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Re-exploring the antecedents of proactivity at work

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Abstract

This paper reports two studies that utilized full structural equation modeling to explore the antecedents of proactivity at work. It was motivated by observations from a recent replication of a leading proactivity model, Parker et al. (J Appl Psychol 91(3):636–652, 2006. https://doi.org/10.1037/0021-9010.91.3.636) in which the replication model failed to confirm multiple previously reported variable relationships and manifested significant evidence of omitted variable bias (correlation between exogenous predictor variables and the disturbance term of the model's dependent variable). Study 1 revisited the antecedents of proactivity in light of the unexpected replication model results. Utilizing the same diverse dataset (N = 521), it analyzed the relationships among all of the original model variables, together with a new contextual information availability variable, and constructed a new model (the "Modified Model") consisting of the path relationships that were observed as statistically significant. The Modified Model differs from the original model in multiple respects: (i) it removes four of eight original variable path relationships, which could not be replicated as statistically significant, (ii) it removes a posited proactivity antecedent, flexible role orientation, whose path relationship with its predictor, co-worker trust, was observed as significant, but negative, (iii) it adds a direct path relationship between proactive personality and proactivity at work, (iv) it respecifies co-worker trust from an exogenous to an endogenous proactivity antecedent of proactivity at work, and (v) it specifies CI availability as new exogenous antecedent of co-worker trust. The Modified Model achieved good model fit and high explained variance ($R^2 = 0.64$). In addition, the Modified Model did not manifest the evidence of omitted variable bias that was observed for the original model utilizing the same dataset. Study 2 was undertaken to cross-verify both of the prior studies using a fresh dataset (N = 479), and both prior studies were confirmed. Re-replication of the Parker et al. (J Appl Psychol 91(3):636–652, 2006. https://doi.org/10.1037/0021-9010.91.3.636) model again manifested evidence of omitted variable bias and provided evidence that corresponded with the results of the initial replication—significant differences from the observations reported by the original study. On the other hand, replication of the Modified Model again manifested no evidence of omitted variable bias, and resulted in observations that confirmed the Study1 observations

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used to construct the Modified Model. Taken together, Studies 1 and 2 provide evidence of the overall validity of the Modified Model of the antecedents of proactivity at work.

Keywords Proactivity · Contextual information availability · Information asymmetry · Information sharing · Work motivation · Structural equation modeling

JEL Classification C39

1 Overview

Given the ever-increasing complexity of issues, velocity of activity and diversity among colleagues faced by organizations today, the need for proactivity in the workplace has never been more significant. Thus, it follows that organizations which understand and exploit the pathways for promoting and managing proactive work behaviors can be expected to achieve competitive advantage. Hence the motivation for this paper, which offers new and more nuanced insights into the antecedents of proactivity at work.

Work motivation scholars have been fascinated by the phenomenon of proactivity at work for decades. Their efforts have been well-chronicled by literature reviews (e.g., Grant and Ashford (2008) and multiple comprehensive models have been offered to explain the variable relationships that determine workplace proactivity outcomes. E.g., Crant (2000), Frese and Fay (2001), Parker et al. (2006), Grant and Ashford (2008). Interestingly, in many cases the authors of these comprehensive models did not conduct empirical studies to assess their models' validity. A notable exception is Parker et al. (2006), which conducted a systematic empirical study of potential proactivity model antecedents Their work has become widely recognized, and, according to Google Scholar, it has been cited more than 2500 times. The Parker et al. (2006) model is parsimonious—three distal (exogenous) antecedents lead to two proximate (endogenous) antecedents, which in turn lead to a single proactivity criterion. The authors created their model by examining relationships among numerous potential candidate variables and then specifying the variable relationships that were observed as statistically significant as model antecedents. The authors acknowledged that a possible limitation on their study related to external validity concerns arising from its basis on observations of a panel of 282 blue collar workers in a single wire manufacturing facility in the United Kingdom. Thus, they called for further study and published their measurement scales to facilitate use by subsequent researchers. Nonetheless, replication studies have been scarce, and the external validity of the model has not been extensively explored. This represents a significant gap in the proactivity at work literature, which is addressed by the replication studies reported in this paper.

1.1 Motivation for this paper

The initial motivation for this paper arose from evidence I observed that called into question the external validity of the results reported by Parker and colleagues. In a

prior study, (Hawthorne 2022, Ch. 3), I sought to replicate the Parker et al. (2006) study on a large and diverse dataset (N = 521) and then explore the effect of adding a new contextual information (CI) availability variable. Surprisingly, however, replication was only partially successful. Four of the eight variable paths posited by Parker and colleagues were not observed to be significant. In addition, the variable path between one of the proximal antecedents, flexible role orientation, and its exogenous predictor was significant, but *negative*. Further, I observed evidence of omitted variable bias in the replication model in that each of the exogenous variables was significantly correlated with the error term of the dependent proactivity variable. These observations prompted me to re-explore the antecedents of proactivity utilizing the Parker et al. (2006) study as a template to develop a new model whose variable relationships are rooted in observations from a large and diverse dataset and whose external validity is confirmed by observations based on independent data. This paper addresses important concerns for proactivity scholars and practitioners alike because the absence of a comprehensive proactivity model whose external validity has been explored and confirmed suggests the possibility that the antecedents of proactivity may not have been well understood.

1.2 Empirical studies undertaken

This paper reports two empirical studies.

Study 1. Following an approach similar to the approach of Parker et al. (2006), Study 1 began by analyzing the relationships among the original model variables and the new (CI) availability variable, based on the replication dataset (the "Study 1 dataset"). It then constructed a new model (the "Modified Model") consisting of the path relationships that were observed as statistically significant and nontrivial. The Modified Model differs from the original model in multiple important respects: (i) it removes four original variable paths that could not be replicated, (ii) it removes the posited proactivity antecedent, flexible role orientation, whose posited positive relationship with its predictor, co-worker trust, was observed as significant, but *negative*, (iii) it adds a newly observed direct proactivity effect for proactive personality, (iv) it respecifies co-worker trust from an exogenous to an endogenous proactivity antecedent, and (v) it adds CI availability as a new exogenous antecedent. Using full structural equation modeling and the Study 1 dataset, the Modified Model achieved good model fit and high explained variance ($R^2 = 0.64$), and it did not manifest the evidence of omitted variable bias that had been observed for the Parker et al. (2006) replication model (correlation between exogenous variables and the disturbance term of the dependent variable) (Antonakis et al. 2010).

Study 2. Study 2 consists of a re-replication of the Parker et al. (2006) model and a replication of the Modified Model using fresh data. Study 2 utilized an independent and diverse dataset (N = 479) that was drawn approximately 18 months later than the Study 1 dataset and had no overlapping participants (the "Study 2 dataset").

Study 2 began by re-replicating the original model using the new dataset and observed the same discrepancies that had been observed in the

initial replication—the model could only be partially replicated. In addition, Study 2 observed evidence of omitted variable bias for the original model comparable to that observed in the initial replication study.

Study 2 then performed a replication of the Modified Model using the new Study 2 dataset. Study 2 observed evidence that confirmed all of the variable relationships posited in the Modified Model by the Study 1 analysis. The Modified Model also achieved good model fit and high explained variance ($R^2 = 0.60$). Importantly, the Modified Model did not manifest evidence of omitted variable bias.

1.3 Importance of this research

This research is important for several reasons. It makes a major contribution to the proactivity at work literature by examining and extending the work of Parker et al. (2006). Specifically, it addresses a major limitation of the original study—external validity concerns arising from the homogeneity of its study subjects, which made the original dataset a less than optimal basis for broad generalizations. The current research addresses these concerns with two principal study design approaches. First, it employs datasets with substantial and observable between-subjects diversity and minimal homogeneity in that the subjects have no known relationships other than their participation on a leading curated academic research survey platform. In comparison, all of the Parker et al. (2006) subjects were blue collar workers who worked for the same company in the same location, many likely knew each other, and all worked in the same work environment. Secondly, the current studies have samples large enough to allow use of full structural equation modeling to explore and explain behavioral variances. Among other things, this provided the ability to control for (i) error in the measurement of the latent variables, (ii) co-variances among the exogenous variables, and (iii) error/disturbance in the measurement of the path relationships between variables. Each of these approaches contributed to the much higher variances explained (R^2) reported for the current studies compared to those reported in Parker et al. (2006).

Perhaps most importantly, this research provides proactivity scholars with much more nuanced insights into proactivity variable relationships. For example, excluding flexible role orientation as a Modified Model antecedent does not necessarily mean that Parker and colleagues erred in including it as an original model antecedent. As described below, trust literature suggests that when the original model was examined in Studies 1 and 2 utilizing larger and more diverse datasets, its variable measurement scales likely tapped into well-understood trust-literature constructs (i.e., monitoring behaviors) that were inconsistent with the positive relationships posited by Parker and colleagues between co-worker trust and flexible role orientation. However, these relationships likely could not have been perceived by Parker and colleagues using their original dataset because of inherent between-subjects homogeneity. In the same vein, the inclusion of a direct effect pathway from proactive personality to proactivity in the Modified Model can perhaps be explained by recognizing that the subjects in the current studies had higher levels of proactivity than those in the Parker et al. (2006) study. Simply put, the original dataset may not

have provided a vehicle for Parker and colleagues to observe variances in certain model variable relationships that were readily apparent from the Study 1 and Study 2 datasets.

Finally, this paper was substantially motivated by the opportunity to explore relationships that might provide practitioners important new insights into ways to promote proactivity in the workplace. Specifically, prior researchers had suggested the possibility that improving the information made available to subjects in the workplace might lead to improvements in their proactivity at work, but extant proactivity models have not included CI availability as a proactivity antecedent, nor have they explored the path relationships between variability in CI availability and workplace proactivity outcomes. The Modified Model addresses this directly by including CI availability as a between-subjects distal antecedent. This enabled the study to observe empirical evidence of the relationship between variance in the CI available to subjects in the workplace (a matter largely within the control of their employers) and their proactive workplace behaviors.

2 Literature review

2.1 Modeling the antecedents of proactivity

An important part of the work motivation literature is the literature relating to proactive behavior at work. Scholars of this literature have considered the relevant theoretical relationships in great depth, but while they have developed logical structural models to explain the phenomenon of proactivity, few have been validated by empirical studies, and external validity remains a major concern for at least one of the leading models.

Grant and Ashford provided a comprehensive review (including an integrative framework) of the workplace proactivity literature. (Grant and Ashford 2008). They chronicled the development of the proactivity literature and concluded their review with a discussion of the emergence of two integrated conceptualizations of proactivity, the first of which is *proactive personality.* The focus of this literature is on a trait-based or dispositional approach to employee attributes initially offered by Bateman and Crant who viewed a proactive personality as a relatively stable tendency to effect environmental change. (Bateman and Crant 1993). While the authors acknowledge a wealth of ensuing literature on the characteristics of proactive employees (e.g., Crant and Bateman 2000; Parker and Sprigg 1999; Seibert et al. 1999, 2001), in their view "... the dispositional perspective offers relatively little information about what behaviors should be classified as proactive (Crant 2000)." (Grant and Ashford 2008, p. 8).

The second integrated conceptualization discussed by the Grant and Ashford (2008) was the concept of personal initiative in work behaviors developed by Frese and colleagues, which they characterized as involving a self-starting nature, a proactive approach and a persistence in overcoming difficulties in the pursuit of a goal (Frese and Fay 2001). In the view of Grant and Ashford (2008), the personal initiative concept advanced the understanding of proactivity in two major ways: it focused

on behaviors rather than personality traits and it expanded the conceptualization of proactivity in the literature.

This paper posits a third integrated conceptualization to explain proactivity. It is the notion that peoples' perceptions of the contextual information (CI) available to them are significant predictors of their workplace proactivity outcomes. CI availability as a distinct variable was examined in Hawthorne (2022, Ch. 1) by integrating multiple established literatures that observed variability in subjects' CI availability as a predictor of their workplace outcomes. Hawthorne (2022, Ch. 1) then drew together common threads observed by scholars of these foundational literatures into a general and unified CI availability theory. It is important to note that proactivity scholars have routinely acknowledged the importance of information availability as a predictor of proactivity at work, e.g., Parker et al. (2019, p. 243). However, they have not included variability of CI availability as a proactivity model antecedent, perhaps because they heretofore did not have an efficient means of measuring CI availability variance.

2.2 The Parker et al. (2006) proactive work behavior model

The Parker et al. (2006) model combined the proactive personality and personal initiative concepts from prior literature into an integrated conceptualization of the anticipatory actions that employees take to impact themselves and/or their environments (Grant and Ashford 2008, p. 8). Parker and colleagues noted that extant proactivity concepts had been operationalized in hierarchical contexts—individual, team and organizational levels—and declared their study's focus to be individual-level proactive work behavior. They did not offer a general proactivity construct. Rather, they devised a somewhat idiosyncratic proactivity measure with two dimensions. "The first, *proactive idea implementation*, involves an individual taking charge of an idea for improving the workplace, either by voicing the idea to others or by self-implementing the idea. The second, *proactive problem solving*, refers to self-starting, future oriented responses that aim to prevent the reoccurrence of a problem (such as by addressing its root cause) or that involve solving it in an unusual and nonstandard way. As this definition implies, exactly what behaviors are "proactive" will be influenced by the context because what is unusual and nonstandard in one environment may be a routine approach in another situation (Frese and Fay 2001)." (Parker et al. 2006, p. 637).

The Parker et al. (2006) model posits three distal (exogenous) antecedents, proactive personality, job autonomy and co-worker trust, and two proximate (endogenous) antecedents, role breadth self-efficacy and flexible role orientation, which mediate the relationships between the distal antecedents and proactive work behavior. The authors did not include CI availability as an antecedent of proactive behavior. While the authors did not provide much insight about their views on CI availability, at least two of their model constructs, role breadth self-efficacy and flexible role orientation, seem to have clear informational antecedents.

The authors describe self-efficacy as "one's judgment about one's capability to perform particular tasks," and point out that it is a critical work motivation

variable which can be measured either generally or in the context of specific situations (e.g., the individuals work role) (p. 638). Drawing on Parker's prior work, the authors used the construct of *role breadth* self-efficacy, which refers to one's perceived capability of carrying out a range of proactive, interpersonal and integrative activities that extend beyond the prescribed technical core as a mediating variable. (Parker 1998). The notional existence of a relationship between CI and role-breadth self-efficacy seems readily apparent, given that the term is defined in terms of the employee's personal perceptions of capability formed in light of information presented and experienced in a specific work situation. Similarly, flexible role orientation explores the degree to which an employee feels responsibility for workplace situations (e.g., goals and problems), whether or not within the scope of their job description. (p. 639) The link between "what I feel responsibility for" and "what I think I know about the situation" is obvious—just as in the case of self-efficacy, the term is defined in terms of perceptions of responsibility formed in light of information presented about a specific work situation. Thus, it appears that each of these constructs may be endogenous to CI availability and that measures of these constructs could be influenced by variance in CI availability.

Parker et al. (2006) set forth the scale items and factor loadings used in their study. Neither the items that compose the category of perceived work environment nor any other items in the scale purport to elicit data concerning the notion of CI availability. Accordingly, matters such as the extent to which respondents perceived that important situationally specific information was available to them, their perceptions about the quality and/or usefulness of available information and their perceptions about whether their colleagues had relatively more or relatively less of such information were not measured.

A structural path diagram for the final Parker et al. (2006) model is set forth in Fig. 1.

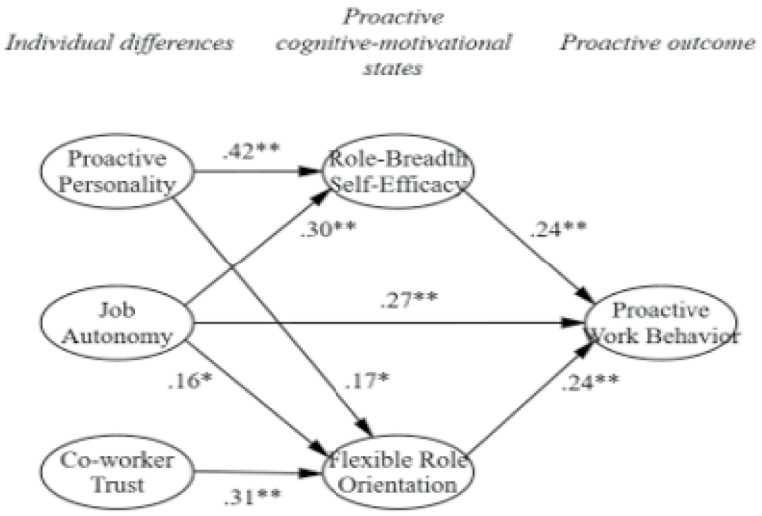
Parker and colleagues summarized their observed variable relationships as follows: "Overall,... each antecedent was important for proactive behavior, albeit via different processes. Proactive personality was positively related to proactive work behavior via both role breadth self-efficacy and flexible role orientation; job autonomy also positively related to proactive behavior via these processes, as well as directly; and coworker trust was positively associated with proactive behavior via flexible role orientation." (p. 645).

2.3 Hawthorne (2022, Ch. 3)—a study of the role of CI availability as a proactivity antecedent that was based on replication of the Parker et al. (2006) study

2.3.1 Replication of Parker et al. (2006) study

Hawthorne (2022, Ch. 3) sought to explore the potential role of CI availability as a predictor of proactivity at work by replicating a leading proactivity model and observing the effects of adding CI availability as a new antecedent variable. Of the leading proactivity models referred to above, only Parker et al. (2006) provided an empirical study of their proposed model relationships. Thus, when Anonymous

Parker, Williams & Turner (2006) Proactive Work Behavior Model



*Note: N = 281. ** = p < .01, * = p < .05.*

Chi^2 (df) = 10.53(13), CFI = 1.00, SRMR = 0.020.

Fig. 1 Parker et al. (2006) proactive work behavior model

(2022, Ch. 3) sought to explore the possible role of CI availability as a possible proactivity antecedent, only Parker et al. (2006) provided a convenient vehicle for conducting a replication study.

Hawthorne (2022, Ch. 3) reported an empirical study (N = 521) that was designed to assess the effect of adding a new antecedent variable to the Parker et al. (2006) model. It attempted to replicate the outcomes reported by Parker and colleagues on a much larger and more diverse dataset, however many of the variable relationships could not be replicated. Ultimately, Hawthorne (2022, Ch. 3) explored the effects of adding a new CI availability antecedent to a partially replicated version of the Parker et al. (2006) model (the "Partially Replicated Model") and reported that variance in a newly added CI availability antecedent variable was significantly and positively associated with variance in model proactivity measures, the amount of proactivity variance explained (R^2) by the model, and the model's predictive ability.

Set forth in Fig. 2 is a structural path diagram of the model used to replicate the Parker et al. 2006 study (the "Replication Model") reported in Hawthorne (2022, Ch.3). The Replication Model substitutes a well-recognized (and more generalizable and parsimonious) dependent proactivity variable, personal initiative (Frese et al. 1997), for the more idiosyncratic measures of proactive idea implementation and

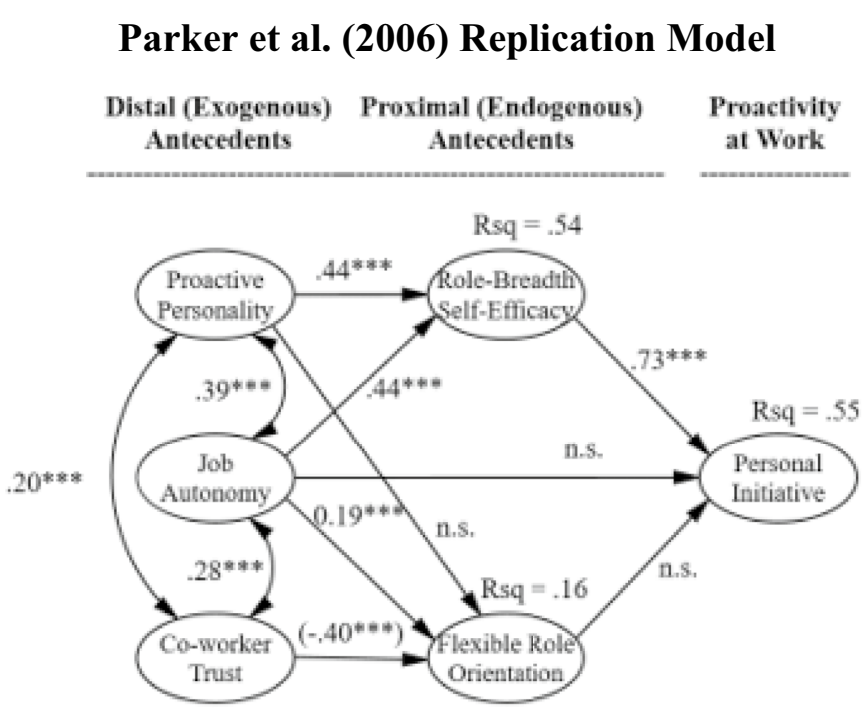


Fig. 2 Parker et al. (2006) replication model

proactive problem solving employed by Parker and colleagues. In all other respects the Replication Model employs the specific variables and measurement scales that were reported in Parker et al. (2006).

The Hawthorne (2022, Ch. 3) expectation for the Replication Model outcomes was that the path coefficients in the Replication Model would resemble those reported by the Parker and colleagues in the original study but that the observed relationships between the variables would be stronger because the use of a full structural model would allow the model to control for measurement error, covariance between the exogenous variables, and endogenous variable disturbance. However, the observed Replication Model results contained multiple differences from Parker et al. (2006).

In the Replication Model, the direct path coefficients for each of the flexible role orientation mediator variable (FRO) and the job autonomy variable (AUTO), with the dependent proactivity variable (PI), were not statistically significant and therefore did not provide evidence consistent with the results reported in the original study. In addition, the direct path coefficient from proactive personality (PROPRS)

to FRO also was not significant. Most surprisingly, the primary positive path coefficient posited between FRO and its principal antecedent, co-worker trust (TRUST), was observed as statistically significant but *negative*. On the other hand, the coefficients that involve the role breadth self-efficacy mediator variable (RBSE) in the Replication Model did provide evidence in support of the original study because, as expected, they were consistent with and stronger than those reported in the original study. In addition, Hawthorne (2022, Ch. 3) observed significant evidence of omitted variable bias in the Replication Model. Each of the exogenous variables was significantly correlated with the error term of the dependent variable. Two of the variables, proactive personality (r = 0.482***) and co-worker trust (r = 0.176**), manifested positive correlations, while job autonomy (r = − 0.776***) manifested a negative correlation. Omitted variable bias in the original Parker et al. (2006) model would suggest potentially serious concerns about the interpretability of model outcome observations. (Antonakis et al. 2010).

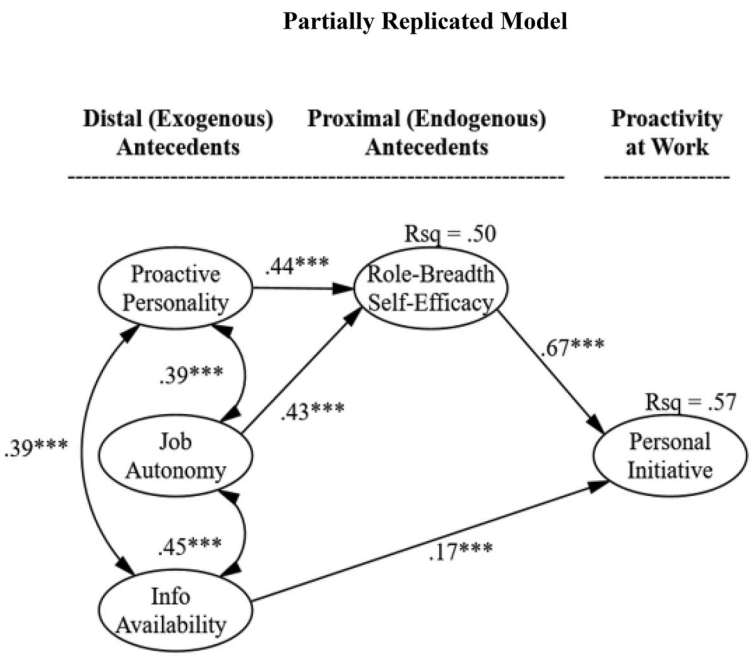
2.3.2 Partially replicated model

To conduct its analysis of the role of CI availability as an antecedent of proactivity at work, Hawthorne (2022, Ch. 3) first constructed the Partially Replicated Model, which specified only those variables from the Parker et al. 2006 model whose previously reported relationships could be replicated by analysis of the data. This resulted in the removal of the flexible role orientation variable (FRO) because it was not shown to have a significant relationship with the proactivity variable (PI). Similarly, the coworker trust variable (TRUST) was removed because TRUST was posited by Parker and colleagues only as a positive predictor of FRO (so there could be no replicated path from TRUST to PI once FRO was removed) and because of the observed discrepancy in the direction of the significant path relationship between TRUST and FRO. The model achieved an acceptable fit to the data. Chi^2 (df) = 822 (291) ***, CFI = 0.932, NFI = 0.899, IFI = 0.924, RMSEA = 0.059.

Hawthhorne (2022, Ch. 3) then augmented the Partially Replicated Model to include an exogenous CI availability variable, which it used to test the study hypotheses. A structural path diagram for the Hawthorne (2022) Model is provided in Fig. 3.

The Partially Replicated model provided for three exogenous antecedents: proactive personality (PROPRS) and job autonomy (AUTO), which are posited to act only indirectly on the dependent proactivity variable (PI) through role breadth self-efficacy (RBSE), and the new variable, CI availability (INFO), which has a direct path to PI. The model achieved an acceptable fit to the data. Chi^2 (df) = 1340 (550) ***, CFI = 0.926, NFI = 0.882, IFI = 0.926, RMSEA = 0.053.

In summary, Hawthorne (2022, Ch. 3) provided empirical evidence that some but not all of the variable path relationships posited by Parker et al. (2006) are valid predictors of proactivity at work (when measured by subjects' personal initiative) and that CI availability is a valid predictor of workplace proactivity as well. However, the scope of Hawthorne (2022) did not include a comprehensive exploration of all of the path relationships among the pool of proactivity variables in the dataset in pursuit of a more generalizable model.



*Note: N = 521. *** = p < .001, Chi²(df) = 1340*** (550),CFI = 0.926, NFI = 0.882, IFI = 0.926, RMSEA = 0.053.*

Fig. 3 Partially replicated model

3 Study overview and hypotheses

3.1 Summary

This paper picks up where Hawthorne (2022, Ch. 3) ended. Study 1 reports a systematic exploration of the relationships among all of the variables in the Study 1 dataset (many of which were not examined in the Hawthorne (2022, Ch. 3) study), and the construction of a new model of the antecedents of proactivity at work (the "Modified Model"), which consists of all of the variable path relationships that were observed as statistically significant and nontrivial. In so doing it takes an approach very similar to the iterative process utilized by Parker et al. (2006), but it utilizes a much larger and much more diverse dataset, as well as a more robust application of structural equation modeling. Study 2 reports the use of a fresh, independent data set (N = 479) that was compiled after construction of the Modified Model to conduct two replication analyses. The first analysis is a re-replication of Parker et al. (2006) that seeks to cross-verify the problematic replication results observed by Anonymous (2022, Ch. 3). The second analysis is

a replication of the Modified Model that seeks to cross-verify the results observed in Study 1, which would be evidence of the validity of the Modified Model.

3.2 Hypotheses

In addition to re-replication of the Parker et al. (2006) model, this paper addresses one fundamental research question: Is the Modified Model a valid representation of the antecedents of proactivity at work?

Study 1 (N = 521) provides empirical justification for the variable relationships that appear in the Modified Model—they comprise all of the statistically significant and nontrivial observed path relationships based on analysis of the Study 1 dataset. In turn, Study 2 (N = 479), examines the external validity of the Modified Model by analyzing model outcomes using independent data. In addition, the presence of the new Study 2 dataset provides a convenient opportunity to re-replicate the Parker et al. (2006) model, so Study 2 also seeks to cross verify the Parker et al. (2006) replication results observed by Anonymous (2022, Ch. 3). Thus,

Hypothesis 1 Re-replication of Parker et al. (2006).

Re-replication of the Parker et al. (2006) study utilizing the independent Study 2 dataset will confirm the path relationships and statistical significance assessments previously observed by Hawthorne (2022, Ch. 3) utilizing the Study 1 dataset, which provided only partial confirmation of the Parker et al. (2006) model.

Hypothesis 2 Modified Model Replication.

Analyses of the Modified Model based on the independent Study 2 dataset will confirm the path relationships and statistical significance assessments previously observed for the Modified Model utilizing the Study 1 dataset.

Hypothesis 3 Modified Model Fit.

The Modified Model will achieve an acceptable fit with the independent Study 2 dataset.

Hypothesis 4 Amount of Variance Explained by the Modified Model.

The amount of variance in the dependent proactivity variable (personal initiative) explained by the Modified Model (R^2) utilizing the Study 2 dataset will be comparable to that previously observed utilizing the Study 1 dataset.

Hypothesis 5 Evidence of Omitted Variable Bias Manifested by the Modified Model.

Modified Model variable relationships observed utilizing the independent Study 2 dataset will not manifest evidence of significant correlations between any of the Modified Model's exogenous variables and the error term of the Modified Model's dependent proactivity variable.

4 Study design

4.1 Methods

I chose to study subjects drawn from diverse workplace environments, which I expected would provide greater observed variance among subjects' responses compared to same-employer panels and would mitigate the potential for common method bias. For Study 1, I recruited 521 subjects, and for Study 2, I recruited 479 subjects, in each case from Prolific Academic (www.prolific.co). These sample sizes accommodate up to approximately 104 parameter estimates for Study 1 and up to approximately 96 parameter estimates for Study 2, as indicated by the basic rules of thumb for use of SEM (at least 200 total observations and at least 5 observations per parameter estimate).

Opportunities to participate were extended to potential study participants by Prolific Academic in accordance with its standard protocols to a pool of approximately 3800 eligible participants (Study 1) and 3500 eligible participants (Study 2), based on customary pre-screening by Prolific Academic of the approximately 120,000 U.S. participants who had participated in surveys in the immediately preceding 90 days. Volunteering participants were selected on a first-come, first-served basis. Subjects were screened in accordance with the following criteria: (i) must be residents of the United States and be fluent in the English language, (ii) must be employed full time, and (iii) must have employment tenure of one year or more.

Study subjects responded to survey questionnaires administered via Qualtrics, a commonly used and accepted online survey tool. Subject screening in the study questionnaire was limited to questions confirming demographic information previously furnished by Prolific Academic. Subjects were required to answer all questions in order to complete the survey and receive payment. The average hourly rate of reward offered paid by the studies was approximately $20.00. A summary of participant demographic data is set forth in "Appendix 1" (Table 7) for Study 1 and in Appendix "2" (Table 8) for Study 2.

The use of Prolific Academic to recruit subjects allowed me to assemble panels of participants selected to reduce the likelihood of structural bias and increase the diversity of subjects' work environments. Study subjects participated on an anonymous basis, there were no panel overlaps, and there were no known between-subjects relationships, other than their common individual participation in Prolific Academic and their meeting the screening criteria. Thus, I suggest that use of the Study 1 and Study 2 datasets is appropriate for examining generalized theoretical relationships because of their larger panel sizes and their between-subjects diversity.

4.2 Measures

4.2.1 Proactivity variable measurement scales from Parker et al. (2006).

The Parker et al. (2006) study was based on self-reported work behaviors of 282 production workers in a single United Kingdom manufacturing company. They completed a survey that was administered by researchers in group sessions during work time, and the response rate was over 70%. (p. 641). The scale items and the Study 1 and Study 2 datasets are presented via Open Science Framework at https://osf.io/2zxmc/?view_only=a95ae38be0b24ac0a2a0501fbf1c90cc.

The proactivity antecedent variable measurement scales and their previously reported statistics were as follows:

(i) (PROPRS) (4 items). Source: Bateman and Crant 1993 (5-point Likert, reliability = 0.87, mean = 2.24, s.d. = 0.72).
(ii) (AUTO) (7 items). Source: Jackson et al. (1993) (5-point Likert, reliability = .85, mean = 1.66, s.d. = 0.79).
(iii) (TRUST) (4 items). Sources: Cook and Wall (1980), McAllister (1995) (5 item Likert, reliability = 0.75, mean = 3.84, s.d. = 0.72);
(iv) (RBSE) (7 items). Source: Parker (1998) (5-point Likert, reliability = 0.93, mean = 2.70, s.d. = 1.05); and
(v) (FRO) (9 items). Source: Parker et al. (1997) (5-point Likert, reliability = 0.90; mean = 3.26, s.d. = 0.80).

4.2.2 CI availability measurement scales

CI availability perceptions were measured using the measurement scale developed in Anonymous (2022) (Ch. 2). It contemplates a latent CI availability variable that explains variance in two factors that total nine items:

(i) *Information Availability Environment* (IAE) (six items)
(7-point Likert, reliability = 0.91, mean = 4.545, s.d. = 1.001), and
(ii) *Information Availability Asymmetry* (IAA) (three items)
(7-point Likert, reliability = 0.91, mean = 3.921, s.d. = 0.827)

In the interest of parsimony, IAE and IAA are combined into a single second level latent CI availability variable, INFO, for purposes of Studies 1 and 2.

4.2.3 Dependent proactivity variable measurement scale

Personal Initiative (PI). Source: Fay and Frese (2001)
(7-point Likert, reliability = 0.88, mean = 4.003, s.d. = 0.699).

Many aspects of the dependent variable measurement scales utilized in the Parker et al. (2006) study were developed with a view toward addressing idiosyncrasies of that study's subject panel and therefore were not efficiently generalizable. Thus, the

proactivity measure I utilized in Hawthorne (2022, Ch. 3) was the well-recognized, self-reported personal initiative scale developed by Frese et al. (1997). It appears in the personal initiative model discussion of Frese and Fay (2001) (pp. 151–153), and in the construct validity discussion of Fay and Frese (2001) (p. 100). Compared to the scales used in Parker et al. (2006), this is a more general, values-oriented scale whose strength is that it will provide an overall measure of proactivity that is neither derived from a common CI availability environment nor single-industry idiosyncrasies. Fay and Frese (2001) presented a summary of studies of the validity of the PI construct. They stated that PI is proactive action, but it also involves self-starting (i.e., goals developed by the subject) and persistence (overcoming barriers) (p. 98). Thus, the scale can be viewed as a conservative indicator of proactivity.

Tornau and Frese (2013) conducted a meta-analysis of work-related proactivity concepts and their incremental validities, which reported that articles based on self-reports of the various constructs of proactive behavior led to the same results. (p. 72). They also observed that self-reported proactivity measures may provide more nuanced insights because when a person answers questions in a survey, the person answers on the basis of the perception of their behavior (outer person); but in addition, the person knows something about their inner thoughts and feelings (inner person) and can, therefore, determine whether the behavior is really part of the person or not. Thus. "... the information leading to answering a question relies on the inner *and* outer person; this also includes knowledge of situational constraints and situational impact of the subject's behavior (Funder 1980)" (p. 52). I submit that the foregoing discussion provides justification for the use of the Frese et al. (1997) self-reported personal initiative scale as a reasonable measure of proactive work behavior in the instant studies, particularly since, as discussed in Hawthorne (2022, Ch.1), the theorized effect of CI availability variance must necessarily operate through "inner person" sensemaking processes (E.g., Zhang and Soergel 2014).

4.2.4 Data and measurement scale availability statement

The Study 1 and Study 2 datasets are available in the Open Science Framework repository. https://osf.io/f4wz8/?view_only=a95ae38be0b24ac0a2a0501fbf1c90cc. The measurement scale items used for the studies are also available in that repository. https://osf.io/yrm2e/?view_only=a95ae38be0b24ac0a2a0501fbf1c90cc.

4.2.5 Analytical tools

Hawthorne (2022, Ch. 3) employed software provided by IBM Corporation: SPSS AMOS ("Analysis of Moment Structures") version 27 (structural equation modeling tools), and SPSS ("Statistical Package for the Social Sciences") version27 (statistical tools). The vendor has since updated these software tools, and Studies 1 and 2 used version 29 of each of them. Because all study participants were required to respond to all survey questions, there were no missing data.

4.2.6 Information reported

Studies 1 and 2 present customary measures of model fit. Chi^2 values provide an indication of exact fit. Because this test is a "badness of fit" measure, statistical significance ($p < 0.05$) would indicate poor fit. Comparative statistics are used to assess goodness of fit, including comparative fit index (CFI), normed fit index (NFI) and incremental fit index (IFI)—all of which assess goodness of fit in respect of a null model (values range from 0 to 1 and a value > 0.90 is an indication of acceptable fit). Root mean squared error of approximation (RMSEA) is also reported (values range from 0 to 1; RMSEA value < 0.08 = good fit). Per (Bentler and Chou 1987), key model statistical assumptions include independence of observations, identical distributions, random samples, linear relationship functions, distribution normality, and adequate sample size. Because of the relatively large sample sizes (N = 521, N = 479), and the source curation and between-subjects randomness associated with participants drawn from Prolific.co, I do not consider these assumptions to be problematic. Lastly, item factor loadings and scale reliabilities are reported. Reliability is measured in terms of Cronbach's Alpha. A reliability score of > 0.70 is considered acceptable because it indicates that the latent variable explains at least half of the variance in the indicator (i.e., $R^2 > 0.50$).

4.2.7 Approach to testing model predictive ability

Studies 1 and 2 explore and report outcomes from AMOS structural equation modeling of the in three categories:

4.2.7.1 Model fit Assessing a model's fit to the data is crucial to understanding its predictive ability. Simply put, a model that does not demonstrate an acceptable fit to its data set cannot be justified as a predictor of outcomes based on such data, and improvements in model fit can be expected to result in improved predictive ability. Thus, I made goodness of fit observations that allowed comparisons of the various iterations of the models under examination.

4.2.7.2 Significant structural path values In structural equation modeling, path coefficients represent regression weights, which, if statistically significant, are evidence of the relationships between predictor and dependent variables. Thus, I made observations of the presence, magnitude, and statistical significance of relevant model path coefficients and of R^2 for the various iterations of the models under examination.

4.2.7.3 Parameter estimate bias arising from omitted predictor variables Perhaps most importantly, model predictive ability can be improved by reducing or eliminating bias in model parameter estimates. The American Psychological Association Dictionary of Psychology defines omitted variable bias as "the situation in which values calculated from a statistical model systematically overestimate or underestimate a degree of relationship or other quantity of interest because an important variable has

been left out of the model." In regression-studies, bias often occurs because the least squares software used in the model regression analysis attributes the effect of the missing variable(s) to those that were included. Problematic omitted variable(s) are both predictors of the dependent variable and correlated with one or more of the included independent variables. (Antonakis et al. 2010). To address omitted variable bias, Studies1 and 2 report observations of the relative effects of variables in the Modified Model iterations and of observed correlations between the disturbance term of the dependent variable and the independent predictor variables in those models. In SEM, these correlations are assumed to be zero so that no misattribution of effects are contemplated. If they are observed to be significant, it is evidence of omitted variable bias.[1]

5 Results

5.1 Descriptive statistics

Tables 1 and 2 set forth the comparable observed means and standard deviations (sum of observed values/number of items) and bivariate correlations among the variables for Studies 1 and 2, respectively.

Table 3 provides a summary of the relevant measurement scale statistics based upon analyses using each of the Study 1 and Study 2 databases.

Each of the scales manifests acceptable reliability in the context of the current datasets. The Cronbach's alpha values are all well above the 0.70 benchmark. Except for AUTO and FRO, the scale coefficients of variance (mean/sd) converge generally in the range of approximately 0.200, likely reflecting common effects of sample size. The somewhat larger coefficients for AUTO and FRO suggest the possibility that those variables have larger comparative variances and may involve a greater likelihood of type-2 error than the other scales. (Ott and Longnecker 2016, p. 244).

5.2 Study 1—development of the initial modified model

5.2.1 Modify the partially replicated model to include a direct path from the proactive personality antecedent (PROPRS) to the proactivity variable (PI)

Parker et al. (2006) do not report any analysis of a possible direct relationship between proactive personality and proactivity. They posited only an indirect relationship between these two variables, stating: "[t]he importance of proactive personality is consistent with previous research showing significant links to proactive

[1] It is important to recognize that the absence of evidence of omitted variable bias in a model does not mean that there are no other variables that could explain variance in model outcome variables. Indeed, it is entirely plausible that other predictors could exist, but those variables would be orthogonal to (i.e., not correlated with) model variables and would not cause least squares modeling software to misattribute effects to existing model variables.

Table 1 Study 1—means, standard deviations and bivariate correlations among study variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	2.55	1.04	–												
2. Gender	1.52	0.52	− .21**	–											
3. Racioethnicity	4.5	1.24	0.07	0.04	–										
4. Education	4.78	1.04	0.02	− 0.00	− 0.06	–									
5. Tenure	3.46	1.09	.47**	.23**	− 0.01	− .030	–								
6. Size	2.71	0.84	− .04	0.01	− 0.04	0.08	0.03	–							
7. PROPRS	3.81	0.74	0.02	− 0.03	− 0.04	− 0.06	0.08	0.01	–						
8. AUTO	3.02	1.15	.17**	− .15**	− 0.01	.14**	.27**	− 0.09*	.35**	–					
9. INFO	5.1	1.03	.13**	− .13**	− 0.08	0.07	.12**	0.03	.30**	.39**	–				
10.RBSE	3.94	0.834	.15**	− .15**	0.01	.13**	.19**	− .10*	.50**	.54**	.33**	–			
11.TRUST	4.17	0.75	.12**	− .13**	− 0.04	0.05	0.08	0.01	.14**	.24**	.63**	.25**	–		
12.FRO	3.01	1.13	− 0.03	0.07	− 0.00	0.03	− 0.04	0.00	− 0.08	0.07	− .25**	0.02**	− .30**	–	
13.PI	4.00	0.70	0.50	− 0.00	0.02	− 0.00	.10*	− 0.04	.59**	.42**	.36**	.63**	.29**	− 0.01	–

($N = 521$). *$p < .05$, **$p < .01$. Variable names are defined in Table 3

Table 2 Study 2—Means, standard deviations and bivariate correlations among study variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	2.84	1.15	–												
2. Gender	1.49	0.51	0.043	–											
3. Racioethnicity	4.27	1.38	.13**	0.07	–										
4. Education	4.72	1.02	0.04	− 0.10	− .15**	–									
5. Tenure	3.56	1.05	.44**	− 0.14	0.06	− .05	–								
6. Size	2.76	0.84	0.01	− .13**	− 0.05	0.08	0.04	–							
7. PROPRS	3.81	0.81	0.06	− 0.09	− 0.03	− 0.09	.142**	0.01	–						
8. AUTO	3.20	1.21	.12*	− .13**	− 0.08	0.07	.29**	− 0.12**	.28**	–					
9. INFO	5.33	1.08	0.09	− .15**	− 0.06	− 0.08	.12**	0.05	.32**	.34**	–				
10. RBSE	3.94	0.904	.13**	− .13**	0.01	0.09	.21**	− 0.02	.48**	.57**	.39**	–			
11. TRUST	4.24	0.72	0.05	− 0.07	− 0.03	− 0.02	0.08	0.01	.35**	.24**	.61**	.40**	–		
12. FRO	2.90	1.19	0.05	.11*	− 0.01	0.0	0.03	− 0.01	− 0.08	0.06	− .20**	0.02.19**	− .22**	–	
13. PI	5.47	1.07	.13**	− 0.05	0.04	− 0.02	.21*	− 0.00	.60**	.41**	.40**	.61**	.41**	− 0.01	–

($N = 479$). *$p < .05$, **$p < .01$. Variable names are defined in Table 3

Table 3 Measurement scale statistics (study 1 database/study 2 database)

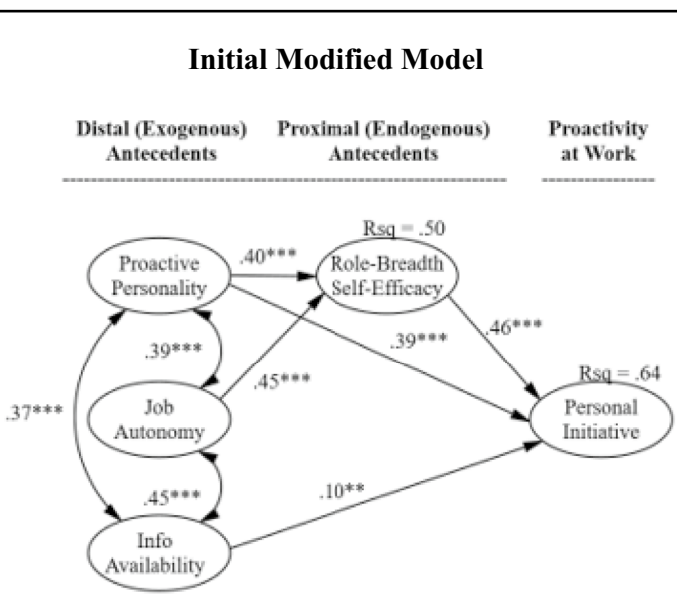
Scale	Variable name	Cronbach's Alpha	Mean	SD	Coefficient of Variance (sd/mean)
Proactive personality	PROPRS (4 items)	0.82/0.83	15.26/15.48	2.949/3.243	0.196/0.213
Job autonomy	AUTO (8 items)	0.92/0.93	24.18/25.62	9.207/9.704	0.381/0.379
Contextual Information Availability	INFO (9 items)	0.90/0.91	45.51/48.00	9.303/9.732	0.203/0.203
Co-worker trust	TRUST (4 items)	0.81/0.82	16.67/16.97	2.984/2.866	0.129/0.169
Role breadth self-efficacy	RBSE (7 items)	0.88/0.90	27.61/27.56	5.839/6.311	0.204/0.229
Flexible role orientation	FRO (9 items)	0.94/0.94	27.09/26.08	10.138/10.700	0.374/0.410
Personal initiative	PI (7 items)	0.88/0.91	28.02/38.31	4.895/7.511	0.175/0.196

outcomes (e.g., Crant 1995; Wanberg and Kammeyer-Mueller 2000), but the present study adds to this literature because it suggests that proactive personality has its effect via its positive influence on self-efficacy and flexible role orientations." Parker et al (2006, p. 646). This suggests that they did not observe a statistically significant path between PROPRS and the dependent proactivity variable in their dataset. However, in the course of performing the analyses in this study, I explored the significance of all of the potential variable paths and observed a strong direct path from the proactive personality variable (PROPRS) to the proactivity variable (PI). This suggested the possibility that model predictive ability based on the current data set could be further improved through the addition of such a new direct path. Thus, I augmented the Partially Replicated Model to include a direct path from PROPRS to PI (the "Initial Modified Model"). Set forth in Fig. 4 is a structural path diagram for the Initial Modified Model.

5.2.2 Observation of initial modified model outcomes

5.2.2.1 Model fit The Initial Modified Model is identical to the Partially Replicated Model, except that it includes a direct path from PROPRS to PI. The model achieved an acceptable fit to the data. Chi square (df) = 1275(5440) ***, CFI = 0.932, NFI = 0.887, IFI = 0.932, RMSEA = 0.051.

5.2.2.2 Path coefficient observations In this model, all path coefficients are statistically significant (all are $p < 0.001$, except for INFO—> PI, which is $p = 0.02$) and R^2 is improved to 0.64, a major increase. As was the case in the prior analyses, pathways from INFO to RBSE and from AUTO to PI were not statistically significant and have been excluded. The direct path coefficient between PROPRS and PI is 0.39 and the



*Note: N = 521. *** = p < .001, ** = p < .01. Chi²(df) = 1278***(546), CFI = 0.932, NFI = 0.887, IFI = 0.932, RMSEA = 0.051.*

Fig. 4 Initial modified model

indirect effect is 0.18. The total effect of PROPRS on PI is 0.57. (which compares to total effects (indirect only) of 0.30 and 0.32 for the earlier models). Thus, the current data do not support the explanation by Parker and colleagues 2006 that proactive personality has its effect solely through its positive influence on self-efficacy. The newly observed data indicate that the effect of PROPRS on PI is only partially mediated by RBSE, that the direct effect is much larger than the mediated effect, and the total effect is almost twice that of the previous models.

5.2.2.3 Observed effects on predictive ability The inclusion of the direct path from PROPRS to PI observed to be statistically significant in the Initial Modified Model is evidence of improvement of the model's ability to account for variance in personal initiative (PI) over and above that provided for in the Partially Replicated Model. Model R^2 increased to 0.64 compared to 0.55 and 0.57 for the prior models—an increase of more than 10%—reflecting an important increase in the overall variance accounted for by the model and further improvement in the model's predictive ability.

As noted above, it is necessary to view effects on a relative basis to allow direct comparison of variable values across models. Table 4 summarizes path coefficient outcomes for the model both without and with the inclusion of the information availability variable:

The values in this table can be interpreted to provide insights into overall predictive bias in the original Parker et al. (2006) model. Most importantly, for the Initial

Table 4 Partially replicated model vs. initial modified model relative distal predictor variable path coefficient comparisons (correlations with pi disturbance terms shown in parenthesis)

Distal antecedent variable	PROPRS	AUTO	INFO
Partially replicated model without INFO variable	0.50 (.45***)	0.50 (− 0.16**)	None
Partially replicated model with INFO variable	0.387 (0.43***)	0.387 (− 0.16**)	0.22 (− .068***)
Initial modified model	0.644 (0.12 ns)	0.237 (− 0.02 ns)	0.113 (0.07 ns)

$N = 521$. *$= p < .05$; **$= p < .01$; ***$= p < .001$ Variable names are defined in Table 3

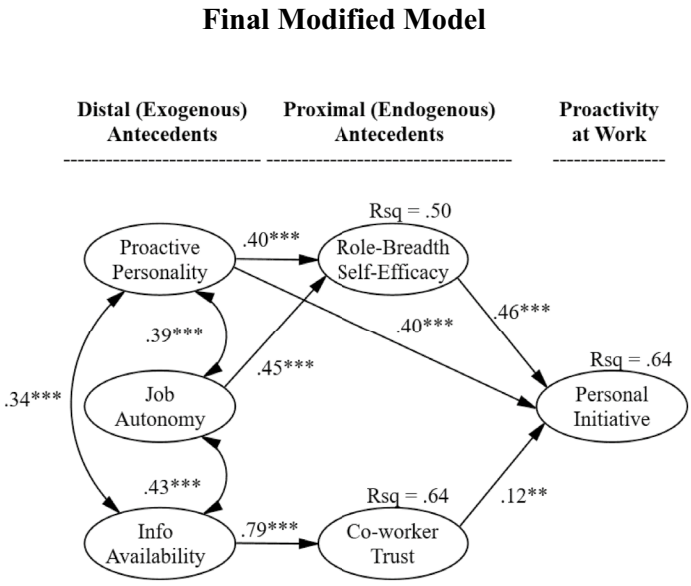
Modified Model, I observed no statistically significant correlations between the exogenous model variables, PROPRS, AUTO and INFO, and the disturbance term for the dependent variable, PI (i.e., evidence of omitted variable bias), whereas I did observe such correlations in earlier models.

The values are very different across the models, and they indicate substantial prediction bias in the Partially Replicated Model. When compared with the Initial Modified Model, the Partially Replicated Model (without INFO variable) would appear (i) to ***understate*** the effects of PROPRS by approximately 22% ((0.644–0.50)/0.644), and (ii) to ***overstate*** the effects of AUTO by approximately 111% ((0.50–0.237)/0.237 Similarly, the Partially Replicated Model (with INFO variable) would appear (i) to ***understate*** the effects of PROPRS by approximately 40% ((0.644–0.387)/0.644)); (ii) to overstate the effects of AUTO by approximately 63% ((0.387–0.237)/0.237); and (iii) to ***overstate*** the effects of INFO by approximately 100% ((0.20–0.10)/0.10), when compared with the Initial Modified Model. Thus, the Initial Modified Model provides substantial improvements to overall predictive ability because it controls for the omitted variable bias that was observed in the earlier models.

5.3 Study 1—development of the final modified model

5.3.1 Further modify the partially replicated model to specify co-worker trust as a proximate proactivity antecedent

In conducting the study analyses, I noted that there remained two path relationships that involved significant correlations which were not accounted for in the revised models. The descriptive statistics summaries in both studies reported significant positive correlations between TRUST and PI, and the summary for the current AMOS study reported a significant positive correlation between INFO and TRUST. Parker et al. (2006) had offered TRUST as an exogenous variable, but on reflection I propose that TRUST can be understood at least as well (if not better) as an endogenous mediator. Whereas the exogenous variables, PROPRS, AUTO and INFO, can each be understood and measured based on subjects' objective perceptions (as opposed to their state of mind), TRUST indicates subjects' views and feelings about



*Note: N = 521. *** = p < .001, ** = p < .01. Chi²(df) = 1553***(687), CFI = 0.927, NFI = 0.876, IFI = 0.927, RMSEA = 0.049.*

Fig. 5 Final modified model

their relationships with their coworkers (e.g., Mayer et al. 1995; McAllister 1995) and can only be understood in the context of their personal workplace interactions and their ongoing personal assessments. Thus, I constructed a model (the "Final Modified Model") that added TRUST as a second cognitive motivational state parallel to RBSE in the model's path structure. And, given the relatively high correlations between INFO and TRUST, I tested the relative relationships between INFO and each of PI and TRUST. Both were significant, but the path coefficient between INFO and TRUST was much stronger than the coefficient between INFO and PI, and TRUST fully mediated the relationship between INFO and PI. Thus, I posited INFO as a new exogenous antecedent and a predictor of TRUST and removed the direct path relationship between INFO and PI that appeared in the Initial Modified Model.

Set forth in Fig. 5 is a structural path diagram for the Final Modified Model.

5.3.2 Observation of final modified model outcomes

5.3.2.1 Model fit The Final Modified Model is identical to the Initial Modified Model, except that it provides a direct path from an endogenous mediator variable, TRUST, to PI, and a direct path from exogenous variable, INFO, to TRUST. The path from AUTO to TRUST was not statistically significant. Similarly, the direct path

Table 5 Initial modified model vs. final modified model path coefficients/effects comparisons (correlations with PI disturbance terms are not statistically significant)

Model path (effect)	RBSE -> PI (total)	TRUST -> PI (total)	PRO-PRs—> PI (total)	AUTO—> PI (indirect/total)	INFO—> PI (total)	R^2
Initial Modified Model	0.46***	na	0.57***	0.21***	0.10*** (direct only)	0.64
Final Modified Model	0.45***	0.12***	0.57***	0.21***	0.10*** (indirect only)	0.64

$N = 521$. *$p < .05$; **$p < .01$; ***$p < .001$. Variable names are defined in Table 3

from INFO to PI was not significant. The model achieves an acceptable-to-good fit to the data. Chi square (df) = 1547 (686) ***, CFI = 0.927, NFI = 0.877, IFI = 0.927, RMSEA = 0.049.

5.3.2.2 Path coefficient observations Table 5 summarizes the respective total effects of both the endogenous (RBSE and TRUST) and the exogenous (PROPRS, AUTO and INFO) indicator variables on the dependent variable (PI) for the Final Modified Model.

Importantly, the newly added TRUST mediator variable was significant ($p = 0.001$), and it fully mediated the effect of INFO on PI. (The path coefficient between INFO and TRUST was remarkably high at 0.79***). The respective total effects of antecedents PROPRS, AUTO and INFO on PI remained unchanged from the Initial Modified Model. Similarly, as was the case with the Initial Modified Model, I observed no statistically significant correlations between those antecedents and the disturbance term for the dependent variable, PI.

5.4 Study 2—re-replication of original Parker et al. (2006) model

Study 2 used an independent dataset (N = 479) to conduct a new replication analysis of the Parker et al. (2006) model using the same protocols that were utilized in Anonymous (2022, Ch. 3). Set forth in Fig. 6 is a structural path diagram which provides the results of that re-replication.

As was the case with the Hawthorne (2022, Ch. 3) replication study, the observed results from the re-replication included multiple differences from those reported by Parker et al. (2006). Specifically:

(i) The direct path coefficients posited for each of the flexible role orientation mediator variable and the job autonomy variable to the dependent proactivity variable were not statistically significant. Thus, the model did not provide evidence in support of a role for either flexible role orientation or job autonomy as a direct proactivity antecedent.

(ii) The direct path coefficient posited from proactive personality to the flexible role orientation mediator variable was not statistically significant. Thus, the

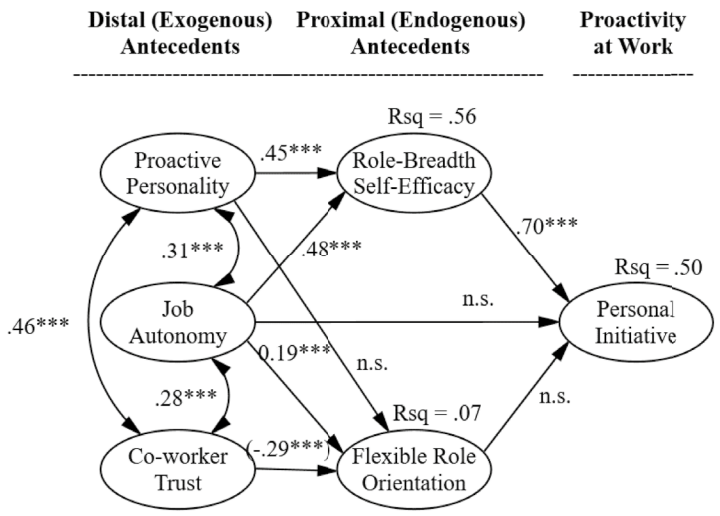


Fig. 6 Parker et al. (2006) re-replication model using study 2 dataset

model did not provide evidence in support of a role for proactive personality as a predictor of flexible role orientation, and

(iii) The path coefficient posited from co-worker trust to flexible role orientation was significant but *negative*. Thus, the model did not provide evidence in support of a role for co-worker trust as a positive predictor of flexible role orientation.

On the other hand, as was the case in the Hawthorne (2022, Ch. 3) replication study, observation of the coefficients that involve the role-breadth self-efficacy mediator did provide evidence in support of the original Parker et al. (2006) study, as they were all positive and statistically significant.

Each of the foregoing observations is consistent with the corresponding observations made in the Hawthorne (2022, Ch. 3) study, and the Parker et al. (2006) model again could only be partially replicated based on analysis using the Study 2 dataset. Thus, Hypothesis 1 is confirmed.

In addition, as was the case with the Hawthorne (2022, Ch. 3), replication model, I observed evidence of omitted variable bias. Each of the exogenous variables was significantly correlated with the error term of the dependent variable (PI). Two of the variables, proactive personality (PROPRS) (r = 0.422 ***) and co-worker trust (TRUST) (r = 0.137*), manifested positive correlations, while job autonomy

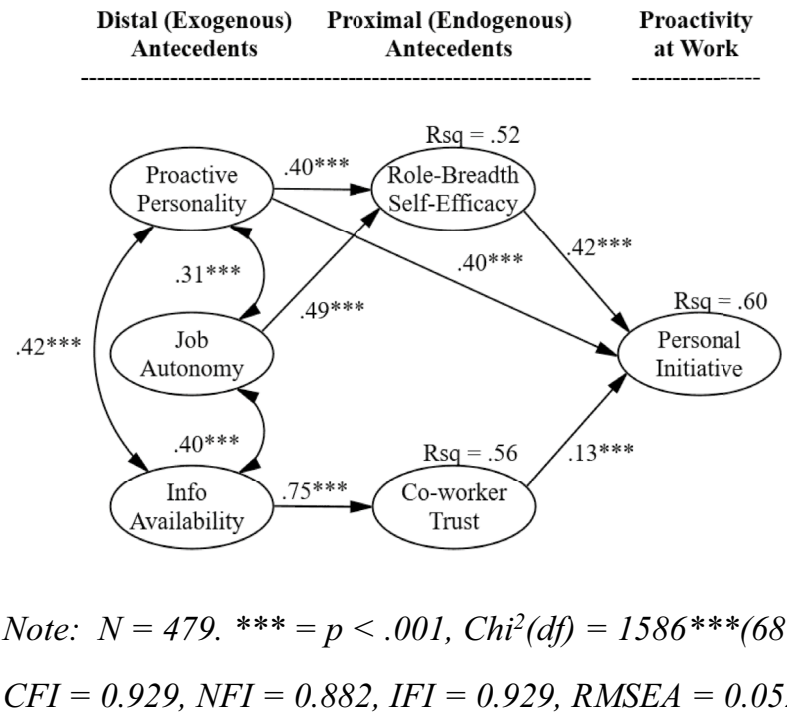


Fig. 7 Replication of final modified model using study 2 dataset

(AUTO) (r = − 0.846 ***) manifested a negative correlation. These observations provided additional empirical justification for exploration of the Modified Model and its newly added variable path relationships.

5.5 Study 2—replication of the modified model

Study 2 used an independent dataset (N = 479) to conduct a replication analysis of the of the Final Modified Model using the same protocols that were utilized in Study 1. Set forth in Fig. 7 is a structural path diagram, which provides the results of that replication.

The model fit statistics are indicative of acceptable model fit, which is evidence that Hypothesis 3 is confirmed.

Hypotheses 2 and 4 contemplated that variable path relationships, statistical significance and variance explained for the Final Modified Model would be comparable across the two datasets. Table 6 provides summarizes the observed path coefficients, observed path significance and observed variance explained (R^2) for the Modified Model for the Study 1 (original replication) dataset compared to the Study 2 dataset.

Table 6 Modified model path comparisons replication dataset vs. original dataset

Model path	RBSE -> PI (total)	TRUST -> PI (total)	PROPRs -> RBSE	AUTO -> RBSE	INFO -> TRUST	R^2
Study 2 Dataset (N = 479)	0.42***	0.13***	0.40***	0.49***	0.75***	0.60
Study 1 Dataset (N = 521)	0.46***	0.12**	0.40***	0.45***	0.79***	0.64

**$p < .01$; ***$p < .001$. Variable names are defined in Table 3

The comparison strongly suggests that the replication results are comparable to the original observations used to construct the Modified Model. In all cases the path relationships are highly significant, and the values are all positive and differ by less than 10% and in many cases differ by less than 5%. Similarly, the observed variance explained (R^2) for the replication was 0.60 compared to 0.64 for the original observation, a difference of approximately 7%. Thus, hypotheses 2 and 4 are confirmed.

Finally, Hypothesis 5 posited that a replication of the Final Modified Model would not manifest the evidence of omitted variable bias that had been observed in prior models—correlation between exogenous variable terms and the error term of the dependent variable. (Antonakis et al. 2010). I observed the structural path relationships between the disturbance term for the dependent proactivity variable, PI, and each of the exogenous antecedent variables, PROPERS, AUTO and INFO. None of these relationships was statistically significant. Thus, Hypothesis 5 is confirmed.

6 Discussion

6.1 Discrepancies between observations from original Parker et al. (2006) study and the replication and re-replication models

6.1.1 Flexible role orientation

As described above, I conducted two replications of the Parker et al. (2006) study of the antecedents of proactivity at work. In both cases I observed evidence that confirmed the previously reported variable relationships relating to role-breadth self-efficacy as a predictor of proactivity at work, but otherwise I did not observe evidence confirming the variable relationships reported by Parker and colleagues. Specifically, I observed no evidence supporting (i) flexible role orientation (FRO) as a predictor of proactivity, (ii) job autonomy (AUTO) as a direct predictor of proactivity (PI), (iii) proactive personality (PROPERS) as a predictor of flexible role orientation (FRO), or (iv) co-worker trust (TRUST) as a predictor of flexible role orientation (FRO). Contrary to Parker et al. (2006), each of variable relationships (i), (ii) and (iii) was observed as statistically insignificant, and variable relationship (iv) was observed as statistically significant, but *negative*.

Upon reflection, I can offer several thoughts that might provide an explanation for at least some of the discrepancies. First, the measurement scale I used for the dependent proactive behavior variable differs from that used in the Parker et al. (2006) study. It is the personal initiative (PI) scale from Frese and Fay 2001 whose reliability I have previously documented. This work was referred to with approval in Parker et al. (2006), so the major differences in path values I observed are unexpected. Of course, the use of a different proactivity scale would only be a possible explanation of the unexpected observations of path relationships between FRO and PI, and between AUTO and PI, not the unexpected path relationship observations between PROPERS and FRO or between TRUST and FRO, which were measured using the scales from the original study.

The PI scale is simply different from the proactivity measurement scales used in Parker et al. (2006), and this must be considered. The PI scale was not designed in the context of the idiosyncrasies of any particular organization, whereas the Parker et al. (2006) study used a scale that was tailored to the sample population (282 employees in a wire-based manufacturing company in the U.K. who completed a survey). Their scale had two components, one related to on-the-job proactive idea implementation and the other related to on-the-job proactive problem solving. While it seems likely that the PI scale is better suited to measuring generalized notions of proactivity than the more-proscribed original scale, the PI scale clearly has different focal phenomena than the measure used by Parker and colleagues.

A second thought relates to external validity concerns. Parker and colleagues clearly contemplated this possibility. The sample on which the original study was based involved 282 employees from a single company who likely had many observable common attributes and relationships, whereas the two current studies involved 521 and 479 subjects, respectively, who had several objective attributes in common that were used for participation screening (U.S. residency, English fluency, full-time employment, job tenure > one year) but otherwise there were no observable between-subjects relationships beyond their participation in Prolific Academic. Summaries of the demographics of the current study participants are provided in Appendices 1 (Table 7) and 2 (Table 8). The differences between the previously reported and newly observed outcomes strongly suggest that there may be external validity issues with respect to the Parker et al. (2006) model.

Stated another way, the idiosyncratic nature of the data upon which the Parker et al. (2006) study was based may have made that data a less than desirable basis from which to make broad generalizations because the data simply did not involve the type and amount of variance necessary to justify generalized interpretation. Parker and colleagues specifically addressed this possibility in describing the limitations of their study. Comparison with the demographic summaries in Appendices 1 (Table 7) and 2 (Table 8) indicates multiple dimensions in which the current study participants have far more diverse characteristics than the original study participants. Moreover, a comparison of the mean scores for common variables suggests many differences between the data sets. (All were based on a 5-point Likert scale). For proactive personality, job autonomy and role-breadth self-efficacy, the scores for Study 1 were well above those for the Parker et al. (2006) study: Current PROPRS = 3.81 vs original PROPRS = 2.24; current AUTO = 3.02 vs. original AUTO = 1.66; current RBSE = 3.94 vs. original

RBSE = 2.70. Co-worker trust and flexible role orientation were more or less comparable: Current TRUST = 4.17 vs. original Trust = 3.84; Current FRO = 3.01 vs. original FRO = 3.28. Overall, the current study mean variable scores ranged from a low of "neutral" (3.01) to a high of "agree" (4.17), whereas the original study mean variable scores ranged from a low of between "disagree" and "somewhat disagree" (1.66) to a high of "neutral" (3.26). This can be interpreted as evidence that subjects in the original study (who were drawn from a population of single company production workers) may have been much less proactive than subjects in the current study (who were drawn from a much broader population).

A third, and perhaps most important, thought relates to a discriminant validity concern about the measure used in the original study to examine flexible role orientation (the FRO variable). The items used by Parker et al. (2006) to observe FRO are similar in many ways to items used in the trust literature to measure the construct of monitoring behaviors. (Costa and Anderson 2011). This construct has been extensively studied by trust scholars, and the dominant perspective is that monitoring implies an absence of trust (Costa et al. 2018, p. 174). The leading trust model explains that the key outcome of trust is risking taking in relationship (Mayer et al. 1995, p. 725).) but "[s]uch behaviors as monitoring are examples of a lack of risk taking in a relationship." (p.729). Thus, if the FRO instrument used by Parker et al. (2006) inadvertently tapped into and became a measure of monitoring behaviors, the trust literature could provide an explanation for the significant negative correlation between FRO and TRUST and the insignificant relationship between FRO and PI observed in the current study.

Moreover, a more nuanced understanding may lie in a further examination of contextual differences between the subjects of the two studies. Costa et al. (2018) point out that trust research has observed that trust and monitoring can sometimes be positively reinforcing and that the effects of monitoring will vary in light of the context in which it is perceived and whether it is expected:

> "When monitoring is perceived as being inherent to the task and thus expected (e.g., flight attendant teams; Marks and Panzer 2004), it is likely that team members will not interpret monitoring as a lack of trust but rather as a way to support others to perform their tasks, keep on track and achieve common goals (McAllister 1995). Conversely, when monitoring is not expected (e.g., self-managing teams; Langfred 2004), team members are more likely to interpret it as a lack of trust. In both cases, the evidence points to the importance of considering the context when analyzing trust in teams and its relationships with other factors." (p. 174).

It seems entirely plausible that the wire factory workers who were the subjects of the Parker et al. (2006) study could have viewed monitoring behaviors as both expected and supportive, which would imply a positive relationship between TRUST and FRO and therefore explain the positive path relationship between those variables observed in the Parker et al. (2006) study. On the other hand, panels of subjects in the current studies were much more diverse and likely exhibited a much higher degree of overall variance between subjects than the panel from the original study. For the current panels, the trust literature would lead one to expect that perceptions

of monitoring would tend to inhibit risk taking in relationship and therefore explain the negative path relationship between TRUST and FRO observed for Parker et al. (2006) based on the current study datasets.

Lastly, there have been very few studies that purport to study the relationship between flexible role orientation and proactivity. One of the few, Ohly & Fritz (2007), utilized a scale to assess role orientation whose items do not appear to have tapped into monitoring behavior issues of the type described above—they simply focused on whether employees saw developing and implementing new ideas at work as their responsibility. (p. 625). Nonetheless, the authors could not find support for a hypothesis that role orientation would be positively related to proactive work behavior. Their discussion suggested that perhaps using the measure of flexible role orientation utilized in Parker et al. (2006) would lead to a different result (p. 628), but both Study 1 and Study 2 explored the effect of using that measure and neither could find such support.

6.1.2 Proactive personality

Perhaps one of the most remarkable observations from the Parker et al. (2006) study was that the measure of subjects' propensity to be proactive at work, proactive personality, did not have a direct effect on proactivity at work. Rather, Parker and colleagues observed that the effect of proactive personality was fully mediated by role-breadth self-efficacy and flexible role orientation. Parker and colleagues stated "[t]he importance of proactive personality is consistent with previous research showing significant links to proactive outcomes (e.g., Crant 1995; Wanberg and Kammeyer-Mueller 2000), but the present study adds to this literature because it suggests that proactive personality has its effect via its positive influence on self-efficacy and flexible role orientations." (p. 646).

As described above, however, the results observed in Studies 1 and 2 were quite different. The primary effect of PROPRS on PI was a direct effect (both studies $r = 0.40^{***}$) and the indirect effect through RBSE was significant but smaller (Study 1, $r = 0.184^{***}$; Study 2, $r = 0.168^{***}$). There were no significant path relationships observed between PROPRS and FRO, or as discussed above, between FRO and PI. Possible reasons for the discrepancies involving FRO are discussed in the preceding section, but the discrepancies involving PROPRS merit discussion as well because the direct path relationship between PROPRS and PI was the strongest single effect on PI for any of the exogenous variables in both Studies 1 and 2, yet such a pathway was not observed as significant in the original study.

I suggest that the principal reason for the discrepancy likely relates to the scales used by Parker and colleagues to measure proactive outcomes. They chose not to utilize established scales, such as the Frese et al. (1997) scale, which had been validated by prior work. Rather, they crafted two new measures that were fashioned in terms of the subjects' particular job situation. (p. 642). The first measure was proactive idea implementation, which asked individuals to recall how many new ideas they had had in the last 12 months and whether or not they had engaged in either suggesting the idea to others of self-implementing the idea. Parker & colleagues reported that the measures were skewed with most respondents scoring zero. The

second measure was proactive problem solving. Subjects were asked what they did in three scenarios: when they were supplied with poor quality wire/rods, when reject/scrap levels are increasing in their area and when their machine breaks down. Each scenario had eight responses that were rated by external raters (10 organizational behavior experts and 10 managers) from a range of organizations who coded all 24 responses from each subject on a 5-point scale. This data was then carefully analyzed for use in study assessments.

Parker and colleagues reported extensive analyses that they undertook to assess the validity of the proactive idea implementation and proactive problem solving scales (p. 642), but the sources of study information were highly homogeneous and the same sources were used to construct and validate the scales as were used to measure study outcomes, all of which suggest a high likelihood of systematic bias (e.g., MacKenzie et al. 2011).

In contrast to the scales used to measure proactive outcomes, all of the other scales utilized in Parker et al. (2006) were well-recognized and had been validated in published studies. Thus, in the absence of evidence of external validity of the original study's proactivity scales, it is perhaps not surprising that path relationships involving measures from that scale could not be replicated.

I also suggest that a second plausible explanation may again lie in the differences between the subject panels. As discussed in the preceding section, the blue-collar wire factory workers had much lower overall variable scores, suggesting much lower levels of proactivity. (The actual proactivity variable scores cannot be compared directly because of differences in the dependent variable measure used in the studies). If this was the case, it is likely that there would have been much less co-variance to observe between the subjects' proactive personalities and their proactivity outcomes when compared to that for Studies 1 and 2.

6.2 Revisiting the antecedents of proactivity—new indicated structural model paths inform the final model

The current datasets provided a basis to reassess the antecedents of proactivity using an approach similar to Parker and colleagues (2006). Of course, for a model to explain a latent construct appropriately, it is appropriate to include all known predictor variables that are found to have a significant effect. As discussed above, failure or inability to do can give rise to omitted variable bias and biased model parameter estimates.

In constructing their model, Parker and colleagues indeed appear to have explored all statistically significant structural paths, and they indicated that they had included all theoretically sound paths in their model. (2006: 644). They did not report a statistically significant direct structural path from proactive personality to proactivity or from coworker trust to proactivity, although they specified indirect paths from each of these variables to proactivity in their model.

Following a similar approach, I used the CI Augmented Model to explore the statistical significance of each of the possible model paths that had not been specified in that Model. In doing so, I observed three significant path correlations to PI that

had not been specified. First, the direct path from PROPRS to PI remained highly significant, notwithstanding the specified indirect path through RBSE. Secondly, there was a significant direct path from TRUST to PI, suggesting an important role for that variable to explain PI, notwithstanding the removal of the insignificant path for it through FRO.

Lastly, there was a significant path from INFO to TRUST, suggesting possible mediation of the relationship between INFO and PI. This was somewhat surprising. The literature I had reviewed examining the relationship between CI availability variance and proactivity focused mainly on the links between information and self-efficacy and between the availability of informational assets and performance. Thus, I had expected the possibility of a significant path for INFO to PI through RBSE, but not through TRUST. However, in the INFO measurement model, several of the IAE factor items relate to information sharing among co-workers, and all of the IAA items focus on subjects' perceptions of the information they have compared to co-workers, so the existence of an important link between INFO and TRUST appears to be theoretically justifiable. I suggest that perhaps this path relationship can be understood by referring to Crant, who posited that perceptions of situational social risk predict subjects' willingness to engage in proactive behavior (Crant 2000, p. 456). This would suggest that positive variances in CI availability (INFO) lead to positive variances in co-worker trust (TRUST), which in turn reduce subjects' perceptions of personal risk in the social environment and lead to greater willingness to engage in proactive behavior (PI).

The foregoing exploratory observations led me to construct the Initial Modified Model (which added the PROPRS to PI direct path) and the Final Modified Model (which further added the paths from INFO to TRUST and from TRUST to PI).

Not only did these models achieve acceptable and improved model fit, but they can also be viewed as substantially improving (and perhaps eliminating) omitted variable bias because the correlations between the disturbance term for the dependent variable (PI) and the exogenous variables were not significant. In my view, this is important. Most work behavior studies do report relationships between predictor and criterion variables, but it is not customary to study and report on the potential for omitted variable bias. Thus, the potential for biased model parameter estimates can be high (Busenbark et al. 2022).

Both the Parker et al. (2006) model and the Final Modified Model specify three exogenous antecedents, two endogenous mediators and one direct path variable to explain proactivity at work. However, at each level, the variables are different. The exogenous (distal) antecedents in the original Parker et al. (2006) model are proactive personality (PROPRS), job autonomy (AUTO) and co-worker trust (TRUST). In the Final modified Model both PROPRS and AUTO are retained as exogenous variables, but the third exogenous variable is CI availability (INFO). Both models retain role breadth self-efficacy as a mediator variable, but the second mediator in the original model is flexible role orientation (FRO), whereas the second mediator in the Final Modified Model is co-worker trust (TRUST). Finally, the original model posits a direct path relationship between job autonomy (AUTO) and proactive behavior, whereas the Final Modified Model posits only a direct path relationship between proactive personality (PROPRS) and proactive behavior.

In my view, both the Parker et al. (2006) model and the Final Modified Model are justified in light of the data sets in respect of which they were constructed. Nonetheless, I believe that, for reasons discussed above, the current data sets are more suitable bases for developing a generalized model. Thus, I propose that the Final Modified Model is much less prone to external validity challenge than the Parker et al. (2006) model.

A major endeavor by Parker and colleagues was to not only identify proactivity antecedents but provide a description of how they lead to proactive behavior. This led them to distinguish between distal (exogenous) antecedents and cognitive-motivational (endogenous) mediator antecedents, which provided a useful template to explore for important relationships in their focal data set. This study used an analogous template to explore the current data set. Thus, I view these analyses and the reported outcomes as extensions of the work reported in Parker et al. (2006).

In addition, multiple papers by Parker and various colleagues have included comments advising that those seeking to enhance proactive behavior at work should take steps to enhance the information available to subjects in the workplace (e.g., Parker et al. 2019). I suggest that such advice is sensibly grounded and propose that CI theory provides appropriate theoretical justification therefor.

7 Contributions to academic literatures

7.1 Proactivity at work literature

This paper reports two replications of the Parker et al. (2006) study, which has been widely cited and has provided a foundation for many other studies. Nonetheless, I am unaware of it being revisited as a whole, even though the authors both welcomed further study and published their scales. As with all empirical research, model outcomes are a function of the related data. This paper contributes to the literature by exploring the Parker et al. (2006) model utilizing two larger and more generalizable data sets to explore the antecedents of proactivity at work. Doing so provides proactivity scholars with important new insights into the factors that explain workplace proactivity.

Secondly, the studies reported in this paper each observed evidence that the flexible role orientation construct is likely not an appropriate variable for inclusion as a proactivity antecedent. The paper also contributes to the proactivity literature by offering a theoretical explanation for these unexpected observations which is rooted in the work of trust literature scholars.

Thirdly, this paper extends the proactivity literature by offering the Initial Modified Model, which includes a direct predictor role for proactive personality to proactivity, in addition to the prior paths. Not only was this path found to be significant, but I observed evidence that its addition resolved omitted variable bias issues associated with the prior models.

Finally, this study extends the proactivity literature by offering the Final Modified Model, which posits a mediator role for co-worker trust and a distal antecedent role for CI availability. These pathways were found to be statistically significant, and this

model provides a more nuanced explanation than the prior models. As with the Initial Modified Model, I did not observe evidence of omitted variable bias in the Final Modified Model.

7.2 Omitted variable bias literature

Recent literature has expressed concern that research studies do not pay sufficient attention to the presence of omitted variable bias and resulting model parameter estimate bias, particularly in management research. (Busenbark et al. 2022). This study contributes to the omitted variable bias literature in several ways. First, it employs an approach to examining model predictive ability that expressly tests for the presence of omitted variable bias. Second, it provides evidence of the effects of omitted variable bias on model parameter estimates by comparing weighted parameter estimates between successive model versions as variables and variable paths are added or changed, which provides support for the teaching of the omitted variable bias literature that parameter estimates from models with omitted variable bias cannot be interpreted. (Antonakis et al. 2010) Third, it reports a practical method available in AMOS to test for omitted variable bias—observing covariances between criterion variable disturbance terms and predictor variables. Lastly, it reports a sequence of model improvements that ultimately appear to reduce, if not eliminate, evidence of omitted variable bias.

Perhaps this approach can be thought of as a template for management research scholars to employ when they attempt to construct models that purport to explain causal relationships. The approaches suggested by the existing literature (e.g., Wilms et al. 2021; Antonakis et al. 2010) can be esoteric (grounded in econometric analysis principles) and therefore of limited use to researchers who are not experts in the finer points of structural equation and regression modeling. On the other hand, the approach used in this study is both intuitive and relatively straightforward for those whose expertise is primarily substance oriented. Thus, the study contributes to the omitted variable bias literature by providing a means of better enabling substantive researchers to follow the advice of omitted variable bias scholars.

7.3 Contextual information theory literature and the related foundational literatures

This paper also offers empirical evidence in support of the validity of CI theory by demonstrating the statistically significant role of CI availability as an antecedent of workplace proactivity outcomes based on analyses utilizing each of the Study 1 and Study 2 databases. As such, it makes a fundamental contribution to the CI theory literature and contributes importantly to each of the various foundational literatures from which CI theory was drawn—self-managed teams, situation awareness, leadership substitutes, information sharing, work behavior, inclusion and information asymmetry. As described in Hawthorne (2022, Ch. 1), CI theory was developed in significant part to respond to calls from information asymmetry scholars for new theory building.

8 Insights for practitioners

An important contribution of this paper is that it provides new guidance to practitioners seeking a new way to promote proactive behaviors within their organizations. Study 2 illuminated significant path relationships between subjects' perceived CI availability and their perceived co-worker trust, which in turn led to significant path relationships with their proactivity at work. This would suggest that organizations seeking to promote workplace proactivity should pay close attention to the CI available to employees in their workplace situations, in addition to their proactive personality traits and their degree of workplace autonomy.

9 Limitations

This study is cross-sectional and based solely on individual self-reports, which makes it subject to concerns about the potential for common method bias. While a strength of the study is ability to mitigate structural bias by using Prolific.co to source numerous respondents with minimal between-subjects relationships, subject anonymity makes it impossible to cross-verify responses with supervisors or co-workers.

A second issue relates to the use of Prolific.co to source respondents. This service has now been in operation for a decade and participants number over 300,000. The participants in this study were drawn from an available pool of over 8,000 eligible candidates based on the study's screening criteria. While I think that sourcing subjects in this way is justified and has enabled me to assemble a data set appropriate for studying generalized phenomena, I do not have much information about individual participants or the nuances of their recruitment for this specific study by Prolific.co. In this respect, the integrity of the data set is dependent upon the integrity of the standards algorithms and procedures employed by Prolific.co. The Prolific.co website provides researchers with a great amount of information about the recruitment process, and the service was developed at a leading university. I feel comfortable about the integrity of the data set and justified in using it to conduct the study, but I acknowledge that other means of collecting data could have provided greater visibility into the recruitment process and individual subject characteristics.

10 Future study of CI availability

Because CI Availability is a ubiquitous construct, the opportunities for future exploration of variance in this phenomenon are likely to be immense for researchers who employ psychometric data in their studies. The literatures of self-efficacy (e.g., Bandura 1977); Trust (Mayer et al. 1995); transformational leadership (e.g., Bass 1985); intrinsic and extrinsic motivation (e.g., Vallerand 1997); regulatory focus (e.g., Higgins 1998); self-determination (e.g., Deci and Ryan 1985); core self-evaluation (e.g.,

Judge and Bono 2001, 2003) and organizational justice (e.g., Colquitt and Zapata-Phelan 2007) are just a few examples of theories that have been developed using psychometric data to explore aspects of workplace behavior. CI theory offers scholars of these literatures an efficient means to control for subjects' CI availability variance and develop much more nuanced insights into variable relationships. In addition, recent commentators have criticized management researchers for ignoring the effects of omitted variable bias on their studies. (e.g., Busenbark et al. 2022), and the ability to examine the role of CI availability in research studies should be very helpful to scholars who wish to respond to these concerns.

One of the most striking observations made in the current study was the strong path relationship from CI availability to Co-worker Trust in the Modified Model. The model posits CI availability as a predictor of Co-worker trust ($R^2 = 0.64$), and further explanation of this relationship could lead to a significant contribution to the trust literature. Indeed, the leading trust literature model specifically posits a theoretical role for variance in the information available to trustors as a predictor in their assessment of trustees (Mayer et al. 1995), but trust scholars apparently have not had the tools to enable them to examine such a relationship thoroughly. (Dumitru and Mittelstadt 2020), (Breuer et al. 2020). I expect that there likely are similar opportunities in most of the other work behavior literatures that employ psychometric data.

The knowledge-sharing literature may also benefit greatly from the study of CI availability. In that literature, CI availability variance could readily be viewed as either a predictor (e.g., are those in the know more likely to share with others?) or a criterion variable (e.g., how do we assess the outcomes of knowledge sharing or other knowledge management behaviors?).

In particular, CI availability should prove to be an important catalyst for narrowing the gap between practitioners and work behavior scholars. Practitioners are often confronted with the axiom that you can't manage something if you don't measure it. CI availability offers the ability to assess outcomes from initiatives grounded in academic theory by examining whether those outcomes lead to changes in subjects' CI perceptions. For example, initiatives promoting transparency, inclusion, enablement, information sharing and trust all may be expected to lead to improvements in CI availability perceptions, which can be measured by using CI theory.

Appendix 1

See Table 7.

Table 7 Study 1 Participant Demographic Summary

Category	Frequency of responses	Percent of total	Cumulative percentage
Employer size			
Micro enterprise	19	3.6	3.6
Small or medium-sized enterprise (< 200 employees)	226	43.4	47.0
Large private enterprise (> 200 employees)	165	31.7	78.7
Publicly listed/traded enterprise	165	21.3	100.0
Employment tenure			
At least 1 full year—2 years	126	24.2	24.2
3–5 years	149	28.6	52.8
5–10 years	125	24.0	76.8
10 or more years	121	23.2	100.0
Age last birthday			
18–25	67	12.9	12.9
26–35	218	41.8	54.7
36–45	147	28.2	82.9
46–55	64	12.3	95.2
56–65	22	4.2	99.4
66 or over	3	0.6	100.0
Gender identity			
Male	257	49.3	49.3
Female	259	49.7	99.0
Different identity	5	1.0	100.0
Education			
Secondary (e.g., GED/GCSE)	3	0.6	0.6
High school diploma/A-levels	79	15.2	15.7
Technical/community college	73	14.0	29.8
Undergraduate (bachelors) degree	261	50.1	79.8
Graduate (masters) degree	86	16.5	79.4
Doctoral degree (PhD/other)	18	3.5	99.8
Prefer not to say	1	0.2	100.0
Racioethnicity			
Asian	37	7.1	7.1
Black/African American	26	5.0	12.1
Hispanic Latino or Spanish	25	4.8	16.9
Native American/Pacific Islander	3	0.6	17.5
White/Caucasian	418	80.2	97.7
Other	12	2.3	100.0

$N = 521$. All participants were residents of the United States, fluent in the English language and employed on a full-time basis

Appendix 2

See Table 8.

Table 8 Study 2 participant demographic summary

Category	Frequency of responses	Percent of total	Cumulative percentage
Employer size			
Micro enterprise	18	3.8	3.8
Small or medium-sized enterprise (< 200 employees)	188	39.2	43.0
Large private enterprise (> 200 employees)	165	34.5	77.5
Publicly listed/traded enterprise	108	22.5	100.0
Employment tenure			
At least 1 full year–2 years	95	19.9	19.9
3–5 years	133	27.7	47.6
5–10 years	140	29.2	76.8
10 or more years	111	23.2	100.0
Age last birthday			
18–25	37	7.7	7.7
26–35	179	37.4	47.6
36–45	142	29.7	74.8
46–55	74	15.4	90.2
56–65	37	7.7	97.9
66 or over	10	2.1	100.0
Gender identity			
Male	246	51.4	51.4
Female	230	48.0	99.4
Different identity	3	0.6	100.0
Education			
No formal education	2	0.4	0.4
High school diploma/A-levels	76	15.8	16.2
Technical/community college	78	16.2	32.4
Undergraduate (bachelors) degree	229	47.8	80.2
Graduate (masters) degree	85	17.9	98.1
Doctoral degree (PhD/other)	18	1.9	100.0
Racioethnicity			
Asian	45	9.4	9.4
Black/African American	33	6.9	16.3
Hispanic Latino or Spanish	37	7.7	24.0
Native American/Pacific Islander	3	0.6	24.6
White/Caucasian	356	74.4	99.0
Other/Prefer not to say	5	1.0	100.0

$N = 479$. All participants were residents of the United States, fluent in the English language and employed on a full-time basis

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