

Chapter 16

The PSC-4; A Short PSC Tool



Maureen F. Dollard

Abstract The aim of this chapter is to introduce the PSC-4 short tool created as a parsimonious measure of PSC, with the same domain coverage as the PSC-12 (canvassing the four domains of PSC), that could be used in research and practice with only four items. This chapter describes the evolution of the PSC concept and assessment tools, beginning with the original short 4-item scale that canvassed limited constructs, the development of the PSC-27 with increased domain coverage in terms of quantity and depth, refinement to the PSC-12, and then the development of the PSC-4 measure. In Study 1, starting with theory we consider the item in each of the four dimensions of PSC that best reflects the underlying theoretical construct. Then using cross-sectional and longitudinal data from the Australian Workplace Barometer telephone interview study we test the psychometrics of the four-item scale against competing scale constellations. We also assess the validity of the scale in a nomological network of theoretical concepts involving PSC. Next in Study 2, in an omnibus population study ($n = 2732$) using face to face interviews, we assessed the PSC-4 and then assessed reliability and validity of the tool, and how PSC related to mental health treatment. In Study 3, since PSC is proposed as a multilevel concept we sought to verify the multilevel factor structure of the PSC-4, this time using AWB multilevel data (31 organisations, 220 employees). PSC-4 psychometrics and predictive validity are as good as the PSC-12, implying support for the use of the parsimonious PSC-4 in research and practice.

16.1 Background to Development of PSC

The aim of this chapter is to introduce the PSC-4 short tool created as a parsimonious measure. This chapter describes the evolution of the PSC concept and assessment tools, and the development of the PSC-4 measure.

Psychosocial safety climate is defined as “policies, practices, and procedures for the protection of worker psychological health and safety” (Dollard, 2007). PSC

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largely reflects management values regarding the psychological health of workers and is assessed through shared worker perceptions of four constructs or domains: (1) the extent of management commitment and support for work stress prevention; (2) the priority for psychological health compared with productivity concerns; (3) organisational communication in relation to psychosocial risks and psychological health; and (4) the participation of employees from all organisation levels in the prevention of psychological distress.

The first published empirical test of PSC (Dollard & Bakker, 2010) used a four-item scale (slightly different from the new PSC-4 tool). The items used in the scale were derived by inductive processes. Through a review of the stress intervention literature and best practice principles of stress prevention endorsed by tripartite advisors the concepts for inclusion in a stress prevention tool were formulated (Dollard, 2012). Together with this information, several evidence-derived principles or key elements underlying successful stress prevention interventions were identified (European Agency for Safety and Health at Work (EASHW), 2002; Giga, Noblet, Faragher, & Cooper, 2003; Jordan et al., 2003; Kompier & Cooper, 1999; Kompier & Kristensen, 2001). Four items were selected and proposed by MD to a project working committee and these were approved for use in the study. Initially these four items were referred to as occupational health and safety best practice, but after considerable thought and with some knowledge of the safety climate literature (Zohar, 1980) the concept was more correctly labelled by MD as psychosocial safety climate. The following four principles or factors were identified in the first trounce of PSC.

The first PSC principle is, (1) senior management shows support for stress prevention through involvement and commitment. This principle is highlighted as crucial for stress prevention (Kompier & Cooper, 1999). Top management involvement and commitment is necessary to ensure that work stress is prevented, that worker demands are manageable and that adequate resources are provided to ensure that workers can manage demands, or have enough resources to implement workplace changes; moreover top management involvement may increase the sustainability of organizational changes to prevent stress, through adequate resourcing and the integration of activities into routine management systems (EASHW, 2002).

The second PSC principle is, (2) participation and consultation in occupational health and safety issues occurs with employees, unions, and occupational health and safety representatives. When workers are empowered to be involved in decision making this can lead to an increased sense of ownership and improved organizational outcomes (Bond & Bunce, 2000; Jordan et al., 2003; Landsbergis & Vivona-Vaughan, 1995; Nytrø et al., 2000). Evidence suggests that worker participation is an essential ingredient for stress prevention (Kompier & Cooper, 1999). Another important aspect is to use participatory approaches to create solutions for work stress problems (Cox, Randall, & Griffiths, 2002), and ensure that structures and process exist to enable upward communication from staff on the front-line to management about stress problems (Jordan et al., 2003).

The third PSC principle is, (3) the organisation should listen to occupational health and safety concerns of workers. Workers develop a sense of control when given a voice at work (Rosecrance & Cook, 2000), which can lead to increased responsibility,

and ownership of ideas (Dollard, Le Blanc, & Cotton, 2008; Pasmore & Friedlander, 1982).

The fourth PSC principle is, (4) to prevent workplace stress, all layers of the organisation are involved. Evidence suggests that stress prevention is more likely to succeed if there is a recognition or philosophy in the organisation about the co-relationship between the individual and organisational health, and that recognises that every member of the organisation has a responsibility in stress prevention and management (Jordan et al., 2003). These principles were used to construct the first measure of PSC which tapped management commitment, communication, involvement and participation. As recommended by Hinkin (1995), a 5-point response scale was used with the response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Several results regarding the psychometric properties of the original four PSC items, reported in Dollard and Bakker (2010) in their study of education workers, are worth mentioning. As reported in Dollard and Bakker (2010), a principal components analysis of these four items, with varimax rotation, generated a one factor solution that explained 65% of the variance. Each of the items loaded significantly on one factor (factor weights in brackets): (1) “senior management show support for stress prevention through involvement and commitment” (0.83); (2) “participation and consultation in occupational health and safety issues occurs with employees, unions, and occupational health and safety representatives” (0.89); (3) “my contributions to resolving occupational health and safety concerns in the organization are listened to” (0.85); and (4) “in practice, the prevention of stress involves all layers of the organization” (0.62). The alpha value was 0.81.

Using data from another human service agency, they found that the four-item version correlated highly with an expanded 12-item version of the scale (see Taylor et al., 2019, Chap. 8, this volume). They also found that the four items loaded on one factor, which after varimax rotation, accounted for 57% of the variance; that measure correlated with psychological distress ($r = 0.30, p < 0.01$), emotional exhaustion ($r = 0.25, p < 0.01$), and engagement ($r = 0.26, p < 0.01$).

Moreover several metrics indicated that the measure had properties consistent with a climate construct (Dollard & Bakker, 2010). The data were nested with responses from $N = 209 - 288$ workers nested in 18 schools. When PSC was aggregated to the unit level the level of within unit agreement was adequate as assessed using the James, Demaree, and Wolf (1984) mean $r_{(WG)(j)}$ agreement index = 0.76, $SD = 0.18$, range = 0.38 – 0.98. Moreover there were significant differences between units, with the ICC1 indicating that 22% of the variance in PSC could be explained by random school level factors. These aspects, homogeneity of perceptions within schools, in combination with differences between schools, suggested that PSC was a climate construct, and justified aggregating PSC to the school level (Bliese, 2000). In longitudinal multilevel relationships PSC reduced demands, increased resources, decreased distress, and increased engagement over time. Moreover PSC predicted the well known mechanisms of the Job Demand-Resource model, predicting the health erosion and motivation pathway, leading researchers to conclude that PSC was a “cause of the causes” and a factor that extended the JD-R model to the organisational

level. The empirically confirmed functionality of PSC in this nomological network as theorised is evidence in support of its construct validity. Moreover PSC aggregated to the organisational level correlated with objective aggregate sickness absence data supplied by the organisation, Spearman $\rho(18) = -0.56, p < 0.05$, further confirming the construct validity of PSC as indicated by the original four item scale.

Despite the promising psychometric results for the original four item PSC measure, in the development of psychometric measurement tools, Hinkin (1995) argues for a balance between parsimony and adequate domain sampling. The next step was to review (with Samantha Kang) the safety literature for insights into the common domains that underlie stress prevention and safety climate. Cox and Cheyne (2000) completed a qualitative and quantitative evaluation of the safety literature and identified the following domains; management commitment, communication, priority of safety, safety rules and procedures, supportive environment, involvement, personal priorities and need for safety, personal appreciation of risk, and work environment. Likewise Griffin and Neal (2000) identified five safety climate factors; management values, safety communication, safety practices, safety training, and safety equipment. Next we looked for commonalities between these domains and the stress prevention principles. The common domains were management commitment and support, communication and involvement. The “priority given to safety compared to production” was not previously identified in the stress prevention area but applied to the issue of psychological health and safety made a lot of sense. According to our view, supported by empirical evidence, much work stress is related to work pressure (Karasek & Theorell, 1990) and this often comes from productivity demands. Items for the selected domains, management commitment and support; safety priority, communication, organisational participation and involvement were selected from a variety of safety science sources (Cox & Cheyne, 2000; Gershon et al., 2000; Pronovost et al., 2003) for inclusion in the scale as documented in Hall, Dollard, and Coward (2010). Next we added the additional items used by Dollard and Bakker (2010) using the evidence from occupational stress research and principles into the remaining domains. With these additions the domain coverage had increased (now four domains) with depth (more items per scale), so we sought to reduce the scale to 3 items per domain. The process of item reduction is reported in Hall et al. (2010) and resulted in the PSC-12 scale (see Table 16.1).

Despite these reductions industry and some researchers have sought a shorter scale, mainly for cost reasons such as the cost of employees time to complete the survey, the ever increasing size of employee surveys, and the cost of administering surveys. The aim of this study was to develop a 4-item scale using one indicator from each of the four domains. We used cross-sectional and longitudinal data from the Australian Workplace Barometer project to test the psychometrics of the four-item scale against competing scale constellations. We also tested the four-item scale in a nomological network of theoretical concepts involving PSC.

Table 16.1 PSC-12 and PSC-4; domains and items

<i>Management support and commitment</i>
1. In my workplace senior management acts quickly to correct problems/issues that affect employees' psychological health
2. Senior management acts decisively when concern of an employees' psychological status is raised
3. *Senior management show support for stress prevention through involvement and commitment
<i>Management priority</i>
4. Psychological well-being of staff is a priority for this organization
5. Senior management clearly considers the psychological health of employees to be of great importance
6. *Senior management considers employee psychological health to be as important as productivity
<i>Organisational communication</i>
7. *There is good communication here about psychological safety issues which affect me
8. Information about workplace psychological well-being is always brought to my attention by my manager/supervisor
9. My contributions to resolving occupational health and safety concerns in the organization are listened to
<i>Organisational involvement and participation</i>
10. Participation and consultation in psychological health and safety occurs with employees', unions and health and safety representatives in my workplace
11. Employees are encouraged to become involved in psychological safety and health matters
12. *In my organization, the prevention of stress involves all levels of the organization

Note PSC-4 Items are asterisked. Adapted from Hall et al. (2010)

16.2 Psychometric Testing of PSC-4: Study 1

16.2.1 Method

16.2.1.1 Procedure

Starting with theory we considered the best items in each of the four dimensions of PSC to reflect the underlying theoretical construct (see Table 16.2). Then we tested the psychometrics of the PSC-4. Some preliminary analysis showed these items related slightly better than the others in relation to a range of outcomes. Here we consider the performance of the scale as a whole. The following statements concern the psychological health and safety in your workplace. Please answer with the best option provided.

Table 16.2 Psychosocial safety climate (PSC-4) © Maureen Dollard University of South Australia

	1	2	3	4	5
1. Senior management show support for stress prevention through involvement and commitment	Strongly Disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Neither agree or disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
2. Senior management considers employee psychological health to be as important as productivity	Strongly Disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Neither agree or disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
3. There is good communication here about psychological safety issues which affect me	Strongly Disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Neither agree or disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
4. In my organisation, the prevention of stress involves all levels of the organization	Strongly Disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Neither agree or disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Participants

Participants were recruited from the Australian Workplace Barometer study, a national longitudinal telephone interview study with three waves of data, from 2009 to 2014–15. Participants were recruited randomly from the Australian Electronic White Pages (in all three waves) and a directory of Australian mobile phone numbers (in the third wave, see Dal Grande, Chittleborough, Campostrini, Dollard, & Taylor, 2016). Repeat and new participants were sent letters informing them of the study purpose and the telephone interview procedure (see Dollard & Bailey, 2014 for detailed sampling process).

Recruitment for the study began with a pool of 20,000 phone numbers from the Australian Electronic White Pages (AEWP), which provided a total of 2790 participants after invalid phone numbers and those unwilling or unsuitable to participate were excluded. Data were collected from participants who were in paid employment. In 2009 participants were from NSW ($n = 1074$) and WA ($n = 1156$). In 2010, participants from NSW ($n = 725$) and WA ($n = 804$) were reinterviewed, and new participants from SA ($n = 1143$) were included. In 2011 participants from SA ($n = 1043$) were re-interviewed and new interviews from ACT ($n = 225$), Tas ($n = 416$), and NT ($n = 170$) were added. In 2014–15 participants were from all Australian states and territories, NSW ($n = 697$), WA ($n = 700$), SA ($n = 723$), ACT ($n = 242$), Tas ($n = 307$), NT ($n = 164$), with new participants from Queensland ($n = 708$), and Vic ($n = 701$) added. For data analysis the separation of data points, creating longitudinal data, was deemed more important than date of testing. The data points were organised as follows; Time 1 (2009–2010), NSW, WA, SA ($n = 3372$); Time 2 (2010–2011), NSW, WA, SA, ACT, NT, Tas ($n = 3066$), and Time 3 (2014–2015), all states ($n = 4242$). Using the latest Australian Bureau of Statistics (ABS) Labour Force Survey, weighting was applied to the data to ensure the sample was representative of the populations of the respective states and territories.

The participants ($N = 7331$) consisted of slightly more females ($n = 3949$) than males ($n = 3380$) with an average age of 46 years at Time 1, 49 years at Time 2 and 48 years at Time 3. Approximately 45% of the participants ($n = 3292$) took part in at least two waves of data, including approximately 16% ($n = 1184$) who took part in all three waves. Participants were from a broad range of occupations (including professional work, manager or administrator, labourer, clerical and sales, tradesperson, technician) and industries (such as health and community services, education, retail trade, manufacturing, construction, government administration and defense). Additional demographics of the sample are available (Dollard & Bailey, 2014).

Measures

Psychosocial Safety Climate. Psychosocial Safety Climate was measured using the PSC-12 a 12 item questionnaire encompassing four sub-scales: Management commitment and support, management priority, organisational communication, and

participation (Hall et al., 2010). Each sub-scale consists of three questions with responses scored on a five-point Likert scale, from 1 = *strongly disagree* to 5 = *strongly agree*. We selected from these the four relevant items to construct the PSC-4 as discussed.

Statistical Analysis

First we tested the reliability of the PSC-4. Next we assessed the stability of the PSC-4 (i.e., test re-test reliabilities), and correlations between the PSC-12 and the PSC-4, across time and within time. We also assessed correlations between the PSC measures and a range of work environment, health and engagement outcomes. In analyzing correlations we refer to Cohen (1992), where $r \geq .1$ implies a small effect, $r \geq .3$ a medium effect and $r \geq .5$ a large effect.

To test the construct validity of PSC we constructed a nomological network (e.g., the PSC extended JD-R theory) to assess how it operated among a system of constructs. We tested the PSC model using structural equation modelling (SEM) and IBM SPSS AMOS 24 software (Arbuckle, 2016) to assess the hypothesised model, alternating the PSC-12 and PSC-4 measures, while testing mediation effects and controlling for measurement error (Holmbeck, 1997).

To assess and compare the fit of the two models we used a range of goodness-of-fit tests (cf. Jöreskog & Sörbom, 1993); the χ^2 goodness-of-fit statistic; the root mean square error of approximation (RMSEA); the goodness of fit index (GFI); the comparative fit index (CFI); and the normed fit index (NFI). We also used the AIC, Akaike information criterion, lower values indicating better fit. Values of 0.90 or higher for GFI, CFI and NFI are indicative of a good fit (Hoyle, 1995) whereas RMSEA values smaller than or equal to 0.08 are an acceptable fit (Schermelleh-Engel et al., 2003).

16.2.2 Results

As shown in Table 16.3 the means and standard deviations for the respective PSC measures (PSC-12 and PSC-4) were similar across measures. One point to note is a better response rate for the shorter PSC-4.

As shown in Table 16.4 the reliabilities for the PSC-12 measure were very high ranging from 0.93 to 0.94; the reliabilities for the PSC-4 measure ranged from 0.87 to 0.88, high and acceptable. For the PSC-12 the lowest intercorrelation between items was 0.40 and for the PSC-4 it was 0.58 (not tabled). In relation to stabilities or test-retest reliability (magnitude of agreement between time points), as shown in the Table 16.4 shows the intercorrelations between PSC-12 measures across time correlated from 0.61 to 0.45, showing large effects. The intercorrelations between PSC-4 measures across time were slightly lower but nevertheless on average were large, ranging from 0.57 to 0.42.

Table 16.3 Mean, standard deviations and range of PSC-12 and PSC-4

	N	Minimum	Maximum	Mean	SD
PSC-12 Time 1	3030	12.00	60.00	40.67	10.28
PSC-12 Time 2	2696	12.00	60.00	40.26	10.31
PSC-12 Time 3	3736	12.00	60.00	40.72	10.35
PSC-4 Time 1	3232	12.00	60.00	40.09	11.31
PSC-4 Time 2	2854	12.00	60.00	39.55	11.37
PSC-4 Time 3	3994	12.00	60.00	40.17	11.37

Note For comparison we multiplied each PSC-4 scale, item adjusted, by 12

Table 16.4 Correlations between PSC-12 and PSC-4 measures

	1	2	3	4	5	α
1. PSC-12 Time 1						0.94
2. PSC-12 Time 2	0.61**					0.93
	1786					
3. PSC-12 Time 3	0.45**	0.46**				0.94
	1076	1217				
4. PSC-4 Time 1	0.96**	0.58**	0.43**			0.87
	3030	1881	1123			
5. PSC-4 Time 2	0.58**	0.96**	0.43**	0.57**		0.88
	1864	2696	1269	1972		
6. PSC-4 Time 3	0.42**	0.44**	0.96**	0.42**	0.43**	0.87
	1135	1277	3736	1194	1339	

Note ** $p < 0.01$ level (2-tailed); sample size is printed below r value; α , alpha coefficients

In relation to the magnitude by which the PSC-12 and PSC-4 related to each other within time, as an estimate of how well PSC-4 represents the domain coverage of PSC-12 we also noted consistently high correlations of 0.96 (shown in Table 16.4).

To determine how well the PSC-4 single items representing each domain corresponded to the PSC-12 parallel domain (3 items added together) we conducted additional correlations. As shown in Table 16.5, each item had a strong correlation with the parallel conceptual domain operationalised in the PSC-12 ($r > 0.83$).

As shown in Table 16.6, there were 63 pairs of correlations (63 each for the PSC-12 and PSC-4), with measures of work conditions, bullying, health and engagement (for a description of the measures see Dollard & Bailey, 2014). These correlations are within time (cross-sectional) and across time (longitudinal). There were 23 occasions when PSC-12 correlated more strongly with the criterion measures; there were 22 occasions when the PSC-4 correlation was higher than PSC-12; and there were 18 occasions when the correlations were identical. More scientifically we used the Fisher r-to-z transformation to determine if the r values were significantly different at $p < 0.05$ (2 tailed). There was only one occasion when PSC-12 correlations were

Table 16.5 Correlations between parallel PSC-12 domains and PSC-4 items

PSC-12 domains	PSC-4 items		
	Time 1	Time 2	Time 3
Management support and commitment	0.87 3236	0.88 2888	0.88 4039
Management priority	0.90 3299	0.91 2923	0.91 4080
Organisational communication	0.88 3210	0.88 2823	0.88 3976
Organisational involvement	0.84 3161	0.83 2810	0.84 3842

Note All correlations significant at $p < 0.01$ level (2-tailed); sample size is printed below r value

significantly higher than PSC-4, and no occasions when PSC-4 correlations were significantly higher than PSC-12 (significant correlation in bold). In other words the PSC-12 and the PSC-4 had the same predictive power in relation to a range of work, health and engagement outcomes.

The r values shown cross-sectionally are in general medium effects and across time, the effects are small, despite if considering work conditions or health and engagement outcomes.

The fit of the nomological model, when PSC-12 was used as the PSC measure, was very good as shown in Table 16.7. The fit was slightly better than when PSC-4 was used in the model, but the PSC-4 was a good alternative for PSC-12. The PSC model is shown in Fig. 16.1; as can be seen the paths that were affected by PSC, between PSC and psychological demands and resources were fairly similar, and between PSC and engagement, were identical.

16.2.3 Discussion

In sum, the PSC-4 shows a very high concordance with PSC-12. It is a stable construct showing a large test-retest reliability. The PSC-4 relates to a range of work conditions, health and engagement outcomes across time as expected, and the strength of associations were consistent with those involving PSC-12. Moreover the PSC-4 had good internal reliability. Finally each of the single items representing the four domains in the PSC-4 were very strongly related to the parallel 3 item conceptual domains represented in the PSC-12. Moreover in a nomological network testing the fundamental relationships specified in PSC theory, the strength of the relationships, and the fit of the overall model were almost identical when the PSC measures were used interchangeably.

Table 16.6 Cross-sectional and longitudinal intercorrelations between PSC-12 and PSC-4

	Time 1		Time 2		Time 3	
	PSC-12	PSC-4	PSC-12	PSC-4	PSC-12	PSC-4
Psychological demands T1	-0.27** 3030	-0.31** 3232	-0.19** 2696	-0.20** 2854	-0.15** 1478	-0.15** 1571
Emotional demands T1	-0.26** 2992	-0.28** 3184	-0.17** 1933	-0.19** 2038	-0.16** 1148	-0.16** 1221
Skill discretion T1	0.25** 3030	0.20** 3232	0.10** 2696	0.08** 2854	0.09** 1478	0.07** 1571
Decision authority T1	0.33** 3030	0.30** 3232	0.17** 2696	0.15** 2854	0.15** 1478	0.15** 1571
Work engagement T1	0.35** 3030	0.33** 3232	0.22** 2696	0.22** 2854	0.18** 1478	0.17** 1571
Emotional exhaustion T1	-0.35** 3030	-0.36** 3232	-0.21** 2696	-0.22** 2854	-0.21** 1478	-0.21** 1571
Psychological distress T1	-0.23** 3030	-0.23** 3232	-0.16** 2696	-0.16** 2854	-0.17** 1478	-0.16** 1571
Psychological demands T2	-0.14** 3030	-0.18** 3232	-0.30** 2696	-0.32** 2854	-0.17** 1478	-0.18** 1571
Emotional demands T2	-0.14** 1953	-0.17** 2074	-0.25** 2667	-0.26** 2818	-0.14** 1303	-0.16** 1382
Skill discretion T2	0.10** 3030	0.09** 3232	0.17** 2696	0.15** 2854	0.03 1478	0.01 1571
Decision authority T2	0.15** 3030	0.15** 3232	0.31** 2696	0.29** 2854	0.17** 1478	0.15** 1571
Work engagement T2	0.19** 3030	0.18** 3232	0.35** 2696	0.34** 2854	0.22** 1478	0.21** 1571
Emotional exhaustion T2	-0.19** 3030	-0.22** 3232	-0.36** 2696	-0.36** 2854	-0.23** 1478	-0.23** 1571
Psychological distress T2	-0.12** 3030	-0.12** 3232	-0.28** 2696	-0.28** 2854	-0.19** 1478	-0.19** 1571
Psychological demands T3	-0.15** 1209	-0.18** 1282	-0.16** 1355	-0.18** 1426	-0.28** 3736	-0.30** 3994
Emotional demands T3	-0.08** 1197	-0.11** 1265	-0.14** 1347	-0.16** 1416	-0.26** 3688	-0.27** 3937
Skill discretion T3	0.10** 1209	0.09** 1282	0.09** 1355	0.06** 1426	0.20** 3736	0.18** 3994
Decision authority T3	0.14** 1209	0.15** 1282	0.17** 1355	0.15** 1426	0.34** 3736	0.32** 3994
Work engagement T3	0.21** 1209	0.21** 1282	0.26** 1355	0.26** 1426	0.37** 3736	0.36** 3994
Emotional exhaustion T3	-0.20** 1209	-0.21** 1282	-0.25** 1355	-0.25** 1426	-0.35** 3736	-0.36** 3994
Psychological distress T3	-0.19** 1209	-0.18** 1282	-0.20** 1355	-0.20** 1426	-0.29** 3736	-0.29** 3994

Note ** $p < 0.01$; * $p < 0.05$; values are r values; sample size is printed below r value; highlighted values are significantly different r values; shaded area are cross-sectional

Table 16.7 PSC model fit alternating PSC-12 and PSC-4

	χ^2	df	GFI	CFI	NFI	RMSEA	AIC
PSC-12	271.40	14	0.98	0.98	0.96	0.078	315.40
PSC-4	274.96	14	0.98	0.96	0.95	0.078	318.96

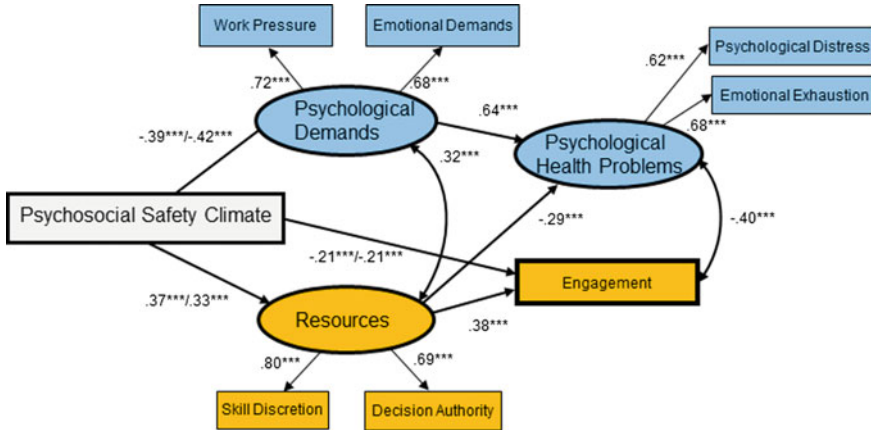


Fig. 16.1 Nomological network alternating PSC measures. *Note* Beta values for the PSC-12 paths are shown to the left of the / and PSC-4 paths are on the right. Sample size is 3029

16.2.4 Limitations and Strengths

There are however some caveats to these conclusions. First, the test we conducted here derived the PSC-4 data from PSC-12 data. Therefore when answering the four items, the items are contextualised by the other eight items. Exposure to the other items could cause a kind of priming effect so that the PSC-4 results may not be as “independent” as desirable from the PSC-12 when testing psychometrics. Nevertheless one way to test the validity of the PSC-4 is to correlate it with the PSC-12 and this can be achieved at least at the individual level if both PSC measures are asked. One solution would be to use the PSC-12 on one occasion and the PSC-4 only on a separate occasion. Second, we did not test the PSC-4 versus the PSC-12 using multilevel modelling. The data base was derived from a large scale population based study where not all data could be aggregated to the organisation level—for this study we used the opportunity to assess the effects of PSC at the individual level with maximal power to uncover effects. Third, we chose to use a theory driven approach to derive the four PSC items, rather than an Item Response Theory (IRT) approach as Huang et al. (2017) did in shortening a safety climate measure. Using a quantitative approach could lead to different item selection, but we feel that the four items as proposed work very well. Fourth, as in any study the interpretation of the meaning of words contained in scale items is assumed to be similar. We do not know precisely how individual workers perceived the word “senior management” or “organization”.

Nevertheless across a wide range of occupations and industries, the PSC construct as operationalised behaves as expected providing some evidence of generalisable conceptual clarity. Next we explore results from a study that used the PSC-4 only, again at the individual level.

16.3 Psychosocial Safety Climate and Treatment for Mental Health Problems: Study 2

We undertook further assessment of the reliability and validity of the PSC-4 tool in a South Australian population health omnibus study in 2014 ($n = 2732$) which involved a face to face interview survey.

16.3.1 Method

16.3.1.1 Procedure

Surveys were administered face-to-face with 2732 people as part of an omnibus public health survey. The sampling method as reported in Harrison Research (2015) states that for the metropolitan sample 390 statistical areas were selected from South Australia and the Statistical Area Level 1 used by the Australian Bureau of Statistics in the 2011 Census, with the probability of selection proportional to their size. From a randomly selected starting point, with a skip pattern for every fourth household, 10 dwellings were chosen. For the country sample, all cities/town with a population of 10,000 or more in the 2011 Census were selected. Most were selected from centres with a population of 1000 or more, with the probability proportional to size. A cluster of 10 dwellings per centre was selected. For both samples, one person was selected per dwelling; in the case of more than one person aged 15 or over in the household, the respondent was the last person to have a birthday. Ethics was obtained from the University of Adelaide Human Research Ethics Committee.

Sample

Ages ranged from 15 to 75 and over. There were rather equal numbers of men ($n = 1343$, 49%) and women ($n = 1389$, 51%) in the sample. Most were married ($n = 1708$, 62.5%), most were born in Australia (1940, 71%), the UK and Ireland ($n = 254$, 9.3%), Asia ($n = 275$, 10.1%) or elsewhere in Europe ($n = 140$, 6.3%). Around 2% of the sample was Aboriginal or Torres Strait Islander. Income ranged from up to \$12,000 to \$180,000 annual household income, and the median household income was between \$80,000 and \$120,000. The median educational level was trade

qualification/apprenticeship, but the frequencies were bi-modal (22% left school after the age of 15, and 23% had a bachelor degree or higher).

Response Rate

From the 5200 households selected, 2732 interviews were conducted with a response rate of 54.5%. For rates of personal behaviour, such as treatment for mental health problems, a weighting was applied, which adjusts data to align each case better with age, gender, and geographic location distribution in the total population. The weight also adjusts the data for the probability of being selected within the household with reference to the total number of people residing in the house.

Measures

Participants were asked for their gender (1 = male, 2 = female), age, and country of birth, and marital status, education level (1 = still at school, 2 = left school at 15 years or less, 3 = left school after age 15, 4 = left school after age 15 but still studying, 5 = trade qualification/apprenticeship; 6 = certificate/diploma-one year full time or less, 7 = certificate/diploma-more than one year full time, 8 = bachelor degrees or higher, 9 = not stated) and annual household income of all household members after tax (on a scale from 1 to 13 indicating gradations of income in values up to \$12,000 to over \$180,000).

Mental health treatment was assessed with a single item, “Are you currently receiving treatment for anxiety, depression, or any other mental health problem?” (1 = yes, 0 = no).

Psychosocial Safety Climate. This was assessed using the PSC-4. Responses range from 1 (*strongly disagree*) to 5 (*strongly agree*), with options for don’t know and refused. The alpha coefficient was $\alpha = 0.91$.

For some PSC analyses we examined only those who were working, $n = 1290$ (842 were full-time, and 448 part-time). Of those who were working 8% ($n = 103$) reported receiving treatment for mental health.

To deal with missing data, for the logistic regression analysis we deleted 9 cases that had missing data on each PSC item. We constructed the mean score for the PSC scale by determining the mean across items when at least 2 items were answered in the scale (7 cases with 2 responses).

16.3.2 Results

As shown in Table 16.8 there was a high correlation between items, and the alpha coefficient was 0.91. Means, standard deviations and frequency of responses by item are shown in Table 16.9.

Table 16.8 Intercorrelations between PSC Items

	1	2	3
1. Senior management shows support for stress prevention through involvement and commitment			
2. Senior management considers employee psychological health to be as important as productivity	0.80**		
3. There is good communication in my organisation about psychological safety issues which affect me	0.71**	0.71**	
4. In my organisation, the prevention of stress involves all levels of the organisation	0.60**	0.62**	0.64**

Note n = 1184. © Maureen Dollard, 2019

The variance in PSC due to country of birth overall was not significant, $F(12, 1172) = 1.34, p < 0.19$ (see Table 16.10). Australian born workers reported less PSC than those born in some other countries (Asia, South America, both significantly more) but higher than those born in North America. There was no difference in PSC by educational level, $F(7, 1169) = 0.67, p < 0.70$.

As shown in Table 16.11 occupations with at least 10 representatives reporting the highest levels of PSC were sales representatives, hairdressers and call centre workers; occupations reporting the lowest levels of PSC were other hospitality workers, general clerks and social workers.

There was no significant difference in PSC level by work status (work full-time vs. work part-time), $F(1, 1284) = 2.69, p = 0.10$. However we found a significant difference in receiving treatment for anxiety, depression, or other mental health problem depending on work status, $F(10, 2719) = 16.59, p < 0.001$ (see Table 16.12). Post hoc analysis using LSD and full-time work as the reference group (reading down the relevant columns in 16.12), we found that groups such as being employed part-time, working home duties, being retired, and not working because of work related injury or disability had significantly higher rates of being in treatment for mental health issues. When employed (working) part time was the reference group, only the not working because of injury or disability groups had significantly higher levels of “in treatment” status.

We then assessed the PSC of the employed work groups at low levels of PSC. We used the $PSC \leq 37$ as the cut point for low PSC (Bailey et al., 2015); this was 3.08 on an item adjusted scale (rated 1–5). We found no significant differences in treatment levels within the work full time group between high and low PSC conditions. There was however a significant increase in treatment levels of the work part time group at high and low levels of PSC, $F(1, 409) = 4.15, p < 0.05$ (high PSC, $M = 0.11, SD = 0.31, n = 281$; low PSC, $M = 0.18, SD = 0.39, n = 131$).

Next we considered if the differences between groups would change if the work conditions of the employed groups was poor. There were significant differences between groups, $F(10, 1943) = 13.94, p < 0.001$. We found that at low levels of PSC the work full-time group mean rate of medical treatment for mental health problems increased, but remained significantly lower than those in work part-time,

Table 16.9 Means, standard deviation, and frequency on response options for the PSC-4

	M	SD	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Don't know	Refused
1. Senior management shows support for stress prevention through involvement and commitment	3.60	1.28	102 (3.7%)	220 (8.1%)	120 (4.4%)	533 (19.5%)	303 (11.1%)	21 (0.8%)	.1 (0.2%)
2. Senior Management considers employee psychological health to be as important as productivity	3.51	1.31	110 (4.0%)	255 (9.3%)	128 (4.7%)	501 (18.4%)	281 (10.3%)	23 (0.8%)	3 (0.1%)

(continued)

Table 16.9 (continued)

	M	SD	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Don't know	Refused
3. There is good communication in my organisation about psychological safety issues which affect me	3.44	1.30	113 (4.1%)	262 (9.6%)	164 (6.0%)	496 (18.1%)	239 (8.7%)	26 (1.0%)	2 (0.1%)
4. In my organisation, the prevention of stress involves all levels of the organisation	3.59	1.31	89 (3.3%)	251 (9.2%)	133 (4.9%)	529 (19.4%)	233 (8.5%)	64 (2.4%)	2 (0.1%)

Note n = 1302, note this is weighted data so the n is different from the actual number 1184. © Maureen Dollard, 2019

Table 16.10 PSC levels by country of birth

	<i>N</i>	<i>M</i>	<i>SD</i>
Australia	884	3.41	1.11
UK and Ireland	105	3.43	1.20
Italy	5	3.80	1.05
Greece	4	3.38	1.16
Holland	6	3.33	1.06
Germany	5	4.20	0.69
Other European	24	3.33	1.32
New Zealand	15	3.29	1.24
African Country	18	3.55	1.17
Asian Country	97	3.69	0.86
South America	5	4.40	0.45
North America	5	2.62	1.50
Oceania	3	3.25	1.55
Total	1177	3.44	1.11

Note Weighted data

home duties, and not working because of injury or disability. Treatment levels for those in full-time work with poor PSC were not different than those of the retired (previously the retired had higher rates).

For those in work part-time, the treatment rate also increased and became significantly higher than for those working part-time self-employed, but remained significantly lower than for those not working because of injury or disability.

Next we assessed the correlation between PSC and mental health treatment. The higher the PSC the lower the likelihood of mental health treatment (see Table 16.13). Mental health treatment was also more likely among older, those with lower education and less household income.

Regression analysis considering all the predictors simultaneous confirmed that age, income, and PSC remained in the model as significant predictors of mental health treatment (see Table 16.14), the -2 Log likelihood was 687.39 and the Nagelkerke R Square was 0.04. Of interest a similar model was run predicting smoking; younger, male, less educated, and lower household income employees were more likely to smoke, but PSC was not related to smoking.

16.3.3 Discussion and Conclusion

The reliability of the PSC-4 was high, and slightly higher than that reported in Study 1. If Study 1 PSC-4 measures were influenced through priming by other PSC-12 items, we would expect this coefficient, when assessed without the other PSC-12

Table 16.11 PSC levels by occupation

ANZSCO 1.2	Occupation	<i>N</i>	<i>M</i>	<i>SD</i>
6113	Sales representatives	11	4.16	0.83
3911	Hairdressers	12	4.06	0.88
5411	Call or contact centre workers	10	4.00	0.90
2211	Accountants	21	3.82	1.13
3411	Electricians	11	3.81	0.75
7331	Truck driver	14	3.76	0.99
2412	Primary school teachers	27	3.74	0.88
3513	Chefs	18	3.68	1.02
1421	Retail managers	11	3.64	0.99
4315	Electronic and office equipment tradespersons	15	3.61	0.96
4211	Child carers	13	3.57	1.06
4231	Aged and disabled carers	33	3.55	1.23
2544	Registered nurses	43	3.54	1.11
5521	Bank workers	19	3.49	1.17
5999	Miscellaneous clerical and administrative workers	55	3.45	1.16
2414	Secondary school teachers	28	3.38	1.08
3212	Motor mechanics	20	3.34	1.12
8999	Miscellaneous labourers	10	3.34	1.39
8211	Building and plumbing labourers	12	3.32	0.91
6211	Sales assistant	35	3.27	1.13
4114	Enrolled mothercraft nurses	14	3.25	0.98
2613	Software and applications programmers	16	3.22	1.30
4319	Other hospitality workers	13	3.22	1.20
5311	General clerks	12	3.22	1.02
2725	Social workers	11	3.15	1.21

Note Occupations with > 10 responses; PSC scores are item averages (range 1–5)

items, to be lower. The observation that this is not the case lends support that the results found in Study 1 are valid.

Using the PSC-4 we confirmed that PSC was a potential antecedent to reports of treatment for mental health problems. This effect was evident after controlling for age, gender, education level and household income. Workers in full-time work reported the lowest level of treatment for mental health problems, significant less than for workers in part-time, home duties, being retired, and not working because of work related injury of disability. When low PSC contexts were considered similar results were found for full time workers but now with higher levels of treatment levels were no different from the retired. For part-time workers at low levels of PSC,

Table 16.12 Receiving treatment for anxiety, depression, or other mental health problem by work status

Work status						Low PSC Work				
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>MD</i>	<i>MD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>MD</i>	<i>MD</i>
Work full time	775	0.07	0.26	Ref	*	282	0.09	0.28	Ref	*
Work full time—self employed	138	0.12	0.32							
Work part time	409	0.13	0.34	*	Ref	131	0.18	0.39	*	Ref
Work part time—self employed	98	0.07	0.26							*
Home duties	166	0.18	0.39	*					*	
Unemployed	70	0.17	0.38							
Retired	777	0.13	0.34	*						
Student	139	0.12	0.32							
Other	38	0.18	0.39							
Not working work related injury	18	0.61	0.50	*	*				*	*
Not working disability	102	0.47	0.50	*	*				*	*
Total	2730	0.13	0.34							

Note Low PSC was PSC item adjusted ≤ 3.08 ; *MD* mean difference; *Ref* reference category for the column; *significantly different from the Ref

Table 16.13 Correlation matrix of study measures

	1	2	3	4	5
1. Age					
2. Gender	0.02				
3. Education	-0.00	0.06			
4. Household income	-0.09**	-0.08*	0.07*		
5. PSC	-0.01	-0.01	0.01	-0.00	
6. Mental health treatment	0.08**	0.05	-0.06*	-0.10**	-0.06*

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

treatment rates became significantly higher than for the part-time self-employed. In all cases those working because of work related injury of disability maintained significantly higher rates of treatment. An outstanding question is whether PSC might have played a role in the group who were not working due to injury and disability. In general country of birth did not explain significant variance in PSC. There were some differences in perceptions of PSC according to where employees were born (lowest perceptions of PSC if born in Australia besides North America). Levels of

Table 16.14 Treatment for mental health issues

	B	S.E.	Wald	Exp(B)	Sig.
Age	0.02	0.01	3.91	1.02	0.05
Gender	0.25	0.21	1.36	1.28	0.24
Education	-0.08	0.05	2.88	0.92	0.09
Household income	-0.09	0.03	8.05	0.92	0.01
PSC	-0.17	0.09	3.94	0.84	0.05
Constant	-1.54	0.70	4.89	0.22	0.03

Note Weighted data (unweighted scores similar). Male = 1, Female = 2

PSC also varied by occupation. PSC was not related to age, gender, education or household income. PSC was not related to cigarette smoking among employees.

16.4 Multilevel Psychometrics, CFA for PSC-4: Study 3

Study 1 and 2 only assessed PSC-4 at the individual level. In Study 3 we assess its multilevel factorial structure.

16.4.1 Method

We selected a multilevel sample from Wave 1 of the AWB data (see Study 1). We first clustered the data by organisation. Then we selected those organisations into the sample where there were at least 3 participants per organisation. There were 220 employees from 31 organisations with average responses per organisation of 7.10.

16.4.2 Results

The ICCs and intercorrelations are shown in Table 16.15.

We used Mplus 7.4 to conduct a two-level CFA mixture model with continuous factor indicators on the PSC-4 items (PSC3, PSC6, PSC7, PSC12). The two-level CFA model was a good fit to the data; Chi-square ($df = 8$) = 6.09, $p = 0.63$; CFI was 1.00; TLI was 1.01; RMSEA was 0.00; SRMR (Standardized Root Mean Square Residual) within = 0.012, and between = 0.19; and AIC was 2244.33. Note the ICC's are quite small but this is not unexpected when sampling the general population and then matching data at the organisational level (e.g. personnel could work at very different locations) versus other sampling techniques where for instance organisations are chosen and samples are taken thereafter.

Table 16.15 Two-level CFA for PSC-4

	ICC1	MW	MB	PSC3	PSC6	PSC7	PSC12
PSC3	0.022	0.00	3.51		0.84	0.64	0.99
PSC6	0.023	0.00	3.21	0.71		0.94	0.81
PSC7	0.009	0.00	3.30	0.63	0.72		0.57
PSC12	0.025	0.00	3.30	0.62	0.72	0.70	

Note Correlations below the diagonal within organisations; above the diagonal are between; ICC, intraclass correlation; B, between; W, within

Table 16.16 Standardised factor loadings for two-level CFA for PSC-4

	StdYXW	StdYXB	RW	RSB
PSC3	0.783***	0.997***	0.61	0.994
PSC6	0.886***	0.998***	0.79	0.997
PSC7	0.815***	0.996***	0.66	0.991
PSC12	0.820***	0.997***	0.67	0.994

Note *** $p < 0.001$; the values in the column labelled Std are standardised parameter estimates. RS is R-square. W is within, B is between, organisations

The standardised factor loadings ranged from 0.78 to 0.87 in the within model, and from 0.996 to 0.998 in the between model, indicating a good fit. The PSC-4 showed good fit at both levels with CFI equal to 1.00, indicating a perfect fit (Table 16.16).

16.4.3 Discussion

The PSC-4 may be partialled into within and between group variance; within these partitions we found that the PSC-4 items all loaded significantly on the within or between group aspect of the factor, verifying its multilevel conceptual status. A potential limitation of the study is the extent to which the participants from the same organisation are representative of the organisation. It is not possible to ascertain this with the current sampling method.

16.5 General Conclusion

Based on the evidence regarding the reliability of the PSC-4 and its validity, its performance is at least as good as the longer PSC-12, and on this basis is recommended for research and practice. In practice however, although the PSC-4 covers each domain, its reduction in size may restrict guidance suggestions for PSC improvement. We

have only established the multilevel factor structure of the PSC-4; further validation of its multilevel status is required in nomological analyses.

Key Messages

- PSC-4 assesses the four theoretical domains of PSC with four items
- PSC-4 is a parsimonious, reliable valid measure of PSC showing predictive validity in relation to future demands, resources, distress and engagement
- PSC-4 is as reliable and valid as the PSC-12
- New evidence shows PSC as assessed by PSC-4 is negatively related to mental health treatment
- PSC-4 has a multilevel factor structure; further validation of its multilevel functioning is required
- PSC-4 may be used as an alternative to the PSC-12 but will give rise to less information about specific aspects to target in interventions.

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