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The influence of psychological flexibility on work redesign:  
Mediated moderation of a work reorganization intervention

Frank W. Bond, Paul E. Flaxman and David Bunce

Goldsmiths, University of London, United Kingdom

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## Abstract

This quasi-experiment tested the extent to which an individual characteristic, psychological flexibility, moderated the effects of a control-enhancing work reorganization intervention in a call center. Results indicated that, compared to a control group, this intervention produced improvements in mental health and absence rates, but particularly for individuals with higher levels of psychological flexibility. Findings also showed that these moderated intervention effects were mediated by job control. Specifically, the intervention enhanced perceptions of job control, and hence its outcomes, for the people who received it, but particularly for those who had greater psychological flexibility. Discussion highlights the benefits of understanding the processes (e.g., mediators, moderators, and mediated moderators) involved in work reorganization interventions.

The influence of psychological flexibility on work redesign:

Mediated moderation of a work reorganization intervention:

The concept of *job control* – people’s perceived ability to exert some influence over their work environment, in order to make it more rewarding and less threatening (Ganster, 1989) – occupies a central position in most models of work organization and occupational health (e.g., the job characteristics model (Hackman & Lawler, 1971), the sociotechnical systems approach (e.g., Emery & Trist, 1960), action theory (e.g., Frese & Zapf, 1994), and the demands-control model (Karasek, 1979)). Consistent with these models, there is extensive research that demonstrates a link between low levels of perceived job control and various unfavorable employee and organizational outcomes, such as mental and physical ill-health, job dissatisfaction, sickness absence, and poor job performance (e.g., Bond & Bunce, 2001; 2003; Bosma, Stansfeld, & Marmot, 1998; Ganster & Fusilier, 1989; Karasek & Theorell, 1990; Parker & Wall, 1998; Terry & Jimmieson, 1999).

It is not surprising, then, that work reorganization (or job redesign) interventions are assumed to improve such variables, if they increase the amount of control that employees have over their work environments (e.g., Jackson, 1983; Murphy & Hurrell, 1987; Parker, Chmiel, & Wall, 1997; Sparks et al., 2001; Wall, Kemp, Jackson, & Clegg, 1986). Despite this ubiquitous assumption, only Bond and Bunce (2001), to our knowledge, have tested this hypothesis, using a quasi-experimental design and recognized statistical tests of mediation (e.g., Baron & Kenny, 1986). They showed that job control did serve as the mechanism by which a work redesign intervention improved several employee outcomes at a one-year follow-up: mental health, sickness absence rates, and self-rated job performance.

The present study replicates and extends Bond and Bunce’s (2001) mediation research. It tested, once again, the extent to which a work reorganization intervention improved outcomes (i.e., mental health, absence rates, and job motivation) by enhancing

perceived levels of job control; in addition, it, uniquely, investigated if the redesign increased perceptions of job control, and hence improved the intervention effects, *particularly* for workers who had higher levels of a specific individual characteristic, psychological flexibility. Investigating the possibility of such mediated moderated intervention effects is timely, as several authors have recently called for greater consideration of individual differences in job design research (e.g., Jex et al., 2001; Schaubroeck & Merritt, 1997; Schaubroeck, Jones, & Xie et al., 2001; Parker, Wall, & Cordery et al., 2001); and to our knowledge, this call has yet to be answered.

### *Psychological flexibility at work*

Psychological flexibility is a primary determinant of mental health and behavioral effectiveness, as hypothesized by one of the more recent, empirically based theories of psychopathology, Acceptance and Commitment Therapy (ACT; Hayes, Stroschal, & Wilson, 1999). Psychological flexibility, or flexibility, refers to an ability to focus on the present moment and, depending upon what the situation affords, persist with or change one's (even inflexible, stereotypical) behavior in the pursuit of goals and values. People cannot focus comprehensively on the present moment, however, when their attention is directed at altering, avoiding, suppressing, analyzing or otherwise *controlling* their psychological events (e.g., thoughts, feelings, physiological sensations, images, and memories) (Bond & Flaxman, 2006). Thus, psychological flexibility involves a reduced tendency to control internal experiences when doing so prevents goal attainment (e.g., when avoiding fear prevents people from taking goal-directed action); instead, flexibility involves people deliberately observing their internal experiences on a moment-to-moment basis, in an open, non-elaborative, non-controlling, and non-judgmental manner (Hayes, Luoma, Bond, Masuda & Lillis, 2006). [Training such non-judgmental attention to psychological events is a primary goal in ACT as well as the contemporary, cognitive-behavior therapies of Linehan (1993), Segal, Williams, and Teasdale (2002), and Wells (2000)]. This non-elaborative, non-judgmental –

or mindful – stance towards (even unwanted) internal events frees people from the need to control them or be overly guided by them; instead, it allows people to re-direct their limited attentional resources to the present moment. As a result, psychologically flexible people are less emotionally disturbed (Baer, 2003; Hayes et al., 2006), and they have more attentional resources for noticing and responding effectively to goal-associated opportunities that exist in the present situation. It is this “goal-related context sensitivity” feature of psychological flexibility that is thought to make this individual characteristic an important influence on job performance, motivation, absenteeism and mental health at work (Bond & Hayes, 2002).

Psychological flexibility’s emphasis on taking goal-directed action invites comparisons to goal attainment theories (e.g., Kuhl, 1992) and motivation constructs such as growth need strength (Hackman & Oldham, 1975) and need for achievement (McClelland, 1961). There is a difference, though: psychological flexibility explicitly considers people’s motivation to achieve, develop and move towards their goals *in relation to how mindful they are*. Thus, people could be high in their need to achieve and develop at work, but if they respond to their thoughts, feelings, fears, and doubts in a rigid, elaborative, judgmental, or avoidant manner (i.e., non-mindfully), they will be low in psychological flexibility (and, perhaps, in their actual ability to achieve their goals over time).

In line with this conceptualization of psychological flexibility, there are now 27 studies that show that this characteristic predicts outcomes such as mental health, job satisfaction and job performance (over a one-year period), with an average effect size of  $r = .42$  (see Hayes et al. (2006) for the complete findings of this meta-analysis.) These effects of flexibility are seen even after controlling for one or more individual characteristics, such as emotional intelligence and each of the “Big Five” factors of personality specified by Goldberg (1990) (see Bond, Hayes, & Barnes-Holmes (2006) for a review). For example, results from a two-wave, full panel design study by Bond and Bunce (2003) showed that psychological flexibility predicted mental health and job performance one year later, after controlling for negative affectivity and locus of control. [Importantly, those two

outcomes did not predict psychological flexibility over that same year. This suggests that flexibility is impacting subsequent mental health and job performance, not the reverse.] In the workplace, psychological flexibility does not just correlate with poor performance and health. Randomized controlled trials show that increasing flexibility is the mechanism, or mediator, by which ACT interventions improve mental health, innovation potential, and reduce burnout rates (Bond & Bunce, 2000; Hayes, Bissett, Roget, Padilla, Knollenberg, Fisher et al., 2004).

*The benefits of psychological flexibility for work redesign*

As noted, people with more psychological flexibility are hypothesized to have greater goal-related context sensitivity: an increased capacity to notice, comprehend, and respond more effectively to goal-associated opportunities that exist in a given situation. Thus, if workers with greater flexibility are given more job control, they may be better able to notice where, when, and the degree to which they have it; as a result, they will be better able to identify more opportunities to pursue goal-oriented actions, which presumably involve making their work more rewarding or at least less aversive (Ganster, 1989). Consistent with this hypothesis, longitudinal studies by Bond and Bunce (2003) and Bond and Flaxman (2006) showed that workers with greater psychological flexibility benefited more from higher levels of job control, in terms of mental health, objective measures of job performance and learning a new computer software system. These studies, the goal-related context sensitivity hypothesis on which they were based, and the above literature review lead to the following three hypotheses.

1. A control enhancing work redesign intervention will reduce psychological distress, absence levels, and improve motivation, when compared to a control group.
2. These intervention effects will be greater for people who are higher in psychological flexibility. That is, flexibility will moderate the intervention effects.

3. These moderated intervention effects will be at least partially mediated (or transmitted) through worker's perceptions that job control increased as a result of the work redesign.

Taken together, hypotheses two and three constitute a mediated moderation model (Baron & Kenny, 1986; Muller, Judd, and Yzerbyt, 2005), which is shown in Figure 1.

## Method

### *Participants*

This study occurred in two customer service centers of a large financial services organization in the United Kingdom (UK). This company wanted to reduce stress and absence rates, as well as improve motivation levels amongst its call center employees. Their primary responsibilities were to answer high-volume telephone enquiries and enter customer account information into computerized systems. In order to participate in this study, these employees were required to have this entry-level and non-managerial role at this organization for at least one year. A total of 312 people fulfilled these inclusion criteria, across the two service centers, one in Merseyside (n=145) and one in West Yorkshire (n=167); 110 (76%) of those people in the Merseyside center completed the Time 1 questionnaires, and 134 (80%) of those in the West Yorkshire group did so. At the second observation point, 14 months later, 84 of the 110 Time 1 respondents (76%) in the Merseyside center completed the Time 2 questionnaires, and 97 of the 134 Time 1 respondents (72%) in the West Yorkshire center did so. This final sample was 67% female, had a mean age of 33 years (SD = 10), and had worked in this entry-level role for an average of 10 years (SD = 8.9).

### *Measures*

*Job control* (Ganster, 1989). This 22-item scale assesses a range of areas over which people can have control at work: variety of tasks performed, the order of task performance, pacing, scheduling of rest breaks, procedures and policies in the workplace, and arrangement

of the physical environment. Each item (e.g., “How much control do you have personally over the quality of your work?”) is rated on a five-point Likert-type scale that is labeled “Very little” (scored 1) to “Very much” (scored 5). Higher scores indicate greater levels of control. Psychometric properties of this scale appear good and reveal a single factor of control (Ganster, 1989). Cronbach alpha coefficients for Time 1 and 2 were .89 and .90, respectively.

*Acceptance and Action Questionnaire (AAQ;* Hayes, Strosahl, Wilson, Bissett, Pistorello, Toarmino, et al. (2004)). This 16-item measure of psychological flexibility assesses people’s ability to take a non-elaborative, non-judgmental approach to their internal events, so that they can focus on the present moment and act in a way that is congruent with their values and goals and not their internal events (e.g., fears, urges, and prejudices). Each item (e.g., “If I get bored of a task, I can still complete it”) is rated on a seven-point Likert-type scale labeled “Never true” (scored 1) to “Always true” (scored 7), with higher scores indicating greater psychological flexibility. Published research on the AAQ, summarized by Bond and Bunce (2003) and Hayes, Strosahl et al. (2004), indicate that it has good construct and criterion-related validities. Cronbach alpha coefficients for Time 1 and 2 here were .77 and .81, respectively.

*General Health Questionnaire-12 (GHQ;* Goldberg, 1978). This is a 12-item scale with very good psychometric properties that is typically used as a measure of general mental health, or psychological distress (McDowell & Newell, 1996). We used the Likert method of scoring (see Banks, Clegg, Jackson, Kemp, Stafford, & Wall, 1980), where each item (e.g., “Have you recently...” “Lost much sleep over worry”) was scored 0 (“Not at all”) to 3 (“Much more than usual”). Higher scores indicate higher levels of psychological distress. Cronbach alpha coefficients for Time 1 and 2 were .86 and .85, respectively.

*Intrinsic Job Motivation (Job motivation;* Warr, Cook, & Wall, 1979). This well-



validated, six-item scale measured respondents' wishes to work to the best of their ability (e.g., "I take pride in doing my job as well as I can"). Each item was scored on a seven-point rating scale ranging from "Strongly disagree" (scored 1) to "Strongly agree" (scored 7).

Cronbach alpha coefficients for Time 1 and 2 were .84 and .82, respectively.

*Absence: Number of occasions and days.* Using records from the human resources department, we compared non-holiday absence rates for the year before pretest (i.e., the year before Time 1) with those for the year before posttest (i.e., the year from Time 1 to Time 2). We made this comparison for two commonly used absence measures (Johns, 1997): *number of occasions* absent, irrespective of duration, and *number of days* absent, regardless of the number of occasions.

#### *Procedure*

This intervention was based upon the principles of participative action research (PAR), which emphasizes a collaborative relationship between the researchers and organization members. Through such a collaborative process, the expertise of both parties can be harnessed to increase the chances of efficacious work redesign (Israel, Schurman, & House, 1989).

In consultation with senior management at the company, we decided to test the PAR program, using two similarly sized customer service centers, in two different regions of the UK (West Yorkshire and Merseyside). Each center provided the same data processing and telephone enquiry functions, and each received all of their work, including phone enquiries, from a central work distribution hub. This ensured that each center had, proportionate to its size, the same amount of work, which meant that each center was utilized most productively. As well as performing the same functions, each center had the same management and team structure, including one senior manager, a small group of team managers and 11 to 15 team

leaders, each of whom was responsible for 16 to 20 employees or “team members”: the group that constituted the participants of this study.

Two months before the beginning of the PAR intervention (Time 1; pretest) and again 14 months later (Time 2; posttest), all employees at the two service centers received questionnaire packs containing the measures listed above, and they were given the opportunity to complete them during working hours. (Only data from those who fulfilled the inclusion criteria were analyzed for this study.) Previous research indicated that benefits from enhancing job control were evident when the posttest was six to 12 months after the pretest (e.g., Bond & Bunce, 2001; Jackson, 1983; McFadden and Demetriou, 1993). Hence, we wanted at least a 12 month posttest and settled on 14 months out of convenience. After collecting the Time 1 questionnaires, we informed the senior managers that we had randomly designated the West Yorkshire center as the intervention group and the Merseyside center as the control group.

Twelve team members (8 females and 4 males) from the intervention group volunteered to participate on a steering committee, and as a group, they were highly representative of their workforce, in terms of age, work function and experience. These 12 members included the senior manager and one team manager. The research team facilitated two, 2-hour steering committee meetings beginning two months after the Time 1 questionnaires were distributed. At the first meeting, we provided the committee members with a summary of the Time 1 results that identified the work organization characteristics (overwhelmingly, job control) that were related to the targeted outcomes: motivation, absenteeism, and mental health. The committee’s aims were to: (1) identify specific instances of these problematic aspects of work organization and (2) recommend changes that might address these problems, in order to improve the outcomes. Consistent with PAR procedures

(e.g., Israel et al., 1989), committee members also consulted with their team colleagues, between the meetings, to develop and finalize their recommendations for change.

Guided by these team consultations, and the Time 1 survey results, the steering committee prioritized the work organization problem areas: (1) lack of control over the batching and distribution of work within teams; and (2) the infrequency of individualized performance feedback and development planning. In order to address the first problem area, the committee proposed that team members be given greater control and influence over their team's daily and weekly work plans, and be allowed more discretion over the selection, timing and ordering of their work tasks. To this end, during the fifth month of the study, the 15 teams in the PAR group implemented systems that provided their members with an opportunity to participate in this work planning process. An interesting result of this change was that all teams shifted from unpopular two-hourly work cycles to daily cycles, which in turn, provided team members with more choice over when to complete particular tasks, and when they could take lunch and rest breaks.

To address the second problem area, the committee recommended implementing regular (e.g., monthly), informal "1-to-1" (team leader-to-team member) meetings designed so that team members could have a "say" (or some input or control) over how to solve problems they perceived, their development planning and training needs. During the fifth month of the study, all team members were informed of this new practice, but they were told that they would not begin for two-to-three months so that they could fully acclimate to the more major work cycle change. Teams had the autonomy to implement the 1-to-1 meetings in month 7 or 8 of the study, and they all began to do so during that timeframe. Two teams leaders, however, did not finish all of their 1-to-1 meetings until the beginning of month 9.

[We took steps to ensure that, during the course of the study, managers in the control group remained unaware of our changes in the intervention group. We found these were

successful, and thus we minimized the internal validity threats of treatment diffusion and compensatory equalization (Cook & Campbell, 1979).]

## Results

Bivariate within-time, and test-retest, correlations are displayed in Table 1, and these are consistent with the relevant theories, research, and hypotheses, noted above. Whilst none of these correlations was high enough to suggest that any of the self-report measures were assessing the same constructs (e.g., Nunnally & Bernstein, 1994), psychological flexibility, as can be seen in Table 1, was strongly associated with mental health and moderately associated with job control. Results from confirmatory factor analyses [conducted with AMOS 5.0 (Arbuckle, 2003)] suggest, though, that flexibility is distinct from those other two constructs. In that, the model specifying flexibility and mental health as different latent variables had a significantly better fit than the one specifying both latent variables as the same construct, at both Time 1, chi-square difference test ( $\Delta\chi^2_{(1)} = 8.32, p < .01$ , and Time 2,  $\Delta\chi^2_{(1)} = 9.72, p < .01$ ; likewise, the model indicating that flexibility and job control were distinct fit significantly better than the one identifying both of these latent variables as the same, at both Time 1,  $\Delta\chi^2_{(1)} = 14, p < .001$ , and Time 2,  $\Delta\chi^2_{(1)} = 9, p < .01$ ).<sup>1</sup>

Group (PAR and control) means and standard deviations for each variable are displayed in Table 2. Chi-square and ANOVA analyses revealed no significant Time 1 differences between the PAR and control group on any biographical, mediator, moderator or outcome variable. In addition, logistic regression analyses showed that no variable measured at Time 1 predicted whether or not people completed the Time 2 questionnaires; furthermore, there was no evidence of a differential attrition rate between the two groups.

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<sup>1</sup> The complete set of CFA results can be obtained from the corresponding author.

*Intervention results*

Our first hypothesis was that the work redesign intervention would reduce psychological distress, absence levels (both number of days and occasions) and improve motivation. As the intervention and control groups did not differ on these outcome variables at pretest (see the ANOVA results in Table 2), we tested this hypothesis using ANCOVAs. Specifically, we tested for a Group difference on each outcome at posttest after adjusting for the outcome's pretest score. This procedure is more statistically powerful and parsimonious than a repeated measures MANOVA (e.g., Pedhazur & Schmelkin, 1992; Weinfurt, 2000). We used SPSS 14 to conduct these ANCOVAs, and their results are shown in Table 2. We controlled for Type I error inflation by applying a Bonferroni correction to the analyses, which set the alpha level significant at .01.

As can be seen in Table 2, the ANCOVA results indicate that the PAR intervention produced several significant improvements. First, the mental health of participants in the intervention group improved from pretest to posttest, such that at Time 2 they were significantly less psychologically distressed than were those in the control group; this difference was of a medium magnitude. (According to Cohen (1988), effect sizes measured using partial eta-squared ( $\eta^2$ ) are small at .01, medium at .09 and large at .25. These are the conventions that we used to interpret those effect sizes.) In comparison to the previous year, people in the PAR group were absent, from Time 1 to 2, on significantly fewer days and on fewer occasions than were those in the control group (see Table 2)<sup>2</sup>. This statistically large reduction in the number of days employees were absent saved the call center £105,164 (or approximately \$210,328) in lost wages (i.e., money paid for days not worked). The reduction in the number of occasions on which employees were absent in the PAR group, whilst significant, was statistically small.

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<sup>2</sup> Absence findings (both number of days and occasions) are based upon untransformed data. We repeated the analyses with a log transformation, but it had little effect on the results, probably because the positive skews and variances for both groups (on both absence variables) were similar (especially at Time 1) (Howell, 2004).

As can be seen in Table 2, the PAR intervention did not produce any significant changes in job motivation. It did, however, increase job control. In that, at Time 2, the PAR group reported significantly more control over their work than did the control group, and this difference was of a medium magnitude. As the primary goal of the PAR intervention was to increase participants' job control, this finding serves as an important manipulation check for the independent variable.

#### *Testing for mediated moderation*

As noted, the second and third hypotheses, taken together, form a mediated moderation model (refer again to Figure 1). We tested this model, and hence those two hypotheses, using the three hierarchical linear regression equations specified by Muller et al. (2005), and which operationally define Baron and Kenny's (1986) conceptualization of mediated moderation<sup>3</sup>. The specification of these three models can be seen, for each outcome, in Tables 3-5. (As the intervention did not impact job motivation, that outcome is not analyzed further.) In testing these three models for each of the outcomes, the predictor variables were centered (Aiken & West, 1991), and we created regressed change scores for each dependent variable by entering the relevant Time 1 scores in the first step of a hierarchical regression equation (Cohen, Cohen, West, & Aiken, 2003). Interaction terms were entered at Step 2 along with their constituent first-order effects (Cohen et al., 2003). In terms of their effect size, the regression coefficients in Tables 3-5 can be considered small at .14, medium at .36 and large at .51 (Cohen, 1988).

Our second hypothesis was that the intervention effects, shown in Table 2, would be greater for people who are higher in psychological flexibility. Consistent with this hypothesis, the "Group x Psychological Flexibility" (or "moderated intervention") effect in Model 1 was significant and negative for each of the three outcomes (see Tables 3-5). Thus, we can conclude

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<sup>3</sup> Edwards and Lambert (2007) provide an alternative method of estimating models that integrate mediation and moderation. However, their conceptualization of mediated moderation does not differ from Muller et al.'s (2005). It is their view of moderated mediation that differs, and as we do not test for this, we used the more

that the PAR intervention was indeed more helpful – in terms of reducing psychological distress and absence rates (number of days and occasions) – for people who were higher in psychological flexibility at Time 1 (see also Figures 2-4, respectively).

Our third hypothesis was that the moderated intervention effects, which we just identified, would be at least partially mediated (or transmitted) through worker's perceptions that job control increased as a result of the work redesign (shown in path a and b in Figure 1). In order to test this hypothesis, we first needed to show that psychological flexibility moderated (by enhancing) the impact that PAR had on job control (path a in Figure 1). As predicted, the significant and positive Group x Psychological Flexibility effect in Model 2 suggested that the PAR intervention did increase perceptions of job control to a greater extent for people who were higher in psychological flexibility at Time 1 (see Figure 5). (The Model 2 data in Tables 3-5 are the same. They are replicated in order to facilitate model comparisons within each table.)

Having now shown there was a moderated intervention effect on job control (path a in Figure 1), we next had to demonstrate that job control actually transmits this effect through to the outcomes (path b in Figure 1). To do so, we needed to perform two tests. First, we had to establish that job control significantly predicted the outcome variables (path b in Figure 1), whilst controlling for the direct impact that the moderated intervention had on the outcomes ( $c^2$  in Figure 1)<sup>4</sup>. As can be seen in Model 3, this test for mediation was met for mental health and both absence indicators (Tables 3-5, respectively). Second, we had to show that, when accounting for the effect of job control on the outcomes (path b in Figure 1), the direct impact that the moderated intervention had on the outcomes decreases ( $c^1 > c^2$  in Figure 1). Thus, if the Group x Psychological Flexibility effect on the outcomes decreases in absolute terms from Model 1 ( $c^1$  in Figure 1) to Model 3 ( $c^2$  in Figure 1), we can infer at least partial mediation; if it

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parsimonious procedures specified by Muller et al. In any event, the pattern of our findings are the same regardless of which estimation method we use.

reduces to non-significance, full-mediation is indicated (Muller et al., 2005). As can be seen in Tables 3 -5, the Group x Psychological Flexibility interaction effect did decrease for mental health, and it decreased to non-significance for both of the absence variables (c.f., Model 1 and 3). Thus, consistent with hypothesis three, these findings suggest that job control partially mediates the moderated intervention effect on mental health, and it fully mediates the impact that the moderated intervention had on number of days and occasions absent.

### Discussion

One of the unique goals of this study was to use a quasi-experimental design to examine the degree to which a particular individual difference variable, psychological flexibility, influenced, or moderated, the effect that a control enhancing PAR intervention had on mental health, absence rates, and employee motivation. As such, this research responds to calls to explore the role of individual differences in job design research (e.g., Jex et al., 2001). We also sought to use commonly accepted statistical techniques (e.g., Baron & Kenny, 1986; Muller et al., 2005) to determine the degree to which job control mediated the impact that the PAR intervention had on the outcomes that we examined. To obtain the most detailed and comprehensive understanding of work reorganization processes, we were not only interested in exploring mediation and moderation in isolation to one another; rather, we wished to examine the degree to which these processes inter-related in the form of mediated moderation.

Consistent with models of work organization (e.g., Hackman & Lawler, 1971; Emery & Trist, 1960; Frese & Zapf, 1994; and, Karasek, 1979), previous intervention research (e.g., Bond & Bunce, 2001; Parker et al., 1997), and our first hypothesis, results indicate that the PAR intervention, as compared to a control group, improved employee mental health and reduced the number of days, and occasions on which, employees were absent. Contrary to our first hypothesis, the PAR intervention in no way affected motivation levels. The reason for this lack

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<sup>4</sup> Such control is necessary, as job control and the outcome variables could be correlated, because they are both



of effect is not understood, however, it may be an attitude that is determined more by other aspects of work organization (e.g., task significance or skill variety) that were not directly targeted by the present intervention.

As predicted in our second hypothesis, these three beneficial effects of the PAR intervention were enhanced for people who had higher levels of psychological flexibility at the start of the study. Furthermore, and consistent with our third hypothesis, these three moderated intervention effects were mediated by job control. Specifically, people who had higher levels of psychological flexibility perceived that they had greater levels of job control as a result of the intervention; and, it was this greater perception of control that led these people to experience even greater improvements in absence rates and mental health.

These mediated moderation findings are consistent with the hypothesis that people with higher levels of psychological flexibility have a greater capacity to notice and respond more effectively to goal-related opportunities at work (Bond & Flaxman, 2006). Thus, if workers with greater flexibility are given more job control, they may be better able to notice where, when, and the degree to which they have it; as a result, they will be better able to identify more opportunities to pursue goal-oriented actions, which presumably involve making their work more rewarding or at least less aversive (Ganster, 1989). This goal-related context sensitivity account of psychological flexibility's effects is consistent with research by Bond and Barnes-Holmes (in preparation) that shows that people with higher levels of flexibility are better able to notice, and respond effectively to, subtle changes in performance criteria on a computerized task. Future research may wish to explore further this context sensitivity hypothesis, and its implications for performance and health at work.

### *Limitations*

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independently caused by the moderated intervention (i.e., Group x Psychological Flexibility) effect (Baron & Kenny, 1986).

This study suffers from a limitation that is practically inherent in work reorganization outcome research: we had to use a quasi-experimental design; and, whilst this is a rigorous and rarely used design in organizational research, it does leave us open to various threats to internal validity (see Campbell & Stanley, 1963). We tried to reduce these threats by closely approximating a pretest-posttest control group design. For example, we formed the PAR and control groups from pre-existing units (i.e., established call centers) in a random, experimenter-controlled fashion (Campbell & Stanley, 1963). In addition, the PAR and control groups were not in close proximity to each other (i.e., they were over 100km apart), and the manager of the “control group” call center reported that she did not hear about any of the PAR-related changes in the intervention group; thus, it is unlikely that any type of treatment diffusion effect occurred (Cook & Campbell, 1979). Whilst these study features should help to limit our exposure to internal invalidity, we cannot of course be immune to it.

For example, one potential limitation of our design is that we did not use a control group that received some “inert” intervention (i.e., a placebo); instead, we used a non-intervention control group and so it is possible that the effects of the PAR intervention were caused by a “Hawthorne effect”. As S.E. Jackson (1983) noted, such an effect is particularly likely when (a) participants know that they are involved in a study, and (b) the follow-up observation point occurs soon after the intervention has ended. In the present study, participants did know that they were in a study; however, regarding the second point, the Time 2 observation occurred five to seven months after the work reorganization intervention strategies were implemented. It may be, unlikely, therefore, that a Hawthorne effect would operate so many months after the work design changes occurred. Furthermore, our mediation findings suggest that the intervention effects occurred for a theoretically substantive reason: it increased job control; thus, further undermining the presence of a Hawthorne effect and, indeed, hypothesis guessing (Cook & Campbell, 1979).

*Implications and conclusions*

There are two primary implications of these findings for organizational behavior and occupational health psychology. First, results from this study indicate that increasing job control was effective in improving people's mental health and absence rates, but it was particularly successful for those who had higher levels of psychological flexibility. These findings are consistent with hypotheses that comprehensive interventions, which target both individual and work-related characteristics, will produce the most efficacious benefits (e.g., Hurrell, 1995). In particular, these present findings suggest that it may be helpful to improve psychological flexibility – e.g., through an ACT intervention (ACT; Bond & Hayes, 2002) – *before* increasing job control through work reorganization. In this way, more people would have higher levels of flexibility and thus be better able to identify, and hence benefit from, improvements in job control. Future research may wish to examine this possibility.

The second implication of these findings concerns the role of psychological flexibility in organizational behavior. Specifically, results from this study are consistent with a growing body of evidence that demonstrates the ability of flexibility, independently and interacting with job control, to predict both mental health and productivity outcomes (e.g., Bond & Flaxman, 2006; Bond & Bunce, 2000; 2003; Donaldson-Feilder & Bond, 2004; Hayes, Stroschal et al., 2004). It appears, then, that this individual characteristic may be a useful one to integrate into models of occupational health and performance. In doing so, these models would account for a variable that is now considered an important, and manipulable, determinant of mental health and behavioral effectiveness by contemporary cognitive-behavioral models of psychopathology and human performance (e.g., Hayes et al., 1999; Linehan, 1993; Segal et al., 2002). In addition, such inclusion may provide a more comprehensive, empirically based guide for developing holistic interventions that help organizations and their employees become more effective and healthy.

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Author Note

Frank W. Bond, Paul E. Flaxman and David Bunce, Department of Psychology,  
Goldsmiths College, University of London, United Kingdom

Paul E. Flaxman is now at the Department of Psychology, City University, London,  
United Kingdom

David Bunce is now at the Centre for Cognition and Neuroimaging, Brunel  
University, United Kingdom

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Correspondence concerning this article should be sent to Frank W. Bond, PhD,  
Department of Psychology, Goldsmiths College, University of London, New Cross, London  
SE14 6NW, United Kingdom. Email: F.Bond@gold.ac.uk

Table 1

*Bivariate Correlations (N=181)*

Variable	1	2	3	4	5	6	7	8	9
1. Psychological distress	<b>.58**</b>	.57**	.53**	-.25**	-.63**	-.34**	.08	.09	-.04
2. Absence: Number of days	.55**	<b>.65***</b>	.36**	-.13*	-.24**	-.18**	-.02	.12	.10
3. Absence: Number of occasions	.54**	.41**	<b>.59***</b>	-.22**	-.28**	-.25**	-.04	.11	.06
4. Job motivation	-.26**	-.15*	-.18**	<b>.64**</b>	.09*	.27**	.05	.05	.07
5. Psychological flexibility	-.58**	-.23**	-.31**	.10*	<b>.73***</b>	.31**	-.11	.14	-.10
6. Job control	-.39**	-.22**	-.24**	.30**	.34**	<b>.61**</b>	-.09	-.12	-.03
7. Age								.24**	.41**
8. Gender									.17**
9. Tenure in organization									

*Note.* Coefficients above the diagonal represent intercorrelations at Time 1, those below at Time 2,

and those on the diagonal are intercorrelations between a variable at Time 1 and 2. For the gender variable, females were coded 1 and males 2.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 2

*Means, Standard Deviations, ANOVA Statistics (on the Time 1 Means) and ANCOVA Statistics (on the Time 2 Means) for the Outcome and Mediator Variables*

Variable		Group				ANOVA on Time 1 means ANCOVA on Time 2 means		
		PAR		Control		F ratio	df	$\eta^2$
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>			
Psychological distress	Time 1	9.31	6.88	9.96	5.84	3.47	1,179	.00
	Time 2	6.58	7.04	10.08	5.53	35.41**	1,178	.12
Absence: Number of days	Time 1	11.44	5.85	12.00	6.41	2.37	1,179	.00
	Time 2	7.27	4.08	12.23	6.31	49.79**	1,178	.27
Absence: Number of occasions	Time 1	2.23	2.32	2.01	2.13	2.26	1,179	.00
	Time 2	1.48	1.61	2.24	2.10	24.75*	1,178	.05
Job Motivation	Time 1	33.40	3.10	33.20	2.97	3.19	1,179	.00
	Time 2	33.90	2.99	33.33	2.72	3.62	1,178	.00
Job Control	Time 1	46.58	2.89	46.69	3.47	2.06	1,179	.00
	Time 2	49.66	5.86	46.58	4.34	52.75**	1,178	.19

Note. PAR = Participative Action Research;  $\eta^2$  = partial eta squared; ANCOVA tests whether the Time 2 PAR and Control group means for a variable are significantly different, after they have been adjusted for their Time 1 means. To control for familywise Type I error, we applied a Bonferroni correction to the five ANCOVA analyses, which set the alpha level significant at .01.

\*  $p < .01$  \*\*  $p < .001$

Table 3

*Hierarchical Regression Models for Testing the Mediated Moderation of Psychological Distress*

Predictor variables		Time 2 criterion variables					
		Psychological distress (Model 1)	$\Delta R^2$	Job control (Model 2)	$\Delta R^2$	Psychological distress (Model 3)	$\Delta R^2$
Step 1	T1 Psychological distress	.58***	.54***		.53***	.58***	.54***
	T1 Job control			.61***		.00	
Step 2	T1 Psychological distress	.51***	.11**		.21***	.51***	.15**
	T1 Job control			.34***		-.06**	
	Group	-.09*		.53***		-.05*	
	T1 Psyflex	-.12**		.06		-.17**	
	Group x T1 Psyflex	-.78***		.26***		-.15**	
	T2 Job control					-.11**	

*Note.* Values are standardized beta coefficients;  $\Delta R^2$  = Change in Adjusted  $R^2$  ; T1=Time 1;

T2=Time 2; Psyflex = Psychological flexibility; Intervention group was coded 2 and control group was coded 1; Group x Psyflex = The interaction term between group and psychological flexibility.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$

Table 4

*Hierarchical Regression Models for Testing the Mediated Moderation of Number of Days Absent*

	Predictor variables	Time 2 criterion variables					
		Days absent (Model 1)	$\Delta R^2$	Job control (Model 2)	$\Delta R^2$	Days absent (Model 3)	$\Delta R^2$
Step 1	T1 Days absent	.65***	.58***		.53***	.65***	.58***
	T1 Job control			.61***		-.07	
Step 2	T1 Days absent	.57***	.18***		.21***	.57***	.17***
	T1 Job control			.34***		-.20	
	Group	-.42***		.53***	.	-.06	
	T1 Psyflex	-.06		.06		-.11	
	Group x T1 Psyflex	-.21***		.26***		-.12	
	T2 Job control					-.32*	

*Note.* Values are standardized beta coefficients;  $\Delta R^2$  = Change in Adjusted  $R^2$ ; T1=Time 1;

T2=Time 2; Psyflex = Psychological flexibility; Intervention group was coded 2 and control group was coded 1; Group x Psyflex = The interaction term between group and psychological flexibility.

\*  $p < .05$ . \*\*\*  $p < .001$

Table 5

*Hierarchical Regression Models for Testing the Mediated Moderation of Number of Occasions Absent*

	Predictor variables	Time 2 criterion variables					
		Occasions absent (Model 1)	$\Delta R^2$	Job control (Model 2)	$\Delta R^2$	Occasions absent (Model 3)	$\Delta R^2$
Step 1	T1 Occasions absent	.59***	.51***		.53***	.59***	.51***
	T1 Job control			.61***		-.03	
Step 2	T1 Occasions absent	.54***	.08***		.21***	.53***	.10***
	T1 Job control			.34***		-.05	
	Group	-.17***		.53***	.	-.06	
	T1 Psyflex	-.09		.06		-.08	
	Group x T1 Psyflex	-.11**		.26***		-.09	
	T2 Job control					-.12**	

*Note.* Values are standardized beta coefficients;  $\Delta R^2$  = Change in Adjusted  $R^2$  ; T1=Time 1;

T2=Time 2; Psyflex = Psychological flexibility; Intervention group was coded 2 and control

group was coded 1; Group x Psyflex = The interaction term between group and psychological

flexibility.

\*\*  $p < .01$ . \*\*\*  $p < .001$



Figure captions

*Figure 1.* Models illustrating the second and third hypotheses of the study. “Group x PF” refers to the interaction term between group (intervention and control) and psychological flexibility. The term “Outcomes” refers to psychological distress, number of days absent, number of occasions absent, and motivation.

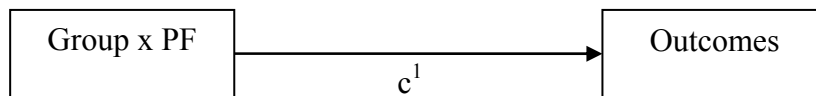
*Figure 2.* Interaction between group (intervention and control) and psychological flexibility at Time 1 in predicting psychological distress at Time 2. High and low psychological flexibility are, respectively, one standard deviation above and below the sample mean.

*Figure 3.* Interaction between group (intervention and control) and psychological flexibility at Time 1 in predicting number of days absent from the year to Time 1 to the year to Time 2. High and low psychological flexibility are, respectively, one standard deviation above and below the sample mean.

*Figure 4.* Interaction between group (intervention and control) and psychological flexibility at Time 1 in predicting number of occasions absent from the year to Time 1 to the year to Time 2. High and low psychological flexibility are, respectively, one standard deviation above and below the sample mean.

*Figure 5.* Interaction between group (intervention and control) and psychological flexibility at Time 1 in predicting perceived job control at Time 2. High and low psychological flexibility are, respectively, one standard deviation above and below the sample mean.

Hypothesis 2: Overall moderated intervention effect



Hypothesis 3: Mediated moderated intervention effect

