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Building Psychosocial Safety Climate in Turbulent Times; The case of COVID-19

Maureen F. Dollard[1,2] and Tessa Bailey[1]

PSC Global Observatory, Centre for Workplace Excellence, University of South Australia[1]; Nottingham University[2]

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Abstract

Our theoretically driven cluster randomized cohort control study sought to understand how Psychosocial Safety Climate (PSC) – a climate to protect worker psychological health – could be built in different organizational change scenarios. We drew on Event System Theory to characterize change (planned vs shock) as an event (observable, bounded in time and space, non-routine) to understand how events connect and impact organizational behavior and features (e.g., job design, PSC). Event 1 was an eight month planned intervention involving training middle managers to enact PSC in work units and reduce job stressors. Event 2 was the shock COVID-19 pandemic which occurred mid-intervention (at 4 months). Three waves (T1, 0 months; T2, 4 months; T3, 8 months) of data were collected from experimental (295_{T1}, 224_{T2}, 119_{T3}) and control (236_{T1}, 138_{T2}, 83_{T3}) employees across 22 work groups. Multilevel analysis showed in Event 1 (T1T2) a significant Group X Time effect where PSC (particularly management priority) significantly increased in the experimental vs control group. Under Event 2 (T2T3), PSC was maintained at higher levels in the experimental vs control group but *both* groups reported significantly increased PSC communication and commitment. Results suggest that middle management training increases PSC within 4 months. Event 2, COVID-19 was shocking and its novelty, disruption, criticality and timing in Australian industrial history enabled a strong top management response, positively affecting the control group. PSC may be sustained and built in times of shock with *top management will*, the application of PSC principles, and a top-level pro-psychological health agenda.

Key words. Psychosocial Safety Climate; work stress intervention; organizational intervention; organizational climate; event system theory

Building Psychosocial Safety Climate in Turbulent Times; The Case of COVID-19

The COVID-19 pandemic has had a profound effect on organizations and workers globally. Many workers lost their jobs (Coibion et al., 2020) or work entitlements, were required to work from home, experienced technostress and isolation, and frontline workers such as healthcare workers experienced considerable emotional distress (Holton et al., 2020; Morgantini et al., 2020; Xiang et al, 2020). Yet some positive effects have surfaced such as the flexibility of work from home and the lack of commuting time (Sim, 2020). Maintaining, optimizing and improving worker psychological health even in times of crisis is important not only for human welfare but for organization and societal sustainability. What we do not yet know is how organizations can protect worker psychological health in steady state contexts (i.e., little change in the organizational system) and in the face of shock (e.g., a pandemic).

This research aims to address this issue and contribute to the literature in fresh ways. First organizational research and work stress research has largely ignored the impact of an external shock to the organization. Most work stress theories have focused on routine chronic work stressors. A large literature has investigated the psychological impact of trauma at work on the worker (Berger et al., 2012) but not the impact of trauma on the organization's response and operating systems. We use event systems theory (EST, Morgeson et al., 2015) and define change as an event that can vary in strength (reflecting an event's novelty, disruption and criticality (indicating what makes events meaningful and impactful)), space (highlighting where an event originates and spreads through an organization) and time (when it occurs and its duration) to understand how change can impact organizational behavior. While researchers have explored the impact of organizational shock on worker behavior, for example the impact of COVID-19 on work-family interface, job attitudes and behavior (Vaziri et al., 2020), missing to date is an appreciation of the organizational response: How does management respond in times of organizational shock to protect worker psychological health? We inform this question by applying EST perspectives to two events, Event 1, a planned organizational intervention, and Event 2, the COVID-19 pandemic, and use this characterization to compare the events to understand how workers can be protected.

Second, our research extends orthodox work stress theories that focus on chronic poor job design in steady state systems to explain worker psychological health. These theories neglect the context of the organization, such as the organizational climate and external factors that potentially influence situational risks and/or their impact. In steady state scenarios, neglecting the context may result in change efforts that are ineffective, exposing employees to unlawful and unnecessary risk. We draw on Psychosocial Safety Climate (PSC, Dollard & Bakker, 2010) theory, a specific organizational climate for worker psychological health and safety, to identify organizational responses in chronic steady state scenarios and we seek to understand how this theory relates to shock scenarios. In this original field investigation we seek to address a gap in the literature – how to build PSC – as called for by international labor policy makers (Wadsworth & Walters, 2019), in steady state and shock conditions. According to EST, event strength refers to how novel, disruptive, and critical the event is (Morgeson et al., 2015). We bring a novel perspective to the literature and consider whether proactive strategies can prepare organizations for shock (Morgeson et al., 2015). Can preparatory activities in building PSC help organizations to cope with future shock?

Third, we respond to calls to examine changes around discrete events using before and after designs (Bliese et al., 2017). We incorporate both variance- and process-oriented perspectives in an EST approach, and use events to understand stability and change, and explore how events command attention and impact organizations (Morgeson et al., 2015). We use a quasi-experimental cohort control organizational intervention design. We theorise that the way to build PSC is to practice it. Through adult learning principles we educate

experimental group organizational middle managers to enact or practice PSC (exercising a muscle makes the muscle stronger) as an approach to reduce risks associated with stressful job design, and in the process *increase* PSC in workgroups. We evaluate the intervention process and impact in the four months preceding the emergence of COVID-19 in Australia (in steady state), then for the next four months (shock state) as the pandemic began to take hold culminating in widespread work from home orders at eight months.

PSC Theory

PSC is defined as shared employee perceptions of the organization's policies, practices, procedures and systems for worker psychological health. There are four principles of PSC: (1) management commitment, (2) management priority, (3) organizational systems for communication, and (4) multi-stakeholder participation, for the prevention of work stress and to protect worker psychological health and safety. PSC is different theoretically from related constructs such as psychological safety climate (Edmonson, 1999, a climate for safe interpersonal risk taking in decision making), safety climate (Zohar, 1980, a climate for protecting workers from physical accidents and injuries) and perceived organisational social support (Eisenberger et al., 1986, the extent to which the organization cares about employee well-being but this construct does not canvas the protection of psychological health and systems to achieve this). The distinct construct validity of PSC has been confirmed empirically (Idris et al., 2012).

PSC theory proposes that in knowing about PSC we can predict future job design and psychological health. The reason is that in a high PSC context, managers are committed to preventing stress and will act quickly and decisively to correct stressors that affect worker psychological health; managers prioritise worker psychological health over productivity; and there is good communication and participation systems to detect pertinent stressors such as high job demands and low resources to either prevent or manage them. Many work stress theories such as the Job Demands-Control (Karasek 1979), Job Demand-Resources (Demerouti et al., 2001), and Effort-Reward Imbalance (Siegrist, 1996) theories highlight how job design can be injurious to worker psychological health, yet ignore known contextual precursors to job design such as organizational climate (Dollard & Bakker, 2010). PSC at low levels is proposed as a predictor of poor job design, and therefore a "cause of the causes" of work stress reactions such as emotional exhaustion, psychological distress and depressive symptoms (Zadow et al., 2019, review). PSC is confirmed empirically to be antecedent to the job design features of work stress theories (Dollard & Bakker, 2010; Dollard, Opie et al., 2012; Owen et al., 2016). Therefore for the greatest effect on worker psychological health it is optimal to target the most distal 'cause' of the problem, that is PSC (Dejoy et al., 2010).

The reason PSC is important is that ultimately it relates to worker psychological health. Taking JD-R theory we can explain how PSC relates to psychological health through job demands and resources (Dollard & Bakker, 2010). Jobs with high demands require greater sustained physical and mental effort to focus on substantive tasks, hence are associated with physiological costs and an erosion of psychological health (Demerouti et al., 2001). PSC is related to psychological health because it is a precursor to demands and the JD-R health erosion pathway. JD-R theory highlights that job resources are important to manage work demands. Since PSC can lead to growth in workplace resources, such as job autonomy and social support, and since resources link together and create 'resource caravans' (Salanova et al., 2010), PSC may improve personal energy and coping capabilities to manage demands and reduce distress.

Mechanisms to Build PSC

We propose that PSC can be built through enacting its principles. In enacting the principles of PSC – management commitment, management priority, organizational communication and participation, we expect that workers in certain circumstances would be

cognizant of these actions and this would result in improved perceptions of PSC. Enactment of PSC should engender greater salience when there is evidence to observers that real change has occurred, such as implementing practices and identifying psychosocial risks.

By considering the organizational change (Stouten et al., 2018) and development (Beckard, 1969; Waddell et al., 2000) literature we can derive insights into how to create a robust organizational climate and the process of change. Several principles for effective organizational change, such as top management support, change priority, communication, participation and voice have been proposed. These principles overlap with those recommended in participatory action risk management (RM) stress intervention approaches to reduce work stress (Cox et al., 2000; European Agency for Safety and Health at Work, 2002). Importantly these process principles are already intrinsically integrated in the concept of PSC. In essence the PSC construct shapes these change process principles towards the goal of protection of worker psychological health.

In intervention studies, by applying the principles of PSC such as in a participatory risk management intervention, researchers have found improvements in job design and morale, work quality and positive performance management (Dollard & Gordon, 2014). Likewise *post hoc*, researchers reported that PSC positively predicted intervention implementation success including more actions, change due to actions, being listened to, and improved trust (Dollard, 2012). These studies imply that enacting PSC principles should lead to reduced risk and improved psychological health, but these interventions were not guided by PSC theory, before and after tests of PSC were not conducted, nor do we have insights into which aspects of PSC can change, or if PSC can be built in times of shock.

A fundamental assumption is that PSC can be modified. Several studies show how PSC levels can change through organizational (Haar, 2018; Rickard et al., 2012) and individual (Rasdi et al., 2018) interventions. What has not yet been trialled is an intervention which aims to address the elements of PSC directly through the practice of its principles (PSC enactment). Having a strong foundation of policy and practice for protecting worker psychological health should include the capacity for management systems and job re/design to maintain a safe workplace environment during steady states of production and to react effectively when faced with external events/shock.

Events as Context

A fundamental premise of EST is that events cause a break in established routine and command our attention. In this there is shift from automatic (implicit, rapid, shortcuts) to controlled (explicit, effortful, slow, logical) cognitive processes that in turn can trigger organizational action (Morgeson et al., 2015). In the current study we juxtapose two events (planned vs shock) to try and address the question ‘What it is about events that command attention and a particular response?’. According to EST focusing on event strength and associated aspects of novelty, disruption and criticality can provide important information about why an event commands attention (Morgeson et al., 2015). In the case of a planned intervention that intends to change an organisational feature such as PSC, to be successful we expect that interventionists will create change that is relatively novel (to make it interesting to members and different from previous approaches), is disruptive but not radical so that learning and adjustments can occur, is critical because workplace mental health is a ubiquitous problem that needs to be attended to, and impactful, because the event is aimed to improve the circumstances of members. The planned intervention should command attention through raising awareness among members about its rationale and aims, and by involving members in the intervention. Applying PSC theory, once members enact the intervention we expect to see changes in features of the organization, specifically PSC, job demands and resources. Our intervention target is PSC since this is a known antecedent to taxing work design. The intervention goal is to enact PSC principles to tackle work stressors which in turn

should increase PSC perceptions. Applying EST we characterize the planned intervention event as moderately strong (in terms of novelty, disruption and criticality), and we predict its effects in space will be narrow and confined to the target experimental work group:

Hypothesis 1. The planned intervention (Event 1) will significantly increase PSC in the experimental (vs control) group during steady state.

Event 2, the COVID-19 pandemic, was extreme in all respects – novel because most organizations had never experienced a pandemic, disruptive because profound changes to work practices were required, such as work from home, and critical not only because it was potentially life threatening, but changes at work may precipitate mental health reactions. EST proposes a space principle too, that sources of change at higher levels in the organizational hierarchy have the greatest effect. The COVID pandemic was a mega-event and therefore likely to trigger extreme responses from the highest organizational levels (space) which have a large scope of influence (Morgeson et al., 2015). As the intervention continued during T2T3 it is plausible that Event 2 could influence both the experimental and control group. In terms of criticality, in enlightened circumstances where managers foresaw mental health implications, Event 2 could precipitate the application of PSC principles due to the stressors of the pandemic, and could sustain or enhance positive intervention effects (Event 1) in the experimental group; for the control group, with no prior exposures the PSC could also increase. In the case where there was no recognition of mental health implications, nor policy or support systems put in place during the pandemic, Event 2, could nullify effects of the intervention (Event 1) in the experimental group; for the control group it could cause a deterioration of PSC. It is difficult to anticipate in advance how the events would interact and manifest, so we keep our expectations open-ended so that we can explore the various effects of Event 2. Moreover we will explore at both T2 and T3 whether enactment of PSC principles, increased resources and decreased demands could account for the results.

Method

Contextual Background, Procedure, and Participants

The intervention (the Lead Indicators Mentoring Program) was triggered externally by the researchers and a leading Australian Work Health and Safety Authority who wished for its constituent organizations to use a lead indicator approach (i.e., PSC) to help improve employee psychological health and prevent psychological harm from workplace stressors. The study was approved by the University of South Australia Human Research Ethics Committee (Protocol 202343: Lead Indicator Mentoring Program), and all participation was voluntary. The study commenced in July 2019 and concluded in April 2020. Six public and two private sector organizations participated providing 11 experimental and 11 control work units (3 agencies had more than one matched group). Work units were groups with a minimum of 20 employees reporting to the same manager. In each organization pairs of groups were matched in terms of size and function then randomly assigned (cluster randomisation) to the experimental or control group.

The planned intervention in experimental work units involved training middle managers, including those with work health and safety functions, in a day long workshop. The approach employed adult learning principles (Knowles, 1980) was problem focused (data-informed, canvased PSC extended JDR theory, and provided PSC feedback), relevant (job embedded, networking, individualised mentoring and coaching) and was goal oriented (developed action plans) (Zepeda et al., 2013). We used the PSC Framework to translate PSC theory into practice (Dollard & Bailey, 2019). The intervention activities (see Appendix 1) followed an organizational development cycle (Waddell et al., 2000): (1) *Diagnosis*: (2) *Intervention planning*; (3) *Implementing change*; and (4) *Evaluating change:* (a) by evaluating impact in the experimental vs control groups; assessing the (b) *Intervention implementation*; and (c) *Implementation process*.

Potential survey responders received an email and information about the project from their manager but were blind to their group assignment. The control group received no treatment. Response rates were good by Australian standards however panel attrition was large (Table 1). We compared PSC levels of Time (T) 1 responders only to those who participated at T1 and other occasions (T1 and T2; T1 and T3; and T1 and T2 and T3) and found no differences, F (3, 517) = 1.00, p = .39, suggesting that panel attrition was not selective. Further group membership (experimental vs control) was not related to study participation, χ^2 (1) = -.002, p = .96. At T2 two organizations dropped out and a third at T3 (due to organizational imperatives and COVID-19) which also affected participation. One dropout organization (at T2 only) was significantly different from the others at T1 (PSC lower, F (1, 529) = 21.22, $p < .001$, $\eta^2 = .04$) but the impact of dropping out would even out across conditions since each organization supplied a control and an experimental group. To subscribe to strict government privacy concerns no demographic data were collected. Data were matched anonymously by using self-assigned codes. To characterise the work group sample, based on sector data, the sampling frame is mostly female (62%), public service level 6 and lower, 40 to 44 years (range 20 to 65 years), worked for 5 to 10 years, with university education (56%). The industry sectors represented were agriculture, forestry and fishing; transport and storage; and government administration and defence.

Measures Intervention and Implementation Evaluation

Survey items for employees are shown in Appendix 2. Response formats are shown in Table 2 and reliabilities, means and standard deviations are shown in Table 3. Intervention implementation was assessed through action plan analysis and responses by 10 middle managers to survey questions at T2 and T3, about the extent to which they found the PSC training useful, the impact of COVID-19, and whether the program built capacity to manage workplace factors impacted by COVID-19.

Table 1

Sampling, Dates, Response and Attrition Rates

	Time 1 July 2019 Pre-COVID-19	Time 2 November 2019 Pre-COVID-19	Time 3 March/April 2020 In-COVID-19
	N (Response Rate)	N (Response Rate)	N (Response Rate)
Experimental	295 (51%)	224 (59%)	119 (44%)
Control	236 (52%)	138 (37%)	83 (36%)
Total	531	362	202
Sample	Experimental	Control	
Time 1 Only	228 (79%)^	184 (79%)^	
Time 2 Only	157 (79%)+	91 (81%)+	
Time 3 Only	67	53	
Time 1 + Time 2	34	30	
Time 2 + Time 3	19	8	
Time 1 + Time 3	19	13	
Time 1 + Time 2 + Time 3	14	9	

Note. Response rate = (responses/ proportion of emails sent)*100. ^, attrition from T1 to T2; + attrition from T2 to T3.

Table 2

Measures and Psychometrics

Variable name and source	Theme/Subscales	Number of Items and response scale
Impact T1, T2, T3 (before and after)		
Psychosocial Safety Climate, PSC-12: Hall et al., (2010)	(1) Management commitment (2) Management priority (3) Organizational communication (4) Organizational participation	Twelve items, Four subscales, 3 per subscale: 1 = *strongly disagree*; 5 = *strongly agree*.
Intervention implementation (T2, T3)		
PSC Enacted (bespoke). A factor analysis of PSC and enactment items found 2 distinct factors at T2 and T3.	Observed activities taken by leaders and members that demonstrate PSC practices	Three items; 2 = *yes, more than before;* 1= *yes same as before,* 0 = *no*.
Resources (bespoke)	Change in resources in the past 3 to 4 months	1 item; 2 = *yes more than before*; 1 = *yes same as before;* 0 = *no.*
Demands (bespoke)	Change in demands in the past 3 to 4 months	1 item; 2 = *yes I now have more*; 1 = *no*; 0 = *yes now I have less*.

Table 3

Descriptives for Experimental and Control Group by Time

		Control			Experimental		
		N	Mean	SD	N	Mean	SD
PSC Total T1	.95	236	38.89	11.39	295	39.31	12.02
PSC Total T2	.96	138	39.90	12.32	224	41.96	12.36
PSC Total T3	.95	83	42.94	11.02	119	43.54	11.79
PSC Management Commitment T1	.90	236	9.81	3.29	295	10.11	3.55
PSC Management Commitment T2	.92	138	9.95	3.50	224	10.69	3.46
PSC Management Commitment T3	.91	83	10.94	3.14	119	11.12	3.39
PSC Management Priority T1	.91	236	9.73	3.56	295	9.43	3.61
PSC Management Priority T2	.92	137	9.73	3.64	224	10.12	3.74
PSC Management Priority T3	.93	83	10.44	3.33	119	10.49	3.68
PSC Communication T1	.79	236	9.73	2.88	295	9.89	3.07
PSC Communication T2	.85	138	10.16	3.14	224	10.51	3.18
PSC Communication T3	.82	83	10.88	2.93	119	11.29	2.83
PSC Participation T1	.79	236	9.68	3.01	295	9.78	3.09
PSC Participation T2	.81	138	10.09	3.03	224	10.55	3.08
PSC Participation T3	.77	83	10.66	2.75	119	10.72	3.01
PSC Enacted T2	.72	127	2.79	1.90	210	3.15	1.88
PSC Enacted T3	.75	78	3.62	1.77	111	3.81	1.80
Resources T2	-	137	0.72	0.67	214	0.92	0.74
Resources T3	-	81	0.96	0.73	114	1.09	0.74
Demands T2	-	137	1.61	0.59	214	1.49	0.61
Demands T3	-	82	1.73	0.57	113	1.59	0.64

Statistical Analysis

The large percentage of dropouts required an analysis strategy that did not delete missing data but accounted for all the information provided by cases (Le Blanc et al., 2007). Hierarchical linear modelling (software, Raudenbush et al., 2019) was warranted as it requires fewer assumptions about the dropout process (Little, 1995; Le Blanc et al., 2007) and accounts for the nested nature of the data. We tested a 3-level null model, which showed significant variance in the null model with PSC T1T2 as the outcome; variance due to the,

occasion was 48% (variance component 68.11), person was 44% (variance component 61.89), and work unit was 8% (variance component 11.41). For the null model with PSC T2T3 as the outcome, variance due to the, occasion was 50% (variance component 68.4), person was 44% (variance component 59.59), and work unit was 6% (variance component 8.58). The percentage of variance at each level justified a 3-level model, occasions nested in employees nested in work groups. Level 1 data were in long format. We assessed change in PSC and subscales (to show which aspects changed). For PSC T1T2 as the outcome we coded the two measurement points into a Time dummy variable with the second measurement T2 coded 1 and T1 as the reference category coded 0. The Experimental Group was dummy coded 1 with the Control Group as the reference category coded 0. In the multilevel analysis the intercept is the average PSC at T1 prior to the intervention; Time refers to PSC at T2. The interaction of the Experimental Group with Time (Group X Time) indicates differences between the Experimental and Control Groups in PSC at T2. To further explore what caused potential changes in PSC T1T2, we examined the mean differences between the Experimental and Control Group on levels of PSC Enacted, resources and demands. Given that the intervention may have varied within the Experimental and reached Control groups we also estimated the interactive effects of PSC Enacted, resources and demands (aggregated across all work units) with Time to predict average PSC change for the respective groups at T2 (we only table significant findings). Each measure was aggregated to the group level, without clustering into the experimental or control group, and entered as a cross-level moderator of the relationship between Time and PSC. We repeated the above analyses for PSC T2T3 as the outcome.

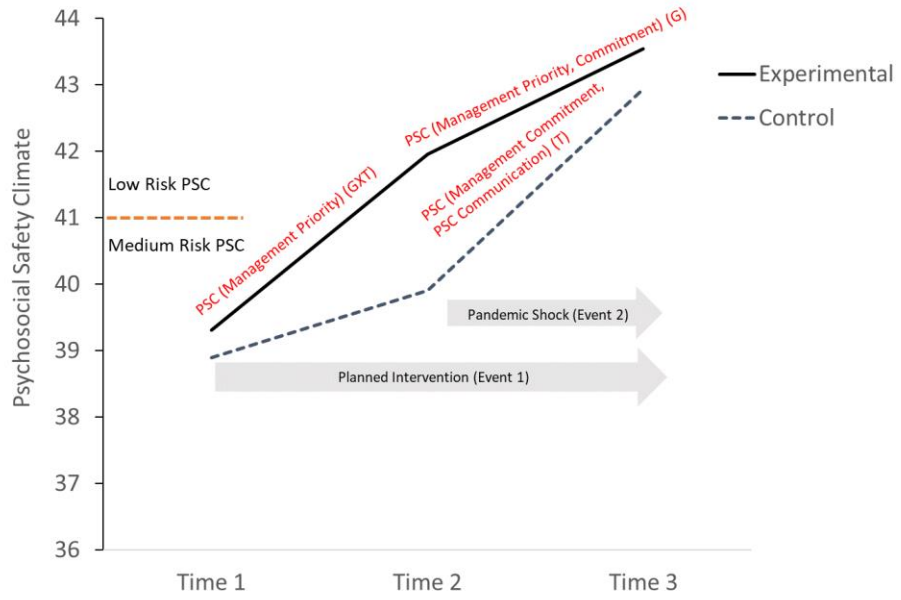
Results

Intervention Impact: PSC-12 Results

Table 4 provides correlations between variables. At T1, there was no significant difference in PSC levels between the experimental and control groups. For PSC T1T2, the interaction effect (Experimental Group X Time) was significant B = 3.77, SE = 1.64, t = 2.30, p = .04 with the interaction term adding significantly to the main effects model, χ^2 (1) = 4.59, p =.03 (see Table 5): the cross-level moderation accounted for 76% (pseudo R^2) of the random slope variance (3.6% of total variance) and showed that PSC for the experimental group increased significantly across time compared to the control group. Figure 1 shows the interaction effect (GXT), Group effects (G) and Time effects (T). Hypothesis 1 that the planned intervention (Event 1) significantly increases PSC in the Experimental vs Control group was supported. The PSC subcomponent which changed the most in the Experimental group (relative to Control) was Management Priority. Table 6 shows a significant Group X Time effect when Management Priority was the outcome, adding significantly to the model χ^2 (1) = 6.92, p = .008 (pseudo R^2 = 89%) of random slope variance (6% of total variance); there was an increase in Management Priority for the experimental group from T1 to T2, whereas for the control group there was a deterioration (Fig. 2). A similar interaction for Management Commitment close to significance (p = .07) should also be noted.

Figure 1

PSC: Experimental and Control Group By Time



Note. G = Group, T = Time

Figure 2

PSC Management Priority Development: Group By Time (Time 1, Time 2)

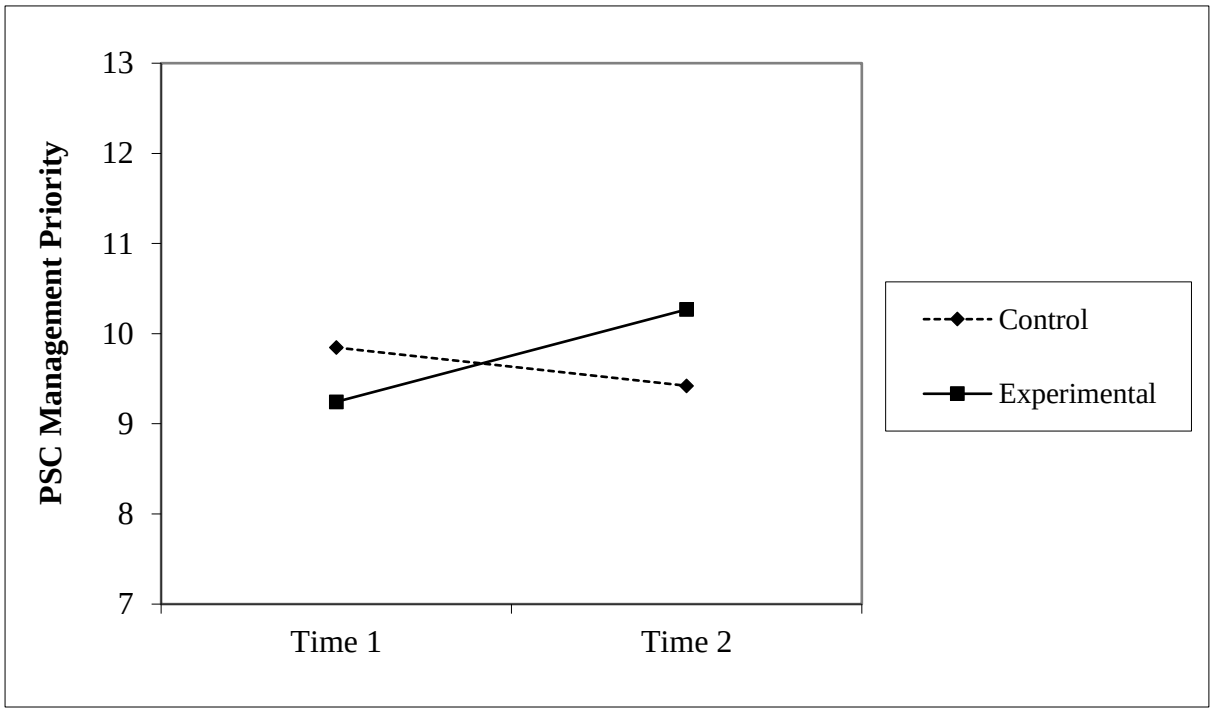


Table 4

Correlations between Measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. PSC Total T1		.92**	.93**	.96**	.90**	.73**	.65**	.73**	.68**	.65**	.37	.33	.28	.37	.42	.05	.55**	.14	.42	-.04	-.14
2. Management Commit T1	.91**		.87**	.82**	.70**	.72**	.68**	.77**	.65**	.54**	.41	.40	.39	.42	.34	-.03	.44	.13	.32	-.12	.04
3. Management Priority T1	.90**	.79**		.81**	.77**	.69**	.63**	.71**	.60**	.62**	.33	.31	.32	.31	.31	.03	.44	.04	.27	-.00	.11
4. Communication T1	.89**	.75**	.72**		.91**	.70**	.58*	.70**	.70**	.64**	.38	.28	.23	.41	.48	.02	.58*	.15	.48	-.01	-.33
5. Participation T1	.87**	.70**	.74**	.72**		.54*	.47	.47*	.53*	.58*	.19	.14	-.03	.16	.40	.12	.51*	.18	.39	.04	-.36
6. PSC Total T2	.51**	.42**	.48**	.45**	.45**		.95**	.95**	.94**	.89**	.54*	.48	.47	.60*	.49	.42	.58*	.25	.41	-.08	-.13
7. Management Commit T2	.48**	.43**	.43**	.39**	.44**	.94**		.90**	.82**	.79**	.34	.30	.31	.42	.28	.40	.43	.29	.32	-.09	-.04
8. Management Priority T2	.49**	.42**	.50**	.38**	.44**	.92**	.84**		.90**	.74**	.60*	.56*	.56**	.66**	.48	.26	.47	.20	.37	-.01	-.08
9. Communication T2	.43**	.33**	.39**	.49**	.33**	.91**	.80**	.77**		.80**	.66**	.60**	.53**	.70**	.63**	.42	.54**	.20	.45	-.08	-.29
10. Participation T2	.46**	.33**	.45**	.42**	.43**	.91**	.77**	.79**	.81**		.46	.35	.33	.51*	.55*	.52*	.82**	.27	.42	-.00	-.21
11. PSC Total T3	.58**	.61**	.54**	.36**	.51**	.66**	.53**	.73**	.52**	.56**		.96**	.88**	.96**	.91**	.25	.34	.38	.50	-.00	-.23
12. Management Commit T3	.56**	.63**	.52**	.32**	.48**	.60**	.49**	.71**	.43**	.51**	.92**		.91**	.88**	.81**	.22	.18	.33	.46	-.13	-.12
13. Management Priority T3	.55**	.55**	.54**	.33**	.52**	.68**	.56**	.76**	.53**	.58**	.92**	.83**		.78**	.67**	.12	.10	.19	.44	-.33	.05
14. Communication T3	.49**	.57**	.48**	.29**	.38**	.54**	.44**	.58**	.45**	.45**	.91**	.78**	.77**		.86**	.23	.38	.42	.44	.12	-.19
15. Participation T3	.55**	.52**	.48**	.44**	.53**	.61**	.51**	.62**	.52**	.51**	.88**	.71**	.76**	.76**		.34	.52**	.47	.58*	.13	-.51*
16. PSC Enacted T2	.14*	.08	.11	.21	.09	.41**	.36**	.32**	.45**	.39**	.20	.16	.29	.15	.16		.41	.54*	.49	.04	-.19
17. PSC Enacted T3	.21	.22	.06	.30**	.18	.38*	.36**	.30**	.37**	.39**	.39**	.34**	.30**	.39**	.41**	.29		.39*	.49	.18	-.38
18. Resources T2	.05	-.04	-.02	.16	.08	.29**	.26**	.25**	.27**	.28**	.24	.18	.21	.20	.28**	.43**	.16		.69**	-.04	-.24
19. Resources T3	.38*	.38**	.33*	.27	.33*	.34*	.32*	.30*	.29	.33 *	.41*	.33**	.34**	.43**	.39**	.22	.52**	.27		-.36	-.44
20. Demands T2	-.24*	-.19	-.18	-.23*	-.26*	-.15**	-.16**	-.12*	-.15*	-.11*	-.13	-.06	-.13	-.09	-.22	-.14*	-.26	-.19*	-.11		-.18
21. Demands T3	-.20	-.14	-.11	-.36**	-.14	-.23	-.32*	-.16	-.07	-.21	-.08	-.07	-.12	-.04	-.07	-.12	-.04	.04	-.04	.26	

Note. * $p < .05$, ** $p < .01$; T refers to Time. Correlations above the diagonal (two-tailed): group level (n range 16-18), below the diagonal individual level (n range 42-351); Due to varying sample sizes significance levels vary so refer to effect size. Commit = commitment.

Table 5

Impact of Intervention: Multilevel Model for PSC Development Over Time

	PSC Time 1 to Time 2				PSC Time 2 to Time 3			
	B	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*
Intercept	39.92	1.73	23.12	<.001	38.61	1.17	33.12	<.001
Time and Intervention								
Group	-.07	2.27	-.29	.77	4.42	1.63	2.71*	.02
Time	-.66	1.29	-.51	.62	2.86	1.44	1.97	.08
Group X Time	3.77	1.63	2.30*	.04	-2.46	1.71	-1.44	.17
Variance Components								
Individual	54.36				71.50			
Occasion	73.59				64.07			
Unit	16.36				3.73			
Slope	.98				.16			
Parameters	9				9			
Deviance	5938.02				4006.20			

Note: Group, 1 = Experimental, 0 = Control; T2, *, $p < .05$; Pseudo R^2 was estimated using the formula (baseline residual variance – interaction variance)/baseline residual variance (Rights & Sterba, 2019a; 2019b) using the main effects model as the baseline model.

Table 6

Impact of Intervention: Multilevel Model for PSC Development Focusing on Change in PSC Subscales Time 1 to Time 2

	PSC Management Commitment				PSC Management Priority				PSC Communication				PSC Participation			
	B	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*
Intercept	10.03	.43	23.52	<.001	9.85	.51	19.19	<.001	10.12	.42	24.22	<.001	10.04	.36	27.74	<.001
Time and Intervention																
Group	.09	.59	.15	.88	-.59	.71	-.83	.07	-.12	.58	-.21	.83	-.24	.50	-.48	.23
Time	-.30	.36	-.82	.43	-.41	.37	-1.13	.26	-.01	.32	-.04	.97	-.02	.37	-.05	.96
Group X Time	.94	.48	1.97	.07	1.41	.48	2.92*	.01	.66	.44	1.51	.15	.84	.49	1.72	.11
Variance Components																
Individual	4.33				5.19				3.19				3.19			
Occasion	6.58				6.45				5.10				5.15			
Unit	1.03				1.71				1.09				.70			
Slope	.08				.06				.11				.28			
Parameters	9				9				9				9			
Deviance	4041.82				4089.69				3836.44				3840.80			

Note. Group, 1 = Experimental, 0 = Control; *, $p < .05$.

Table 7

Impact of Intervention: Multilevel Model for PSC Development Focusing on Change in PSC Subscales Time 2 to Time 3

	PSC Management Commitment				PSC Management Priority				PSC Communication				PSC Participation			
	B	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*
Intercept	9.55	.37	26.28	<.001	9.10	.43	21.17	<.001	10.33	.23	45.56	<.001	10.10	.35	28.85	<.001
Time and Intervention																
Group	1.35	.45	2.95*	.01	1.35	.56	2.42*	.03	.82	.45	1.82	.09	.86	.45	1.93	.08
Time	1.22	.47	2.59*	.02	.87	.45	1.95	.07	.62	.27	2.33*	.04	.30	.41	.73	.48
Group X Time	-1.06	.60	-1.76	.10	-.94	.56	-1.67	.12	-.07	.53	-0.14	.89	-.42	.52	-.82	.43
Variance Components																
Individual	4.28				8.43				2.96				3.11			
Occasion	6.99				4.03				5.66				5.26			
Unit	.17				.51				.30				.27			
Slope	.03				.00				.02				.02			
Parameters	9				9				9				8			
Deviance	2726.08				2756.12				2597.18				2579.89			

Note. *, $p < .05$.

During shock, for T2T3, there were no significant Group X Time interactions for global PSC or the PSC subscales (Table 7). For PSC, management commitment, and management priority, there were significant Group effects, indicating that PSC was significantly higher on average for the experimental group (regardless of Time), implying a sustained intervention effect in the shock condition (see Fig. 1, G). For PSC management commitment and PSC communication there was a Time effect indicating these aspects increased across time for *both* groups (Fig 1, T).

Intervention Implementation: What Caused the Effect?

PSC Enacted: As shown in Table 3 the mean scores for PSC Enacted were higher for the experimental group compared to the control group, $t(335) = 2.93$, $p = .09$, consistent with the intervention effect. Considering effects across all groups, from T1T2 (see Table 8), we found a significant interaction effect of PSC Enacted T2 X Time, χ^2 (1) = 5.21, $p = .02$, on PSC T1T2 (pseudo R^2 = 53%, 6.7% of total variance) (see Fig. 4). Under conditions of high PSC Enacted T2, PSC increased across time and decreased for low PSC Enacted. At T2 there was a significant difference in levels of PSC across work groups because of high and low PSC Enacted levels in the past 3 to 4 months (reported at T2). From T2T3, PSC Enacted T3 related to PSC as a direct significant positive synchronous relationship, high levels of PSC Enacted T3 positively relating to average group levels of PSC T2T3.

Job Redesign: Job demands increased in the past 4 months at T2 (67% C; 55% E) and particularly at T3 (79% C; 67% E); resources increased at T2 (12% C, 24% E) and more so at T3 (25% C, 32% E). At T2 the experimental group reported significantly more job resources than the control group, t (349) = 2.59, p <.01 consistent with the intervention effect (see Table 3 for M and SDs).

Table 8

Impact of Intervention: Multilevel Model for PSC Development over Time by PSC Enacted

	PSC Time 1 to Time 2				PSC Time 2 to Time 3			
	B	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*
Intercept	39.70	1.14	34.96	<0.001	41.26	.69	59.06	<0.001
Time and Intervention								
PSC Enacted	.31	1.68	.19	.85	3.38	0.99	3.42**	.004
Time	.93	.87	1.08	.30	1.30	0.99	1.31	.21
PSC Enacted X Time	2.97	1.22	2.43*	.03	-1.29	1.64	-.79	.44
Variance Components								
Individual	55.58				73.55			
Occasion	72.03				63.44			
Unit	16.84				.75			
Slope	1.98				.08			
Parameters	9				9			
Deviance	5934.18				4003.58			

Note. Group, 1 = Experimental, 0 = Control; **, $p < .01$; *, $p < .05$; # PSC Enacted was at Time 2 in the first model and Time 3 in the second model.

Table 9

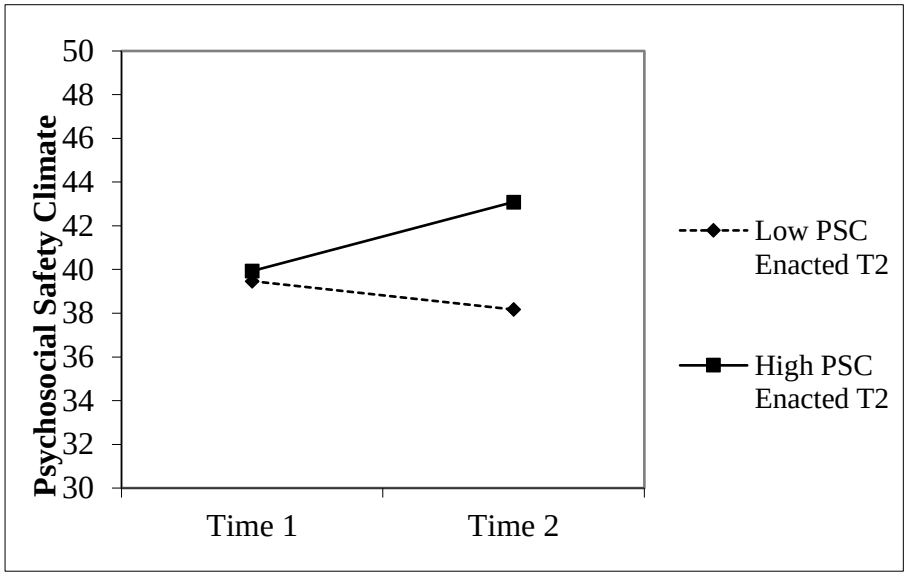
Impact of Intervention: Multilevel Model for PSC Development over Time by Resources

	PSC Time 2 to Time 3			
	B	*SE*	*t*	*p*
Intercept	41.11	.84	48.96	<0.001
Time and Intervention				
Resources T3	14.64	4.76	3.08*	.008
Time	1.36	0.89	1.52	.15
Resources T3 X Time	2.03	5.28	0.38	.71
Variance Components				
Individual	71.72			
Occasion	65.30			
Unit	3.34			
Slope	.30			
Parameters	9			
Deviance	4005.30			

Note. *, $p < .05$.

Figure 3

PSC Development: PSC Enacted Time 2 By Time



With PSC as outcome, we assessed the impact of demands and resources, and their interactions with Time across all groups. Demands showed no interaction or main effects from T1T2 nor T2T3 (not tabled). Resources showed no interaction or main effects from T1T2 (not tabled); from T2T3 there was a direct significant positive synchronous resource effect on PSC (see Table 9).

Intervention Implementation Evaluation

Action Plans. Eight action plans were analysed at T3 for common themes relating to actions implemented. Six themes as agreed by the researchers were evident: Communication (n = 6, e.g., psychosocial safety as an agenda item in meetings); Participation (n = 7, e.g., systems for employees to discuss stressors with supervisors); Management priority (n = 6, e.g., greater transparency of management activities for protecting mental health); Policies for reasonable demands (n = 5, e.g., develop an overtime policy); and Resources and supports to

match job demands (n = 5, e.g., job control). Around 88% of managers at T2, and 90% at T3, reported that actions in their action plan were implemented.

Capacity Building. At T2 there was 100% agreement (strongly agreed, agreed), that the workshop was useful. At T3 most (90%, strongly agreed or agreed) found the program, mentoring and networking useful in building organizational capacity: "it hard wired the discussion of mental stressors and change into meetings, processes, and discussions".

COVID-19 Impact. Most middle managers at T3 agreed that COVID-19 had an impact on work demands and resources: "Increase in demands via changes in work practices"; "Less connection with working from home"; "[Lack of clarity] of what is expected and visibility of [senior] staff"; "Shift in how our teams communicate, in some ways it has improved"; "working from home has changed the way we provide service", and "most staff are working from home so the IT system's capacity to cope causes a lot of frustration .. something that you can't control". Most (70%) reported that the program was helpful in building their capacity to manage workplace psychosocial factors impacted by COVID-19.

Discussion

This is the first experimental study of a PSC informed intervention that attempted to build PSC. As expected, consistent with an intervention effect, in steady state (T1T2) there was a significant increase in PSC (from medium to low risk levels) in the experimental (vs control) group, implying that the intervention (process of implementation, training and actions) increased PSC, particularly perceptions of management priority and commitment. We delved deeper to explain the experimental effect. In accord with the extended PSC JD-R model the intervention aimed to *enact* PSC principles for the protection of worker psychological health and job redesign. There were significant increases in resources in the experimental (vs control) group at T2 consistent with an intervention effect. Also PSC enacted at T2 was higher ($p = .09$) for the intervention group; moreover PSC enacted significantly interacted with Time to predict PSC increase across groups, building evidence that PSC change might be attributed to PSC enactment. In the shock (T2T3) context (Event 2), PSC rose for both groups, with the experimental group maintaining low risk PSC levels (> 41) and the control group also moving to low risk PSC. Significant Group effects on PSC (also management priority and commitment), indicated that the experimental group maintained levels on these subscales significantly higher than the control group. This could be due to higher PSC enactment and resources (main effects) sustaining these PSC levels in the intervention group. Significant Time effects revealed increases in PSC subscales (management commitment, communication) across time for both groups indicating that the control group was positively affected in the shock condition. Changing demands had no significant influence on PSC. In sum Event 1 had a positive boosting effect on PSC for the experimental group and a nil effect on the control group; Event 2 sustained the effects of Event 1 and had a positive boosting effect on PSC subscales in the control group (noted as parallel increasing lines in Fig 1).

Applying EST, our results during steady state suggest the intervention (Event 1) was moderately strong (in terms of novelty, disruption and criticality). A plausible narrative is that senior management hierarchical to the experimental group, made psychological health a priority (lobbied as they were by the program instigators and by middle managers as per their action plans) and supported middle managers to enact PSC principles which increased resources, and these actions in turn increased employees' PSC perceptions. In terms of space the intervention impact was specific and confined to the experimental work units.

In T2T3 the shock (Event 2) was very strong (novel, causing much disruption, with many threats to wellbeing), and in terms of space, arose external to the organization through state and national directives and affected organizational behavior at the highest level (CEOs, top management), with inevitable impact across all organizational work groups, including the control group. Particularly communication and commitment from senior management

influenced the control groups too possibly because management focused on those who needed support the most. During this period, middle managers reported that concern about mental health was salient and we noted increases in PSC communication (information, being listened to, good communication about psychological safety issues) to support this. In terms of timing, the shock coincided with a historic societal maturity for concern in Australia about psychologically health workplaces, and led to unprecedented discussion about how important it was to look after worker's psychological health (expert observations of the researchers) during COVID-19. The shock commanded a response from the head of the Public Service who published guidance reminding agencies to consider their work health and safety obligations, encouraging agency heads to facilitate employees working from home and provide information to help employees look after their mental health during the pandemic. Since the trigger was external (lending concepts from narrative therapy, White & Epston, 1990) this may have enabled organizations to 'externalise' and objectify the problem, thus normalising mental health reactions whilst aiding communication about mental health. A parallel finding is that workers receive more support for a traumatic event vs chronic stress exposure because the trauma event is readily verifiable and a psychological reaction could be expected (Dollard et al., 2001).

Theoretical Implications

There are two main theoretical implications. First in relation to PSC theory and timing, we found support for the proposition that PSC can change significantly, within four months, and that change can be *sustained* over eight months even in shock conditions. Moreover in steady state the intervention coincided with improved job design in the form of increased resources – this provides further support for PSC extended JDR theory, that PSC can influence resources but raises concerns that job demands may not be as readily modifiable (understandably though since job demands increased during COVID). By implication work stress intervention theory needs to be expanded to include PSC as an intervention target (*what* works, Nielsen, & Miraglia, 2017). Second by integrating EST concepts and considering change as an event we can add to PSC theory about *when* PSC can change by considering the strength of the precipitant event and its meaning, *what* changes in terms of PSC sub-dimensions, and *where* PSC can change in terms of space: in the steady state the intervention was controlled and targeted to the work group; in the shock state during COVID-19, top-down actions likely led to organization wide strategies affecting the controls. Theoretically the control group result during the pandemic reinforces the fundamental role, uncovered in T1T2, that top management *will* has for improving PSC in both steady state and shock conditions. According to EST, events can affect future events. It seems likely that preparatory work in steady state prepared the system for shock as directly reported by managers. Moreover during shock the experimental group PSC did not significantly reduce but maintained its increase – and the levels of PSC remained in the low risk categorisation.

At another level of abstraction Dollard and Karasek (2010) discussed the need for a higher level social level controller in organizations given that many social platforms of stability have been eroded by global economic phenomenon (e.g., family breakdown) (Karasek, 2008). A social level controller could provide resources to cope with random, unexpected and uncontrollable demands facilitating worker control and their internal capacity for self-regulation (Dollard & Karasek, 2010). In this sense the planned intervention may have built a social level controller and conditions such as organizational resilience (Taylor et al., 2019) which may future proof organizations from external shocks.

Practical Implications

The process evaluation revealed that the planned intervention was useful and informative, increased understanding of PSC and work risks, and prepared middle managers for the impact of COVID-19 even in the face of challenges (73% reported increased demands

in shock). The PSC construct encapsulates a series of process principles for workplace change for worker mental health. Our evidence-based intervention approach suggests that organizational middle managers can be supported to build PSC in chronic work stress situations. Organizations should consider the benefits of PSC capacity building, networking and mentoring to reduce risks to worker psychological health. The approach could also help future proof organizations beyond the current crisis as middle managers reported that learnings in steady state helped them manage risks associated with the shock. During times of shock, prioritisation and commitment from top level management is likely most beneficial compared to middle management involvement (Morgeson, 2005). Senior management can learn from this study that to make change it is important that members understand how important the proposed changes are. Normalising the mental health response to chronic stress situations should help people participate in systems and routinely communicate about risks to psychological health. The link between external imperatives (shock) and organizational responses also implies that other externalities such as legal requirements for safe PSC levels could promote future positive corporate responses. We should not rely on shock to build PSC.

Limitations, Strengths and Future Research

In any organizational intervention research there are threats to internal validity. Response rates decreased over time typical of organizational longitudinal research, but our comparison of dropouts to stayers suggests that the participating sample is not biased. An important point is that effects on PSC are assessed as group effects and predictive research shows that PSC in aggregate can be a proxy for other group members who drop out (Dollard, Opie et al., 2012; Dollard, Tuckey, et al., 2012). Overall we do not think that attrition and dropouts are a serious threat to our results. Due to privacy we did not collect sample demographics but these, for example age, gender, and income, show very small ($r < .07$, Cohen, 1992) correlations with PSC (Dollard & Bailey, 2014) so their omission in analyses should not lead to bias. We bolstered the study's internal validity by integrating intervention implementation checks, action plan analysis, reports of PSC enactment and changes in demands and resources. We cannot rule out that organizational learnings from the intervention at T2 influenced the organization's reaction during shock and the consequent impact on controls–however if so, it further supports the future proof shock argument.

We did not investigate specific reactions to PSC in terms of mental health since ample research makes this link (Zadow et al., 2019) and supportive organizational responses in the pandemic are protective for mental health (Holton et al., 2020). Future research could assess: PSC change as the pandemic became chronic; whether stronger employee involvement enhances PSC (Dollard & Gordon, 2014; Le Blanc et al., 2007); barriers to intervention participation (Kompier & Kristensen, 2001; Dollard & Zadow, 2018); perceptions of levels of demands/resources rather than change perceptions; the level of approach (individual, Joyce et al., 2016 vs organizational, Egan et al., 2017); and, different shocks (e.g., corporate corruption). Results are likely generalisable to workplaces in capitalist economies with similar national/historic labor backgrounds, and steady state and early onset external shock contexts.

Conclusion

We investigated how PSC can be built in steady state and shock contexts, in terms of EST, considering event strength, time and space. In steady state capacity building (Event 1) PSC increased in the experimental compared to the control group, and prepared middle managers for the external shock of COVID-19 (Event 2). Higher levels of PSC in the experimental group (intervention continued) were sustained in shock. The shock also precipitated increases in some PSC subscales across both experimental and control groups, all illustrating how powerful management *will* can be in building PSC despite the context.

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APPENDIX 1

PSC Framework Program Intervention Activities

July 2019 *Data collection and Diagnosis* *Time 1*	PSC-12 (on-line survey) was distributed by middle managers to Experimental and Control group members via email. The organization's PSC levels were diagnosed; ≥ 41 low risk; < 41 and > 37, medium risk; ≤ 37, > 26 high risk, and ≤ 26 very high risk (Bailey et al., 2015; Dormann et al., 2017).
August 2019 *One-day program workshop*	Middle managers and WHS personnel from the Experimental groups attended a one-day workshop which included: • education about psychosocial factors at work and the PSC Framework, • guided interpretation of results from experimental group data, • the PSC Hierarchy of Control applied to audit current policies, practices, and procedures relevant to particular risks (demands/resources in this study) and to protect worker mental health, • co-design of action plans was between workshop personnel and researchers, based on T1 diagnosis to increase PSC items and manage risks (focus on demands and resources) in their units, • action plans were tailored to align with existing policies and targeted to address low scoring items/subscales from PSC risk assessment that if enacted could prevent psychological harm from psychosocial hazards
August to November 2019	Action Plans were implemented with mentoring and coaching support (e.g., phone calls, meetings, feedback) for workshop participants

Three month mentoring service	including a minimum of one phone call or email communication per week to review action plan progress and refine action plan content.
September 2019 to end of May 2020 Ongoing networking	Workshop participants attended a one- to two- hour online meeting once per month to: • receive feedback on T1 to T2 PSC change shortly after T2 data collection, • provide an update on progress in implementing action plan activities, • receive feedback about strategies, • problem solve barriers, • share resources.
November 2019 Time 2 data collection	PSC-12 (on-line survey) was distributed by middle managers to Experimental and Control group members via email. Process evaluation questions were distributed via email to workshop participants.
March/April 2020 Time 3 data collection	PSC-12 (on-line survey) was distributed by middle managers to Experimental and Control group members via email. Process evaluation questions were distributed via email to workshop participants.
	Each organization received a report regarding the change in PSC in their Experimental and Control groups. Reports included a description of activities from the action plans. Recommendations were provided based on results. Workshop participants were advised to implement any strategies they deemed appropriate for the Control group following completion of the research program.

APPENDIX 2

PSC-12 Scale

Management support and commitment

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

Management priority

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

Organizational communication

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

Organizational involvement and participation

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: Items are reprinted from "Psychosocial Safety Climate: Development of the PSC-12" by G. Hall, M.F. Dollard, & J. Coward, (2010), *International Journal of Stress Management*, Volume 17 (4), pages 382-383. Copyright 2010 by the American Psychological Association.

PSC Enacted

In the past 3 to 4 months:

1. Have psychosocial factors and/or protection of worker psychological health been formally discussed in meetings as a matter of workplace safety?
2. Have people in your workplace actively identified risks or hazards to psychological health?
3. Have your leaders actively demonstrated practices that promote psychological health and wellbeing?

Resources

In the past 3 to 4 months:

Have you received resources and/or supports that assist you with managing your job demands?

Demands

In the past 3 to 4 months:

Have job demands changed?

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