $p < 0.001$	$F = 21.98$, $p < 0.001$	$F = 5.94$, $p < 0.001$
Education	$F = 21.84$, $p < 0.001$	$F = 4.78$, $p = 0.008$	$F = 3.46$, $p = 0.03$	$F = 10.92$, $p < 0.001$	$F = 8.01$, $p < 0.001$
Work status	$F = 11.50$, $p < 0.001$	$F = 13.43$, $p < 0.001$	$F = 15.15$, $p < 0.001$	$F = 15.71$, $p < 0.001$	$F = 20.63$, $p < 0.001$
Income	$F = 18.50$, $p < 0.001$	$F = 6.07$, $p < 0.001$	$F = 9.00$, $p < 0.001$	$F = 12.26$, $p < 0.001$	$F = 10.98$, $p < 0.001$
Dwelling ownership	$F = 6.68$, $p < 0.001$	$F = 7.07$, $p < 0.001$	$F = 8.14$ $p < 0.001$	$F = 9.68$, $p < 0.001$	$F = 7.40$, $p < 0.001$
Aboriginal Torres Strait Islander	$t = 2.14$, $p = 0.03$	$t = 1.67$, $p = 0.12$	$t = -2.24$, $p = 0.04$	$t = 0.09$, $p = 0.93$	$t = -1.27$, $p = 0.23$
Pension	$t = 6.42$, $p < 0.001$	$t = 3.18$, $p = 0.002$	$t = 2.57$, $p = 0.01$	$t = 4.30$, $p < 0.001$	$t = -5.05$, $p < 0.001$

Table 4 summarises the demographic variables that were significantly associated with all of the scales. Marital status, work status, income and dwelling ownership were all characteristics significantly associated with all five scores.

Generally, variables with high mean scores for distress had low mean scores for well-being and vice versa, but there were two exceptions to this. Firstly, there was usually no significant difference in mean score between genders for the PW scales, but female gender was associated with higher scores of PD. Secondly living in a household with one or more children was significantly associated with higher scores for PW but there were no significant differences in mean scores for PD.

Discussion

The paper reports on a collection of 16 items from existing scales which as a total, captures the main dimensions of what the literature indicates as a consensus regarding the nature of psychological well-being: a sense of control, supportive social relations, and general satisfaction with life. The separate and the composite measures of PW are internally reliable, reasonably well correlated with each other, and negatively correlated with PD as expected.

The results indicate that if researchers wanted a briefer measure the 9-item scale formed from the factor analysis first component might be suitable, and if an even briefer measure were needed, the 5-item SWLS seems to be the best. Whether individual scales or the composite total is preferable for use may depend on specific research

questions. The separate scales are not so highly correlated amongst themselves (either different components of PW, or PW against PD), as to suggest that only one factor is being investigated. The findings do not provide strong support for the need to measure PW separately from PD. However if public acceptance of positively worded items were to prove higher, it may be necessary to modify expression of EM and PR items currently phrased negatively.

An important question remains about what range of scores may be of prime interest to researchers. Well-established measures of PD have cut-off points above which scores validly suggest the need for clinical assessment and intervention, for example "high PD" is approximately the top 10% of the range of scores on the K10. It is common to use cut-off points to describe proportions of the population who for example, are at risk of a bad outcome, are disabled in everyday life (e.g. employment), or who need extra services. The national mental health survey in Australia established strong links between mental disorders such as anxiety and depression and the likelihood of being disabled in carrying out usual activities (Andrews et al. 2001; Dear et al. 2002). But what cut-off scores are meaningful in discussing well-being? Are researchers and public health policy-makers going to be interested only in the top 10% of PW, or, as seems more likely, will they want to know about the sociodemographic and personal attributes of scorers in the top quartile or tertile? Keyes (2005) used tertiles and diagnoses modelled on the DSM-IIIR approach to distinguish those "flourishing" with complete mental health, from those "languishing", whose mental health places them between "moderately" well and those with mental illness. Huppert (2009) used these categories to advance the public health argument that shifting the average of the mental health distribution, even by a small change in score, would greatly increase the proportion of flourishing and decrease the languishing or mentally ill. Suggestions about how to achieve this small shift, such as school-based or worksite interventions (Huppert 2009) or more psychotherapy (Lamers et al. 2011) need to be seen in the context of more comprehensive prescriptions for mental health promotion (e.g. Herrman 2001).

Suggestions for future research

Further exploration of the applicability and predictive validity of the Overall well-being measure seems warranted, and comparisons with others such as the MHC-SF (Lamers et al. 2011) and the Warwick-Edinburgh Mental Well-being Scale (Tennant et al. 2007), are needed to evaluate the relative merits of different instruments.

Predictors of PW need to be explored further, and candidates would include both social determinants of health such as socio-economic status, and personal history factors such as parental rearing conditions and current satisfaction with social support. As a specific example, it would be extremely useful to gain insights into how parent attitudes to their children's achievements and failures in various areas of life, contribute to PW and resilience of those individuals in later life. Developmental changes with age also need more exploration. McMahan and Estes (2011) found that younger compared with older adults emphasised the experience of pleasure and self-development in their conceptions of well-being, while older people emphasised avoidance of negative experience more than younger ones, and there was no age difference in emphasis on making a contribution to others/making the world a better place. Westerhof and Keyes (2010)

concluded that although older adults have fewer mental health problems than do younger adults, they are not in better positive mental health.

The longitudinal consequences of PW can be hypothesised as improved quality of life and life expectancy, less frequent use of health services, and adaptive coping with a range of adverse events such as acute and chronic illness and disability, relationship disruptions, single parenthood, work stress and unemployment. In fact researchers could learn more about "resilience", by closer study of individuals who score high on PW despite living in what we know to be adverse circumstances, such as being unemployed, living alone, or having low education. Such studies are likely to require in-depth data collection in the form of interviews in order to enrich the scope of possible conclusions, by avoiding imposing preconceived ideas in the form of researcher-selected questions.

Regarding the relationship between PW and PD, numerous researchers have argued for the independence of positive and negative affect (e.g. Larsen et al. 2001; Warr et al. 1983), but Huppert's (2009) review concluded that well-being and ill-being have many common drivers. Keyes and colleagues (Keyes 2005; Lamers et al. 2011) have concluded there are separate but correlated axes of mental health and mental illness. The answer is unlikely to be categorical. For example Zautra et al. (2005) proposed that in times of low stress, positive and negative affect are relatively uncorrelated, but that in stressful situations they collapse to a simpler bipolar dimension. And McNulty and Fincham (2012) have recently shown that whether forgiveness, optimism, benevolent attributions and kindness have positive outcomes or not depends on the interpersonal context; this contextual dependence means that "Just as studying dysfunction cannot tell researchers how to promote flourishing ..... studying flourishing cannot tell us how to prevent suffering" (p.107). Therefore the extent to which PW and PD are independent of each other may vary according to the external and internal environmental challenges people face, and researchers will need to make choices about the value of measuring both, according to those considerations.

Conclusions

The total of 16 items from exisiting scales to measure well-being shows psychometric promise for community surveys, and shorter versions have here been recommended according to researcher needs. In a representative community sample of adults, psychological well-being and psychological distress were driven by very similar sociodemographic characteristics

The issue of appropriate cut-off scores needs further investigation, to determine if there are categories of relative PW which predict successful coping with serious stress, illness or adversity. There might for example be high utility in a measure of PW where scores within a given range could reliably predict benefits from interventions such as better education, psychoeducation, or access to health care.

Competing interests
The authors declare that they have no competing financial or nonfinancial interests.

Authors' contributions
HW conceived of the study, prepared the literature review and drafted the report, assisted by the other authors. TG and AT participated in the design of the study and were responsible for the data collection and analyses. RP contributed substantially to the data analyses and interpretation. All authors read and approved the final manuscript.

Acknowledgements
This study was funded as part of the Assessment of the Determinants and Epidemiology of Psychological Distress (ADEPD) study, through the Strategic Health Research Program 2007 – 2009, SA Health.

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Received: 31 January 2012 Accepted: 14 June 2012
Published: 25 June 2012

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doi:10.1186/2211-1522-2-3
Cite this article as: Winefield *et al.*: Psychological well-being and psychological distress: is it necessary to measure both? *Psychology of Well-Being: Theory, Research and Practice* 2012 **2**:3.