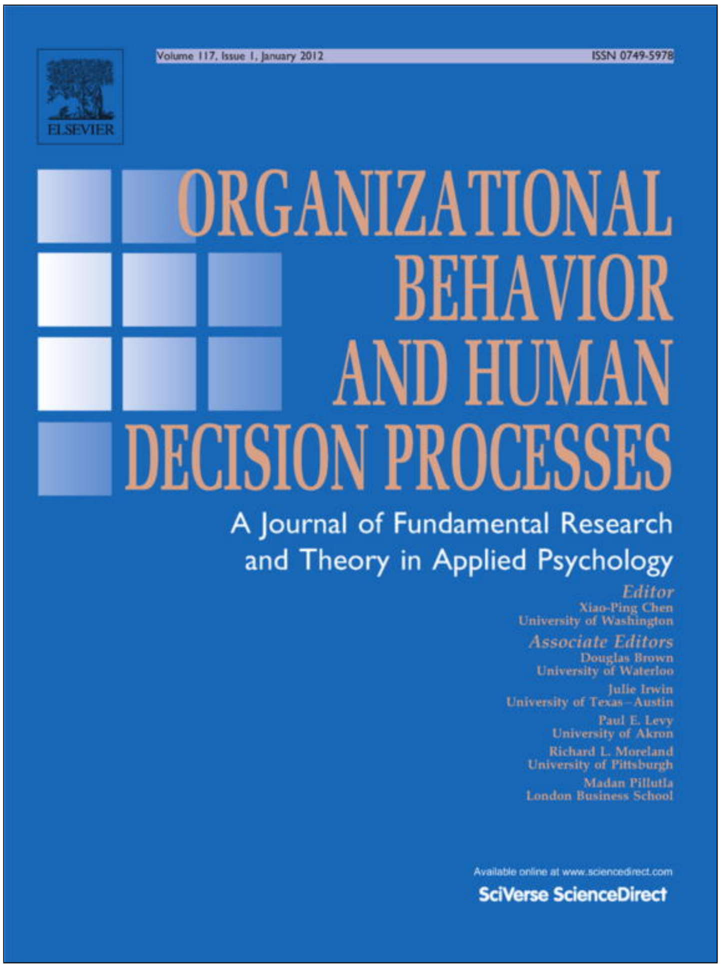
Volume 117, Issue 1, January 2012
ISSN 0749-5978
ELSEVIER
ORGANIZATIONAL BEHAVIOR AND HUMAN DECISION PROCESSES
A Journal of Fundamental Research and Theory in Applied Psychology
Editor
Xiao-Ping Chen
University of Washington
Associate Editors
Douglas Brown
University of Waterloo
Julie Irwin
University of Texas–Austin
Paul E. Levy
University of Akron
Richard L. Moreland
University of Pittsburgh
Madan Pillutla
London Business School
Available online at www.sciencedirect.com
SciVerse ScienceDirect

Organizational Behavior and Human Decision Processes 117 (2012) 125–137

Contents lists available at SciVerse ScienceDirect

Organizational Behavior and Human Decision Processes

journal homepage: www.elsevier.com/locate/obhdp

A closer look at decisions to quit

Craig J. Russell [a,*], Mary Van Sell [b,1]

[a] University of Oklahoma, United States
[b] Oakland University, United States

ARTICLE INFO

Article history:
Received 17 February 2010
Accepted 8 September 2011
Available online 4 October 2011
Accepted by Paul Levy

Keywords:
Voluntary turnover
Decision simulation
Criterion validity
Incremental validity

ABSTRACT

Aspects of March and Simon's (1958) subjective expected utility model and a prediction of Lee and Mitchell's (1994) unfolding model of voluntary employee turnover were tested. A policy capturing simulation that varied high, moderate, and low levels of five job characteristics was used to model voluntary turnover decision processes for 532 nurses. Survey measures of these job characteristics obtained over the next 2 years were multiplied by weights derived from nurse simulations to yield turnover likelihood estimates. These estimates exhibited 80%, 127%, and 190% more predictive power (depending on turnover operationalization) than post-employment survey estimates of turnover intention, job satisfaction, and job availability. Groups of nurses with homogeneous voluntary turnover decision models were also identified, though no groups with homogeneous job perceptions were observed. Evidence suggested nurses responded to "shocks" as predicted. March and Simon's model of voluntary turnover was supported and implications drawn for managing voluntary nursing turnover.

Introduction

Most models of employee voluntary turnover trace their roots to March and Simon's (1958) description of a subjective utility maximization decision process, where choice to stay or leave an employment relationship was a function of decision inputs affecting motivation to stay and motivation to leave. Modeling cognitive decision making processes dominated many applied management contexts (e.g., performance appraisal – Feldman, 1981; job evaluation – Grams & Schwab, 1985; loan applications – Libby, 1976; auditor judgments – Ashton & Brown, 1980; consumer decision making – Mowen & Gaeth, 1992; and assessment center rating processes – Russell, 1985). Peterson and Beach (1967) and Slovic and Lichtenstein (1971) provided detailed descriptions of policy capturing and other decision modeling approaches used in these settings. Curiously, voluntary turnover investigators to date have systematically failed to leverage these approaches to decision modeling. Voluntary turnover research since 1958 instead can be described as having taken a "black box" approach, where attitudinal inputs, correlates, and outcomes of the turnover decision making "black box" are examined over time. No prior research examines how individual employees weigh and combine information in deciding to quit.

Lee, Mitchell, Wise, and Fireman (1996) and Steel (2002) noted post-March and Simon research instead took a distinctly attitudinal detour, exploring paths between survey measures of job characteristic perceptions, job satisfaction, turnover intention, job availability, and voluntary turnover, though paths were generally assumed to be constant across employees (see Hom & Griffeth, 1991; Hom & Kinicki, 2001; Mobley, Griffeth, Hand, & Meglino, 1979; Price & Mueller, 1981a, 1981b for path models dominating this literature). For example, Price and Mueller (1981a, 1981b) paid a great deal of attention to perceptual, attitudinal, affect, and intention predictors most likely to exhibit direct and mediated effects. Price and Mueller did not consider whether employees weighed and combined decision inputs similarly in deciding to quit.

Using between subjects research designs, this literature was theory driven and cumulative (Lee et al., 1996) in ways permitting meta-analytic summarization. Griffeth, Hom, and Gaertner (2000) meta-analyzed 71 studies from this literature ($\Sigma N > 63{,}000$), finding survey measures of intention to turnover[2] yielded the highest

* Corresponding author. Address: Price College of Business, University of Oklahoma, 307 W. Boyd Norman, OK 73019, United States.

E-mail address: cruss@ou.edu (C.J. Russell).

[1] This research was initially conceived by the first author and the late Mary Van Sell of Oakland University over a series of conversations while sharing an office in graduate school from 1978 to 1980. Dr. Van Sell passed away before the current research effort started, though she substantively contributed to its conceptualization and a pilot study demonstrating the viability of within-subject modeling of turnover decision processes. This pilot study formed the core of a research proposal which received the 1986 Ghiselli Award for Research Design from the Society of Industrial and Organizational Psychology and was the basis of the current study. Shaila Miranda, three anonymous reviewers, and the action editor provided useful feedback and comments on early drafts, though all responsibility for any errors in the manuscript remains with the first author.

[2] Intention to turnover items typically make specific references to likelihood of staying on the job or intention to quit. This item content differs from "thoughts about leaving" and "search intentions," subscales that often contribute to measures of the broader "withdrawal cognitions" construct (Hom & Griffeth, 1991).

0749-5978/$ - see front matter © 2011 Elsevier Inc. All rights reserved.
doi:10.1016/j.obhdp.2011.09.002

bivariate predictive power at $\bar{r} = .35$, though the 95% credibility interval ranged from .00 to .77. Weighted application blanks exhibited second highest predictive power at $\bar{r} = .33$ and a 95% credibility interval of $-.25$ to .87.[3] Job satisfaction surveys yielded $\bar{r} = -.17$ with a 95% credibility interval of $-.38$ to .00. At best, meta-analytic estimates of bivariate predictor–turnover relationships indicated employees most likely to quit (1) intend to turnover, (2) are unhappy in their employment, and (3) are aware of job openings elsewhere. Unfortunately, most individual predictor criterion validities emerging from the extensive attitudinal path model literature yielded 95% credibility intervals containing zero, suggesting they could not be used with confidence to predict voluntary turnover across settings.

Relatively low meta-analytic criterion validities led many to question attitudinal path models. Lee and Mitchell (1994) noted "existing models of turnover are too simple; leaving an organization can take place in many different ways" (p. 84). Hom and Griffeth (1991) viewed failure to explore turnover decision making processes as a key deficiency. Low predictive power with high variability across samples led Lee, Mitchell, Holtom, McDaniel, and Hill (1999) to posit "individuals experience unique circumstances when they leave" (pp. 450–451). "Unique circumstances" may include individual differences in both (1) job and non-job related perceptions and (2) how those perceptions are weighed and combined in deciding to quit. Turnover intention scales, with items asking how likely it is employees will be working in their current position 6 months from now, capture employees' forecasts of future turnover decisions, i.e., their intention to make a future decision to quit. Survey-based turnover intention scales did not reveal whether employees arrived at their intentions the same way or how decisions to quit were made.

The unfolding model

Frustrated with attitudinal path models, Lee, Mitchell, and colleagues (Felps et al., 2009; Lee & Mitchell, 1994; Lee, Mitchell, Sablynski, Burton, & Holtom, 2004; Lee et al., 1996, 1999; Mitchell, Holtom, Lee, Sablynski, & Erez, 2001) used Beach's (1990) Image Theory to capture non-rational aspects of organizational decision making that might impact an "unfolding" model of voluntary turnover. Image Theory and the unfolding model suggest employees' use non-optimal information screening and integration processes to minimize cognitive load in making turnover decisions. Self and organizational "images" are used to non-optimally screen incoming information for turnover relevance (Lee & Mitchell, 1994). Voluntary turnover occurred as a result of a number of possible event sequences or "paths" that varied in breadth and sequence of information considered, presence/absence of discrete informational "shocks," and whether alternative job opportunities were considered.

A shock was "an event that generates information or has meaning about a person's job. A shock must be interpreted and integrated into the person's system of beliefs and images. In this sense, it is sufficiently jarring that it cannot be ignored. Note that not all events are shocks. Unless an event produces job-related deliberations that involve the prospect of leaving the job... it is not a shock" (Lee & Mitchell, 1994, p. 60). Large, discrete changes in key decision input variables that cannot be ignored would certainly constitute shock, while small incremental changes might be overlooked. The presence/absence of shock, pre-scripted exit strategies, fit with individual images, job search, and consideration of alternate job opportunities led Lee and Mitchell (1994, pp. 61–69) to develop five alternate decision paths in which turnover relevant information is non-optimally monitored and processed.

Findings reported by Lee, Mitchell, and colleagues (Felps et al., 2009; Lee et al., 1999, 2004; Mitchell et al., 2001) and others (e.g., Kammeyer-Mueller, Wanberg, Glomb, & Ahlburg, 2005; Lee, Gerhart, Weller, & Trevor, 2008) generally support Lee and Mitchell's (1994) unfolding model. Case analyses of 44 nurses who left their positions showed patterns of qualitative and quantitative results consistent with the unfolding model (Lee et al., 1996). Results suggested employee groups considered meaningfully different work and life circumstances in arriving at voluntary turnover decisions. Maertz and Campion (2004) reported similar results in a sample of 159 "leavers," with those who quit without an alternative job lined up exhibiting much higher negative affect. Maertz and Campion (2004) described evidence of additional voluntary turnover decision paths labeled "Pre-planned Quitter," "Impulsive Quitter," "Comparison Quitter," and "Conditional Quitter." Importantly, the notion of shock is not limited to the unfolding model's non-rational decision processes. "Shock" within March and Simon's model could occur when large discrete change in one or more key turnover decision input variables affect membership motivation.

Unfortunately, no evidence suggests unfolding model paths incrementally contribute to voluntary turnover prediction over levels attained by attitudinal path models (Lee, personal communication, July 16, 2009). Lee et al. (2008) contrasted subsets of Lee and Mitchell's (1994) paths as well as select "shock" events, while Kammeyer-Mueller et al. (2005) examined effect of "critical events" that were very similar to Lee and Mitchell's (1994) "shocks." Unfortunately, while both studies contained select variables found in attitudinal path models, neither obtained measures of attitudinal path models' most powerful single predictor, i.e., survey measures of intention to turnover. Hence, neither can be considered to have estimated incremental criterion validity of the unfolding model relative to attitudinal path models. In contrast, evidence of the non-rational unfolding model's incremental contributions to March and Simon's subjective expected utility decision theory cannot exist, as research modeling individual employees' voluntary turnover decision processes does not exist. Lee and Mitchel's redirection toward non-rational cognitive processes may have been premature given the absence of research explicitly estimating individual employees' underlying voluntary turnover decision making models.

The primary purpose of the current study was to directly test March and Simon's (1958) theory by estimating (1) individual employees' turnover decision models using a policy capturing simulation, (2) whether these models predict subsequent turnover, and (3) whether shocks have predicted effects on voluntary turnover. March and Simon's (1958) subjective expected utility maximization model implies at least two sources of possible variance in how people rationally decide to quit: decision content and decision process. Eq. (1) offers a representation of how turnover decisions might be modeled, where P_{quit} is the probability of quitting, X_1–X_k capture decision content, and β_0–β_k capture decision process:

$$P_{quit} = \beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k. \quad (1)$$

One source of variance can occur in employees' perceptions of decision inputs X_1 to X_k. Hence, the rational model also theoretically suggests one form of X_1 to X_k variance – "shock" due to jarring change in one or more turnover decision inputs – can lead to voluntary turnover.

[3] Weighted application blank (WAB) criterion validities reported in the literature and combined for meta-analytic purposes were typically cross validities, i.e., estimates of criterion validity that reflected prediction error present in both the original validation sample and future samples it might be applied to. Hence, WAB validities were subject to an additional source of attenuation relative to other predictors' meta-analytic estimates. WAB empirical keys were typically created to optimally predict some criterion other than turnover, further attenuating cross validities.

A second source of decision model variance is reflected in the weights employees apply to decision inputs (β).[4] Regardless of whether information was rationally or non-rationally monitored/processed, two individuals could follow identical sequences of (1) monitoring turnover relevant information, (2) planning/not planning to quit before accepting alternate employment, and (3) experiencing subsequent job- and non-job-related perceptions and/or shocks. Yet one individual quits due to the importance (β) given pay equity while the other quits due to the importance (β) given job autonomy and variety. The presence of these two employees would have added sampling error in past attitudinal turnover research, contributing to Griffeth et al.'s (2000) wide meta-analytic credibility intervals (Russell, 2010). Unfolding model investigations would have allocated both individuals to the same "path," when in fact they followed very different decision routes. Employee variations in turnover decision processes, i.e., how inputs are weighed and combined in deciding to quit, constitutes a second source of predictor variance that remains unexamined in any voluntary turnover research stream. Lee et al. (1996) criticism of attitudinal path models perhaps says it best – "(i)f (research) interest shifts to non-affect-induced turnover, a process in which non-attitudinal forces prompt employees to quit cannot be articulated with even modest confidence" (p. 5).

The current study examined five hypotheses drawn from March and Simon (1958) and one from the Lee and Mitchell's (1994) unfolding model. Policy capturing simulations yielded models of how nurses decide to quit hypothetical jobs. Non-optimal, sequential information monitoring minimally (if at all) affected nurses' simulated decisions, as all turnover relevant information was available simultaneously in written descriptions of the hypothetical jobs (i.e., turnover relevant information did not sequentially present itself as it might on a real job over long periods of time, precluding non-rational information monitoring described by Image Theory). Hence, individual turnover decision models estimated from simulation responses provided a direct approximation of March and Simon's hypothesized turnover decision making processes. Combining a nurse's turnover decision "policy" with her subsequent job characteristic perceptions yielded simulation-based estimates of turnover intention ($\widehat{TI}_{sim}$), which captured important individual differences in how employees decide to quit and hence were expected to predict voluntary turnover better than the best attitudinal path model predictors (Mitchell, 1974).

H1. Voluntary turnover decision models will be accurately estimated from simulations using hypothetical jobs at the time employment begins – Eq. (1) estimates for individual nurses will exhibit high, statistically significant multiple correlations.

H2. Simulation-based turnover intention forecasts ($\widehat{TI}_{sim}$) derived from pre-employment simulation-based turnover decision models (Eq. (1)) and subsequent job perceptions will significantly predict turnover.

H3. $\widehat{TI}_{sim}$ will predict voluntary turnover better than questionnaire measures of turnover intention (TI_{ques}), job satisfaction, and perceived job availability. Given Griffeth et al.'s (2000) meta-analytic results suggested weighted application blanks were the second best individual predictor of voluntary turnover, a biographical information scale was expected to significantly predict turnover, though at a lower level than $\widehat{TI}_{sim}$.

[4] See Dawes and Corrigan (1974) for a description of why additive models are most likely to perform well in the presence of monotonic $X \rightarrow Y$ relationships. As no evidence of nonlinear or interactive turnover decision models exist in the literature, simple linear additive models seemed a reasonable starting point.

Groups of nurses with similar turnover decision models were expected due to shared life circumstances (e.g., an employed spouse, minor children, etc.) that are causes, consequences, or covariates of decision weights. The work-family conflict literature suggests family characteristics (e.g., number of children, a working spouse, etc.) influence both affect and organizational attachment decisions (e.g., Goff, Mount, & Jamison, 1990; Grover & Crooker, 1995; Hammer, Neal, Newsom, Brockwood, & Colton, 2005; Kossek, 1990; Mano-Negrin & Kirschenbaum, 2000; Waite, 1980). At least two groups of nurses were expected to exhibit homogeneous turnover decision models, one emphasizing characteristics affecting family life (e.g., scheduling flexibility), another emphasizing characteristics that minimally affect family life (e.g., job autonomy and variety).

H4. Groups with similar turnover decision policies within group and meaningfully different policies between groups will exist, at least one of which emphasizing job characteristics affecting life at work and another characteristics affecting family life.

Conscientious nurses were theoretically expected to less likely to voluntarily turnover from positions characterized by high quality/quantity information flow, or instrumental communication, from other health care professionals (Barrick & Mount, 1991). Hence, additional evidence of internal validity of individual nurses' decision models obtained from simulated turnover decisions will exist if $\beta_{\text{inst. communication}}$ is highly correlated, or converges, with conscientiousness scale scores. Biographical information item responses reflecting experiences with specific job characteristics in prior jobs (instrumental communication and four others) were expected to correlate highly with those job characteristics' weights in turnover decisions and less highly with other job characteristic weights (i.e., evidence of convergent and discriminant validity). For example, $\beta_{\text{inst. communication}}$ was expected to converge with a biodata scale score derived from just those life history items developed to target instrumental communication, and diverge with biodata scale scores derived from items targeting past experiences with other job characteristics.

H5. Weights estimated from nurses' simulated turnover decision policies will exhibit convergent and discriminant validity with responses to a biographical information inventory and a conscientiousness scale.

Finally, job perception trajectories were estimated for five job characteristic measures (i.e., turnover decision content) taken at six, 12, 18, and 24 month anniversary dates of employment. Coarse trends in job content perceptions were expected to simply reflect the presence or absence of "shock" events.

H6. Some nurse job characteristic perception profiles will exhibit evidence of shock, where nurses experience large negative changes in job perceptions and are most likely to quit and exhibit low job satisfaction. Nurses who experience smaller "non-shock" negative changes in job perceptions will also be more likely to quit and dissatisfied, though not as likely as nurses experiencing the shock of large drops. Nurses with positive changes in job perceptions will be least likely to quit and most satisfied.

Methods

Sample

All registered nurses with prior hospital work experience ($\overline{X} = 11.6$ years, $s = 6.2$) hired by a large tertiary care hospital chain in the southwestern United States over a 104 week period

($N = 532$) were sampled. Pilot research found newly graduated applicant simulation decision models were less reliable, so 71 new graduates hired during this period were excluded. Job applications provided information on degree date, program type,[5] and prior hospital nursing experience.

Design

A predictive validity with selection design examined relationships between pre-employment individual difference measures, turnover decision models obtained from simulations administered at time of hire, subsequent job perceptions, and nurses' decisions to quit. Job perceptions were surveyed at six, 12, 18, and 24 month anniversary dates of employment.

Measures

Pre-employment

Personnel records and a selection test battery provided pre-employment data. Nurses were told test scores were used for research purposes and would not be used in making job offer decisions. Tests were administered after HR personnel completed a job interview and before job offers were made.[6] Personnel records yielded demographic information (age, prior nursing training, prior nursing employment, number of children, etc.) and hire/termination date.

A 75 item biographical information inventory (biodata) was developed following Russell's (1994) construct-based item development recommendations targeting key job characteristics manipulated in the turnover simulation. For example, pay fairness questions asked how often pay inequity occurred in past nursing positions, how often difficult financial decisions (trade-offs) had occurred because they were underpaid, etc. Scheduling flexibility questions asked how often scheduling difficulties occurred in prior nursing positions, requests for schedule changes were turned down, etc. An empirical key was created to optimally predict subsequent job tenure.

A Hogan Personality Inventory (HPI) subscale measured conscientiousness. Hogan (1992) and others (e.g., Frei & McDaniel, 1998; Mabon, 1998) reported substantial evidence of reliability, construct, and criterion validity. Barrick and Mount (1991, $\bar{r} = .20$) and Dudley, Orvis, Lebiecki, and Cortina (2006), $\bar{r} = .15$) reported meta-analytic criterion validity evidence for conscientiousness measures with job performance. The Wonderlic Personnel Test measured general cognitive ability (g) (see Hunter, 1984, for reliability and criterion validity evidence).

Post-employment

Surveys administered at 6 month intervals used scales adopted from Price and Mueller (1981a) measuring participants' perceptions of promotion probability, scheduling flexibility, pay fairness, job variety and autonomy, instrumental communication (degree to which co-workers provide information needed for job performance), and job availability perceptions. All scales yielded good psychometric qualities in prior research settings (e.g., Price & Mueller, 1981a, 1981b), with single factor solutions and Cronbach α ranging from .75 to .90. Atwood and Hinshaw (unpublished) reported evidence of convergent, discriminant, and predictive validity ($\bar{\alpha} = .72$) for their modification of Brayfield and Rothe's (1951) overall job satisfaction scale administered here.

Date of voluntary turnover was obtained from personnel records. Seven nurses terminated for cause were dropped from analyses estimating criterion validity. The remaining 525 all voluntarily quit within 6 years of starting employment (42 turned over in their first 6 months on the job). The final data set contained 525 nurses who had voluntarily turned over, 42 with censored data (i.e., no survey responses were available), and 483 (90.7%) with complete predictor and criterion data.

Analyses

Modeling simulation decisions

Decisions to quit were modeled from responses to an 81 scenario policy capturing simulation. Promotion probability, scheduling flexibility, pay fairness, job variety and autonomy, and instrumental communication varied across high, medium, and low levels, while job variety and autonomy were perfectly confounded in the manipulation.[7] These job characteristics were selected for manipulation in the simulation because Price and Mueller (1981a, 1981b), Lum, Kervin, Clark, Reid, and Sirola (1998), and Prestholdt, Lane, and Mathews (1987) found they predicted nursing turnover best.

Each simulation page described a hypothetical nursing job in a tertiary care hospital setting. Participants were asked to (1) imagine they were working in that job and (2) indicate how likely they would be to voluntarily quit that job by placing a mark on a 150 mm line segment anchored on the left and right with "1: very unlikely to turnover" and "100: very likely to turnover," respectively (Fig. 1). Distance in millimeters of each response from the line segment's left end was recorded as a nurse's turnover intention for that job (cf. Russell & Bobko, 1992).

A full factorial orthogonal design has $3^5 = 243$ possible jobs. Cochran and Cox's (1957, p. 291) fractional replication design retained main effect orthogonality by eliminating 162 cell combinations and losing the ability to test 4- and 5-way interaction effects.[8] This was not considered a critical loss, as evidence of 4- and 5-way interactions do not appear in any decision simulation research setting. A final 94-page simulation inserted checks for manipulation levels and ten scenarios randomly repeated to permit test–retest reliability estimation.

H1. Nurse simulation responses were regressed onto dummy coded promotion probability, scheduling flexibility, pay fairness, autonomy/variety, and instrumental communication manipulations (1 = low, 3 = high). Within subject standardized regression analyses yielded 532 models of voluntary turnover decision policies (Eq. (2)). Large, significant R will test whether likelihood of quitting was accurately estimated from the simulation.

$$\text{Likelihood}_{\text{quit}} = \beta_1 Z_{\text{pay fair}} + \beta_2 Z_{\text{sch. flex.}} + \beta_3 Z_{\text{promo.prob.}} + \beta_4 Z_{\text{aut.\&variety}} + \beta_5 Z_{\text{inst. comm.}}, \quad (2)$$

[5] Four year colleges and universities typically offer B.S.N. programs, two year community colleges typically offer A.A. programs, while diploma degrees are two to three year programs owned and operated by a hospital.

[6] Interviewers had available a structured interview format with a standard question sequence, though they were not required to use it.

[7] Autonomy and variety manipulations referred to three different nursing care delivery technologies. Marram, Schlegel, and Bevis (1975) reported evidence that primary care nursing deliver systems were equated with high autonomy/variety, team care systems with medium autonomy/variety, and functional care systems with low autonomy/variety. Hence, autonomy and variety were perfectly confounded within the simulation. Discussions with incumbent nurses and nurse administrators suggested both (1) job variety and autonomy were actually confounded in instances where these three nursing delivery systems were used in the hospital chain and (2) reference to these generic nursing care delivery systems would likely evoke the desired perceptions of high, medium, and low autonomy/variety within the simulation.

[8] Variance explained by any true 4- and 5-way interaction effects is added to the error term. If no 4- and 5-way interaction effects are present, no information is lost, and significance tests of H_0: $\beta \neq 0$, H_0: $\beta_1 = \beta_2$, and H_0: $R = 0$ are not influenced. If 4- or 5-way interaction terms were present, the test statistics estimated to test H_0: $\beta \neq 0$ and H_0: $R = 0$ are more conservative due to inflation of their respective error terms.

Please imagine you are currently working as a floor nurse in a tertiary care hospital facility. This job differs from other jobs in a number of ways. First, information you have available suggests your compensation (pay and benefits) is **high/approximately equal to/low** relative to compensation received by floor nurses in comparable tertiary care hospitals in the area. Hospital staffing levels have resulted in **high/moderate/low** scheduling flexibility. Sharing information in a timely manner is critical to good nursing practice, and the working climate among health care professionals at the hospital results in **high/moderate/low** levels of instrumental communication between physicians, nurses, and other health care professionals. Forecasts of future career opportunities at the hospital and your latest annual performance review suggest a **high/moderate/low** probability of promotion. Finally, your floor uses **primary care/team care/functional care** approach to delivery of nursing services, resulting in **high/moderate/low** levels of autonomy and variety in your daily work.

Again, please imagine you are currently employed in the floor nursing position described above. After considering the job's characteristics, please place a mark on the line below indicating how likely it is that you would voluntarily turnover from this position.

1		100
Very unlikely to quit	Moderately likely to quit	Very likely to quit

Fig. 1. Sample page from decision simulation.

H2. $\widehat{TI}_{sim}$ estimates used equation 2 and measures of $Z_{pay\ fair.}$, $Z_{sched.}$ flex., etc. from the survey administered closest to each nurse's date of voluntary turnover, addressing Steel's (2002) requirement that predictors be obtained when nurses were actively considering quitting. Logistic regression analysis estimated howwellbTIsim estimates predicted which nurses quit in their first 630 days of employment (median job tenure = 630 days), directly testing Hypothesis 2.

H3. Incremental change in prediction when job satisfaction, job availability perceptions, a global questionnaire-based turnover intention measure (TI_{ques}), biodata, conscientiousness, and g scales were added to $\widehat{TI}_{sim}$ in logistic regressions tested Hypothesis 3. Each nurse's TI_{ques}, job availability, and job satisfaction scores used in the logistic regression analyses came from the same survey administration as the Z scores used in deriving $\widehat{TI}_{sim}$. Estimates of biodata score criterion validity were obtained using Efron and Tibshirani's (1993, 1997) .632 bootstrap method of cross validity estimation.

H4. Standardized regression coefficients β_1 to β_5 from 532 nurses were submitted to cluster analysis and q-factor analysis to sort nurses into groups with similar decision models. Simple regression analyses and ANOVA/ANCOVA analyses using Dunn's correction for cumulative Type I error tested how pre-employment measures were related to each nurse's β_1–β_5 profile and group membership, testing Hypothesis 4.

H5. Simple correlations assessed whether predicted relationships occurred between $\beta_{inst.\ comm.}$ and conscientiousness, and biodata items and β derived for their root job characteristics, testing Hypothesis 5.

H6. Nurses with precipitous drops in job perception scores of at least 1.5 standardized difference scores between two adjacent survey administrations were identified as experiencing "shocks."[9] Significantly different quit rates and job satisfaction scores were expected, respectively, for nurses experiencing $\Delta X \geqslant 1.5$ *SD* drops in one or more job perceptions, $0 < \Delta X < 1.5$ *SD* drops in job perceptions, and $\Delta X \geqslant 0$ increases in job perceptions, supporting Hypotheses 6. Exploratory cluster and q-factor analyses were conducted on job perception score trajectories in hopes of identifying groups of nurses with similar X_1–X_5 job perception profiles over time as the unfolding models suggests.

Results

H1: Simulation accuracy and manipulation checks (internal validity)

Average multiple correlation across all 532 within-subject regression models derived from policy capturing simulation responses was $\overline{R} = .89$, $s = .039$, with a range of .78–.98, while $R = .62$ across 43,092 scenario responses pooled across all participants. The 43.5% increase in prediction accuracy demonstrates the value of considering individual differences in turnover decision models. Two- or three-way interactions terms achieved statistical significance in models derived on only $N = 7$ nurses. R was generally low for these nurses, and the largest incremental R increase due to interaction effects was only .03. Average test–retest reliability correlations for the random 10 scenarios repeated at the end of the simulation was $\bar{r} = .97$, $s = .06$. Tests of whether mean differences existed between responses to the first versus second iteration of a scenario (H_0: $\mu_{1st} = \mu_{2nd}$) were non-significant at $p < .25$. Four randomly placed manipulation checks asked participants to describe pay fairness, scheduling flexibility, promotion probability, and instrumental communication levels (respectively) in the immediately preceding scenario without turning back to look again. Three additional items asked participants to recall the type of nursing delivery system used in the scenario. ANOVAs indicated significantly higher job characteristics levels were observed corresponding to low, medium, and high job manipulation levels. A χ^2 test indicated significantly different frequencies of recalling type of nursing delivery system, consistent with the preceding delivery system manipulation. Results indicated (1) nurses attended to simulation manipulations, (2) linear models accurately predicted simulation responses, and (3) complex nonlinear models were not needed. Results directly supported Hypothesis 1 – simulated

[9] Lee and Mitchell (1994) defined "shocks" as some environmental change that caused employees to actively consider quitting, i.e., that was so "jarring" that it could not be ignored. Unfortunately, the unfolding model does not specify a minimum threshold needed for something to be considered a "shock." The 1.5 *SD* change levels examined here were arbitrarily chosen.

voluntary turnover decisions were accurately estimated using hypothetical jobs at nurses' time of hire.

H2: Predicting turnover (external validity)

Table 1 reports descriptive statistics, reliabilities, and simple correlations between all predictor measures and job tenure. The global four item questionnaire-based turnover intention estimate (TI_{ques}) and estimate of turnover intention derived from turnover decision simulation (TI_{sim}) correlated between .13 and .21 ($p < .01$, 2-tailed) across administrations. Simple correlations with job tenure averaged 190% higher for TI_{sim} than TI_{ques} ($\bar{r}_{TI_{sim}} = .56$ and $\bar{r}_{TI_{ques}} = .19$). Cronbach's α for TI_{ques} were all above .90, so differences in predicting job tenure were not due to differences in measurement error.

Table 2 describes logistic regressions used to predict which nurses quit before the median 630 days of job tenure. Results reported in column 1 test Hypothesis 3, indicating TI_{sim} strongly predicted which nurses quit within their first 630 days of job tenure ($-2LL = -223.4$, $p < .001$ and $r_{logistic} = .52$). Importantly, column 2 reports logistic regression results when the five most proximate survey administration job perception measures were used to predict turnover without benefit of the weights derived from each nurse's simulated turnover decision policy (Eq. (2)). Log likelihoods did not significantly differ from the null model when turnover was regressed directly onto the five job perception measures. Thus, Hypothesis 2 was strongly supported – simulation-based turnover intention (TI_{sim}) accurately predicted both overall job tenure and which nurses quit.

H3: Incremental prediction and biodata cross validity

Table 2's columns 3 and 5 show turnover logistically regressed onto the global questionnaire-based turnover intention estimates (TI_{ques}) and biodata scale scores, respectively, while columns 4 and 6 add TI_{sim}. Biodata and TI_{ques} significantly predicted turnover in each 6 month period at $p < .001$ ($r_{logistic} = .49$) and $p < .05$ ($r_{logistic} = .24$), respectively. TI_{sim} added significant incremental prediction to all other predictors, TI_{ques} did not. TI_{sim} predicted correct turnover status of an additional 72 nurses relative to TI_{ques}, a statistically significant 51% increase in accuracy. TI_{sim} predicted correct turnover status of an additional 32 nurses relative to biodata alone, a non-statistically significant 23% increase in accuracy.

Further examination of Table 2's column 6 reveals biodata scores and TI_{sim} both contributed significant incremental prediction ($\Delta r_{logistic} = .15$ for TI_{sim}). Adding biodata to the equation led to accurate prediction of an additional 18 nurses' turnover status ($\Delta r_{logistic} = .12$), consistent with meta-analytic findings showing weighted application blanks (a form of biodata) yield the second highest average correlation with turnover (Griffeth et al., 2000).

Table 2's columns 7 and 8 report results for other attitudinal path model predictors. Job availability was the only significant contributor to prediction, with $r_{logistic} = .35$ when turnover was logistically regressed onto TI_{ques}, perceived job availability, and job satisfaction. Column 8 results show predictive power increased by almost 60% when TI_{sim} was added to the equation ($\Delta r_{logistic} = .20$), and only job availability joined TI_{sim} as a significant contributor to prediction. Table 2's column 9 logistically regressed turnover onto TI_{sim}, key attitudinal path model predictors, conscientiousness, and g, yielding $r_{logistic} = .69$. Comparing these results to TI_{sim}, TI_{ques}, and the biodata scale as single predictors (i.e., comparing column 9 to columns 1, 3, and 5) indicated inclusion of all other predictors improved prediction by TI_{sim} alone $\Delta r_{logistic} = .17$, by TI_{ques} alone $\Delta r_{logistic} = .65$, and by the biodata scale alone $\Delta r_{logistic} = .45$. TI_{sim}, job availability, and biodata scores were clearly the strongest predictors as evidenced by column 10 ($r_{logistic} = .68$). All other predictors yielded non-significant prediction increments ($\Delta -2LL = 4.2$, or $\Delta r_{logistic} = .02$). Hence, TI_{sim} was the strongest single predictor and added the most incremental predictive power relative to the best attitudinal path model predictors, supporting the first portion of Hypothesis 3.

Efron and Tibshirani's (1993, 1997) showed that the .632 bootstrap method was most efficient at estimating cross validities compared to other methods (e.g., "leave one out jack knife, etc."). Response option-based empirical keys (Kluger, Reilly, & Russell, 1991) were developed for 1000 bootstrap samples of size $N = 525$. The empirical key was then applied to those observations not contained in each bootstrap sample (i.e., an expected 1 – 63.2% or 36.8% of samples drawn from a normal distribution, hence the origin of Efron & Tibshurani's label) to create a biodata score. The average biodata score – job tenure correlation in these hold out samples, i.e., $r = .42$ reported in Table 2, is the best estimate of cross validity for the empirical key. The empirically keyed biodata inventory is expected to yield high criterion validity when applied to future samples drawn from this population, consistent with meta-analytic average correlations for weighted application blanks and also supporting the latter portion of Hypothesis 3.

H4: Identification of homogeneous voluntary turnover decision making groups

The 525 individual sets of β_1–β_5 standardized regression coefficients derived from nurses' decision simulations were cluster and Q-factor analyzed ($N = 7$ nurses for whom 2- or 3-way interactions achieved significance were dropped). The fractional replication design, absence of 2- and 3-way interactions in $N = 525$ participants' models, and absence of evidence of 4- and 5-way interactions in the larger cognitive modeling literature suggested β_1–β_5 standardized regression coefficient estimates from Eq. (2) directly reflected job characteristic importance (Cochran & Cox, 1957), i.e., they were not biased by multicolinearity. Hierarchical cluster analysis was expected to reveal groups of nurses with similar β_1–β_5 decision profiles. Q-factor analysis helped determine whether the 525 decision profiles were dominated by a specific number of group decision profiles, providing additional guidance for interpreting cluster analysis results.[10]

Hierarchical cluster analyses using the centroid and Ward's distance measures indicated large increases in the root mean square standard deviation index and a distinct peak in pseudo F statistics between 26 and 25 clusters. 21 clusters contained only one or two nurses with very unique, "outlier," decision policies (e.g., $\beta_{pay\ fairness} = .18$, almost 300% of the highest value derived for other nurses and β values ∼.00 for all other job characteristics). Cluster analyses conducted after removing these 21 clusters ($N = 34$ nurses) found a large increase in the root mean square standard deviation index and a distinct peak in pseudo F statistics when moving from five to four clusters (see Milligan & Cooper, 1985, for guidance in interpreting cluster analysis). Q-factor analysis suggested five homogeneous group decision profiles, with a 73% drop in eigenvalue occurring between the 5th and 6th factor. Combined Q-factor and cluster analysis results indicated five distinct voluntary decision making profiles existed for 491 nurses. Table 3 reports average job characteristic weights (β) for each group. $\bar{R}$

[10] Estimates of q-factor loadings were too unstable for interpretation because the ratio of decision weights to nurses (<.01) is well below the common heuristic ratios of 5–10 to 1 (Nunnally & Bernstein, 1994). However, Bobko and Schemmer's (1984) Monte Carlo simulation showed eigenvalues were highly robust in the face of low observation to item ratios. Hence, q-factor analysis was conducted to provide additional guidance in making the subjective decision about which number of groups is most interpretable. A large change in eigenvalue between the 5th and 6th factor suggested a five group solution fit best, consistent with decision heuristics applied to the cluster analysis results. See Colihan and Burger (1995) for an example of q-factor analysis paired with cluster analysis to identify latent groups.

Table 1
Descriptive statistics and simple correlations for pre-employment measures and 6-, 12-, 18-, and 24-month job tenure measures.*

				Pre-employment measures						Measures obtained at 6 months job tenure							
	$\bar{X}$	*sd*	*α*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
*Measures obtained pre-employment N = 520**																	
1. Prior experience (months)	75.8	27.9		1.00													
2. Age	27.6	4.7		.78	1.00												
3. Months since graduation	99.4	55.2		.69	.71	1.00											
4. *g*	35.3	6.7		.09	.10	.10	1.00										
5. Biodata[1]	52.6	13.6		.12	.12	.23	.04	1.00									
6. Conscientious	29.7	4.1		.20	.20	.19	.35	.18	1.00								
Measures obtained at t = 6 months job tenure N = 483																	
7. Pay fairness	13.8	3.1		−.20	−.20	.27	.09	.16	.09	1.00							
8. Promotion probability	14.5	3.2		−.11	−.10	.11	.10	.04	.10	.39	1.00						
9. Autonomy/variety	14.2	4.0		−.09	.28	.28	.15	.07	.14	.19	.43	1.00					
10. Instr. communication	14.0	4.3		.16	.31	.21	.14	.18	.11	.30	.30	.31	1.00				
11. $TI_{questionnaire-6}$	16.2	6.2		−.10	−.17	.10	.05	.12	.14	.30	.19	.12	.14	1.00			
12. $TI_{simulation-6}$	−.00	.32		.13	.04	.13	.06	.19	.14	.29	.34	.34	.18	.13	1.00		
13. Job availability	13.8	4.8		−.20	.09	.20	.09	.23	.09	.20	.14	.20	−.03	.19	.23	1.00	
14. Overall satisfaction	3.1	1.1		.21	.31	.29	−.09	.40	.07	.40	.28	.20	.05	.31	.40	.20	1.00
Measures obtained at t = 12 months job tenure N = 379																	
15. Pay fairness	13.6	3.0		−.10	−.10	.24	−.06	.16	.09	.84	.20	.11	.20	.15	.29	.09	.27
16. Promotion probability	14.4	3.3		−.07	−.09	.12	.02	.06	.07	.39	.47	.09	.14	−.02	.26	−.12	.25
17. Autonomy/variety	14.1	4.1		.20	.20	.22	.11	.13	.09	.30	.28	.81	.30	−.06	.23	.09	.20
18. Instr. communication	14.1	4.4		.20	.29	.19	−.04	.19	.10	.36	.31	.40	.69	.06	.30	.03	.20
19. $TI_{questionnaire-12}$	16.4	6.1		.21	.19	.09	.00	.11	.14	.21	.29	.20	.18	.69	.19	.30	.28
20. $TI_{simulation-12}$	+.00	.35		.29	.29	.11	−.09	.27	.13	.37	.43	.39	.39	.20	.92	.33	.37
21. Job availability	13.6	5.0		−.15	−.13	.18	.05	.19	.04	.19	.31	.19	.20	.20	.19	.63	.09
22. Overall satisfaction	3.2	1.3		.19	.29	.21	.10	−.19	.08	.21	.25	.36	.16	−.13	−.20	.21	.18
Measures obtained at t = 18 months job tenure N = 272																	
23. Pay fairness	13.9	3.5		−.09	−.05	.20	−.04	.13	.07	.78	.28	.11	.16	.09	.18	−.15	.17
24. Promotion probability	14.7	3.5		−.03	−.02	.11	.06	.06	.07	.40	.39	.20	.14	.15	.15	.03	.15
25. Autonomy/variety	14.4	4.4		.04	.27	.20	.04	.10	.06	.33	.30	.75	.11	.11	.16	.09	.21
26. Instr. communication	14.5	4.5		.27	.30	.15	.08	.16	.10	.20	.30	.30	.52	.26	.15	.09	.19
27. $TI_{questionnaire-18}$	16.1	6.6		−.19	−.11	.07	.10	.15	.09	.20	.21	.19	.12	.64	.22	.30	.28
28. $TI_{simulation-18}$	−.00	.33		−.25	−.20	.10	.14	.21	.08	.38	.29	.27	.18	.21	.85	.34	.35
29. Job availability	13.7	4.9		−.10	−.06	.16	.04	.14	.11	.22	.20	.10	.16	.26	.27	.48	.09
30. Overall satisfaction	3.1	1.4		.17	.15	.17	.11	−.20	.03	.19	.19	.27	−.16	−.29	−.31	.09	.72
31. Job tenure	665	278		.11	.15	.07	.07	.42	.08	.20	.21	.21	.20	.18	.47	.19	.38

			Measures obtained at 12 months job tenure								Measures obtained at 18 months job tenure							
	$\bar{X}$	*sd*	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
Measures obtained at t = 12 months job tenure N = 379																		
15. Pay fairness	13.6	3.0	.84	.20	.11	.20	.15	.29	.09	.27	.84	.20	.11	.20	.15	.29	.09	.27
16. Promotion probability	14.4	3.3	.39	.47	.09	.14	−.02	.26	−.12	.25	.39	.47	.09	.14	−.02	.26	−.12	.25
17. Autonomy/variety	14.1	4.1	.30	.28	.81	.30	−.06	.23	.09	.20	.30	.28	.81	.30	−.06	.23	.09	.20
18. Instr. communication	14.1	4.4	.36	.31	.40	.69	.06	.30	.03	.20	.36	.31	.40	.69	.06	.30	.03	.20
19. $TI_{questionnaire-12}$	16.4	6.1	.21	.29	.20	.18	.69	.19	.30	.28	.21	.29	.20	.18	.69	.19	.30	.28
20. $TI_{simulation-12}$	+.00	.35	.37	.43	.39	.39	.20	.92	.33	.37	.37	.43	.39	.39	.20	.92	.33	.37
21. Job availability	13.6	5.0	.19	.31	.19	.20	.20	.19	.63	.09	.19	.31	.19	.20	.20	.19	.63	.09
22. Overall satisfaction	3.2	1.3	.21	.25	.36	.16	−.13	−.20	.21	.18	.21	.25	.36	.16	−.13	−.20	.21	.18
Measures obtained at t = 18 months job tenure N = 272																		
23. Pay fairness	13.9	3.5	.84	.20	.11	.20	.15	.29	.09	.27	.84	.20	.11	.20	.15	.29	.09	.27
24. Promotion probability	14.7	3.5	.39	.47	.09	.14	−.02	.26	−.12	.25	.39	.47	.09	.14	−.02	.26	−.12	.25
25. Autonomy/variety	14.4	4.4	.30	.28	.81	.30	−.06	.23	.09	.20	.30	.28	.81	.30	−.06	.23	.09	.20
26. Instr. communication	14.5	4.5	.36	.31	.40	.69	.06	.30	.03	.20	.36	.31	.40	.69	.06	.30	.03	.20
27. $TI_{questionnaire-18}$	16.1	6.6	.21	.29	.20	.18	.69	.19	.30	.28	.21	.29	.20	.18	.69	.19	.30	.28
28. $TI_{simulation-18}$	−.00	.33	.37	.43	.39	.39	.20	.92	.33	.37	.37	.43	.39	.39	.20	.92	.33	.37
29. Job availability	13.7	4.9	.19	.31	.19	.20	.20	.19	.63	.09	.19	.31	.19	.20	.20	.19	.63	.09
30. Overall satisfaction	3.1	1.4	.21	.25	.36	.16	−.13	−.20	.21	.18	.21	.25	.36	.16	−.13	−.20	.21	.18
31. Job tenure	665	278	.32	.35	.27	.38	.20	.59	.30	.28	.22	.40	.28	.36	.20	.49	.31	.27

			Pre-employment measures						Measures obtained at 6 months job tenure							
	$\bar{X}$	*sd*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Measures obtained at t = 24 months job tenure N = 203																
32. Pay fairness	14.2	3.6	−.22	−.18	.24	.06	.18	.11	.78	.15	.18	.16	.19	.19	.06	.25
33. Promotion probability	14.7	3.7	−.10	−.14	.12	.10	.07	.12	.35	.51	.07	.12	−.07	.24	−.11	.22
34. Autonomy/variety	14.5	4.5	−.05	.25	.26	.14	.06	.11	.30	.24	.80	.31	−.08	.21	.09	.21
35. Instr. communication	14.6	4.6	.14	.32	.22	.12	.18	.12	.32	.33	.37	.71	.04	.38	.04	.21
36. $TI_{questionnaire-24}$	16.4	6.7	−.11	−.12	.12	.08	.17	.12	.20	.25	.21	.11	.47	.18	.31	.18

(*continued on next page*)

Table 1 (*continued*)

	$\overline{X}$	*sd*	Pre-employment measures 1	2	3	4	5	6	Measures obtained at 6 months job tenure 7	8	9	10	11	12	13	14
37. $TI_{\text{simulation-24}}$	−.00	.36	.11	.01	.17	.076	.13	.13	.33	.47	.35	.35	.21	.89	.34	.32
38. Job availability	13.8	5.0	−.15	−.02	.21	.02	.21	.05	.14	.38	.13	.22	.22	.17	.69	.03
39. Overall satisfaction	3.2	1.5	.20	.21	.39	−.03	.34	.05	.24	.24	.31	.17	−.10	−.17	.11	.13

	$\overline{X}$	*sd*	Measures obtained at 12 months job tenure 15	16	17	18	19	20	21	22	Measures obtained at 18 months job tenure 23	24	25	26	27	28	29	30
Measures obtained at t = 24 months job tenure N = 203																		
32. Pay fairness	14.2	3.6	.73	.12	.12	.17	.14	.16	.03	.21	.74	.21	.10	.11	.11	.19	.19	.17
33. Promotion probability	14.7	3.7	.32	.58	.02	.11	−.06	−.04	.01	.12	.29	.55	.11	.12	.02	−.06	−.17	.05
34. Autonomy/variety	14.5	4.5	.33	.24	.81	.51	.03	.15	.19	.11	.31	.18	.71	.20	.16	.03	.19	.10
35. Instr. communication	14.6	4.6	.32	.31	.31	.75	.07	.30	−.01	.11	.30	.30	.20	.79	.16	.22	.23	.10
36. $TI_{\text{questionnaire-24}}$	16.4	6.7	.20	.21	.24	.10	.40	.10	.32	.11	.20	.23	.26	.11	.77	.17	.26	.23
37. $TI_{\text{simulation-24}}$	−.00	.36	.33	.41	.31	.36	.26	.89	.34	.32	.31	.41	.36	.35	.22	.88	.13	.17
38. Job availability	13.8	5.0	.11	.32	.12	.12	.27	.07	.59	.05	.12	.30	.13	.21	.21	.17	.58	.11
39. Overall satisfaction	3.2	1.5	.22	.21	.30	.12	−.11	−.12	.10	.18	.20	.21	.35	.12	−.03	−.11	.09	.28

	$\overline{X}$	*sd*	Measures obtained at 24 months job tenure 31	32	33	34	35	36	37	38	39
Measures obtained at t = 24 months job tenure N = 203											
31. Job tenure	665	278	1.00								
32. Pay fairness	14.2	3.6	.14	1.00							
33. Promotion probability	14.7	3.7	.19	.32	1.00						
34. Autonomy/variety	14.5	4.5	.11	.32	.29	1.00					
35. Instr. communication	14.6	4.6	.23	.31	.37	.41	1.00				
36. $TI_{\text{questionnaire-24}}$	16.4	6.7	.19	.20	.30	.21	.19	1.00			
37. $TI_{\text{simulation-24}}$	−.00	.36	.67	.33	.28	.32	.35	.22	1.00		
38. Job availability	13.8	5.0	.33	.22	.30	.17	.23	.22	.09	1.00	
39. Overall satisfaction	3.2	1.5	.20	.20	.23	.32	.17	−.09	−.11	.20	1.00

* $N = 520$ nurses with pre-employment data results in all Pearson correlations of $r_{xy} > .09$ or $< -.09$ significant at $p < .05$. $N = 483$ results in all Pearson correlations of $r_{xy} > .09$ or $< -.09$ significant at $p < .05$. $N = 379$ results in all Pearson correlations of $r_{xy} > .10$ or $< -.10$ significant at $p < .05$. $N = 272$ results in all Pearson correlations of $r_{xy} > .12$ or $< -.12$ significant at $p < .05$. Finally, $N = 203$ results in all Pearson correlations of $r_{xy} > .14$ or $< -.14$ significant at $p < .05$.

[1] The Biodata scoring procedure gave each participant 50 points, then added or subtracted points as a direct reflection of the point biserial correlations between the criteria and each response option chosen. Simple correlations with job tenure reported in the text (r = .48) above reflect the average cross validity taken from 1000 bootstrap samples using the .632 estimation method (Efron & Tibshirani, 1993,1997). All other correlations with biodata scale scores used the biodata score derived from a key optimized to predict job tenure. Contact the author for a copy of the original ReSampleStat program used to derive estimates of cross validity and is available from the first author on request.

within groups ranged from .92 to .97 versus $R = .62$ obtained when all $81 \times 491 = 39{,}771$ simulation decisions were analyzed together.

Groups 1, 2, and 5 emphasized job characteristics likely to affect non-work life (i.e., scheduling flexibility and pay fairness) while Group 3 emphasized job characteristics reflecting nursing job content alone, directly supporting Hypothesis 4. Scheduling flexibility alone dominated Group 2's simulated turnover decisions. Group 1 and 5's models were dominated by pay fairness and scheduling flexibility, with increased scheduling flexibility resulting in lower turnover likelihood for Group 1 and higher turnover likelihood for Group 5. Desire to perform core nursing duties dominated Group 3's simulation turnover decisions, with high autonomy/variety and instrumental communication resulting in lower turnover likelihood, and high promotion probability associated with higher turnover likelihood. Group 4's decisions were dominated by job characteristics affecting both work and non-work life, with quit decisions dominated by pay fairness, scheduling flexibility, and promotion probability.

Group descriptive statistic profiles were generated following Hair, Anderson, Tatham, and Black's (1998) recommendations for validating clusters. ANOVAs indicated all but percent with Diploma degrees and number of children differed across the five groups (Table 4).[11] Typical Group 1 members had a B.S.N. degree, one prior nursing job since graduation, average 30 months of prior job tenure, one child, and were between 25 and 30 years of age. Conversations with local nursing administrators suggested this group had taken jobs shortly after graduation, abandoned nursing employment on arrival of their first child, and was now re-entering the workforce. Economic and time demands of small children are associated with scheduling flexibility and pay fairness dominating their decision models.

Group 4, though a little more than 1/4th the size, was very similar in profile to Group 1, and appeared to make choices to maximize income. Typical Group 4 nurses held $\overline{X} = 3$ jobs and worked $\overline{X} = 3 = .81$ months since graduation, taking almost no time away from nursing and rotating through approximately two more jobs after childbirth. Group 4 valued probability of promotion at about the same level as pair fairness, while probability of promotion did not contribute to Group 1 decisions.

Group 2 was older ($\bar{x}_{\text{age}} \cong 37$) with more work experience ($\overline{X} = 184$ months), $\overline{X} = 4$ jobs, and $\overline{X} = 2$ children since graduation with an A.A. degree (72%). Scheduling flexibility was the single dominant job characteristic driving turnover simulation responses, while they had significantly higher $\bar{x}_{\text{job tenure}} = 660$ days than Groups 3, 4, or 5. Groups 3 and 5 were young (early 20s) and generally held only one nursing job since graduation, though neither group tended to have children. Group 3's decision model focused on aspects of the job itself, finding instrumental communication from other health care professionals (e.g., physicians) and autonomy/variety desirable, while high promotion probability (which

[11] Raw item data was not available for the general cognitive ability (g) scores or for the Hogan conscientiousness scale, so internal consistency reliability could not be estimated. Hunter (1984) and the Wonderlic Manual reported the Wonderlic's reliability as .88, while Barrett and Rollan (2009) reported alpha for the Hogan conscientiousness scale as .66 in the "normative" HPI sample of $N = 156{,}614$.

Table 2
Logistic regression turnover prediction in four time windows.

Predictors	Predicting turnover with median 630 days (245 of 489 turnover) parameter estimates									
	1	2	3	4	5	6	7	8	9	10
TI_{sim}	1.59***			1.72***		1.42***		1.45***	1.49***	1.53***
TI_{ques}			.81*	.31			.30	.29	.20	
Job availability							.52*	.65*	.61*	.59**
Job satisfaction							−.21	−.16	−.11	
Biodata[a]					−1.32***	−1.1***			−1.29**	−1.18***
Conscientious									.19	
g									.21	
Pay fairness		−.30								
Scheduling flexibility		−.29								
Autonomy/variety		−.14								
Inst. communication		−.19								
Promotion probability		.11								
$-2LL$[b]	−223.4***	−292.5	−288.6*	−220.2***	−233.1***	−179.1***	−268.7*	−213.6***	−160.4***	−164.6***
$\Delta -2LL_{sim}$				68.4**		109.5***				
$\Delta -2LL_{other}$				3.2		44.3**			62.9**	58.8**
$R_{logistic}$[c]	.52	.04	.24	.53	.49	.64	.35	.55	.69	.68
$\Delta R_{logistic}$ due to TI_{sim}				.29		.15		.20		
$\Delta R_{logistic}$ due to other predictors				.01		.12		.03		.16

[a] The Biodata scoring procedure used point biserial correlations between job tenure and each response option chosen. Simple correlations with job tenure reported above reflect average cross validities from 1000 bootstrap samples using the .632 estimation method (Efron & Tibshirani, 1993, 1997). All other correlations with biodata scale scores used average response option weights across all cross validated keys to derive biodata scale scores. Contact the author for a copy of the original ReSampleStat program used to derive cross validity estimates.
[b] $-2LL = -2\log$ likelihood.
[c] $R_{logistic}$ is the Cox and Snell (1968) pseudo approximation of R generated by OLS regression, where $R_{logisitic} = \sqrt{(-2LL_{null} - 2LL_k)/-2LL_{null}}$, LL_{null} is the log likelihood of a model containing just a constant (i.e., a function of the average daily turnover across the entire span of the study), and LL_k is the log likelihood of the model containing k predictors.
* $p < .05$, 2 tailed.
** $p < .01$, 2 tailed.
*** $p < .001$, 2 tailed.

Table 3
Average standardized regression coefficients from voluntary turnover decision simulations for five homogeneous groups.[a]

	Race			$\bar{R}$	Pay fairness	Scheduling flexibility	Promotion probability	Autonomy and variety	Instrumental communication
	W	*H*	*B*						
Group 1: $N = 175$	134	22	19	.945	−.492^{***,a}	−.316^{***,a}	−.073^{b}	−.052^{b}	−.101^{b}
Group 2: $N = 132$	35	52	45	.949	−.030^{b}	−.855^{***,a}	−.002^{b}	−.047^{b}	−.028^{b}
Group 3: $N = 102$	50	33	19	.924	−.048^{b}	−.054^{b}	.163^{*,c}	−.466^{***,a}	−.452^{***,a}
Group 4: $N = 44$	18	19	7	.966	−.316***	−.279^{**,a}	−.325^{***,a}	−.061^{b}	−.039^{b}
Group 5: $N = 38$	8	17	13	.945	−.673***	.208$^{*\ a}$	−.046$^{\ b}$	−.022^{b}	−.012^{b}
Total $N = 491$	245	143	103	.622**	−.245***	−.298^{***,a}	−.074^{***,b}	−.099^{***,b}	−.119^{***,a}

a, b, c – Within and between the first five rows, all superscripted "a," "b," or "c," respectively, significantly differ from one another, though all those with like superscripts are not significantly different. The same is true within the last row.
[a] $N = 34$ nurse's models did not fall into any group. For those 34 nurses, $\bar{R} = .81$.
* $p < .05$.
** $p < .01$.
*** $p < .001$, 2-tailed.

would take them away from nursing duties) undesirable. Group 5 focused on economic rewards, inflexible work schedules and the higher wage rates paid for working undesirable shifts ($\bar{\beta}_{sch,flex} = .208$). Group 5 had the second shortest job tenure ($\bar{X} = 425.7$ days) and was dominated by A.A. nursing degrees.

In the unfolding model tradition of labeling turnover decision paths, inspection of turnover decision models and group differences led to the descriptive labels "Economically Strapped New Parents," "Seasoned Parents," "Committed Nursing Professionals," "Long Term Economic Maximizers," and "Short Term Economic Maximizers" for Groups 1–5, respectively.

H5: Convergent and discriminant relationships with decision profiles

Conscientiousness was correlated .41 ($N = 491$, $p < .001$) with $\beta_{inst.\ comm.}$ and $\bar{r} = .16$ with all other β, supporting convergent and discriminant validity in Hypothesis 5. General cognitive ability and four sets of survey measures obtained at six, 12, 18, and 24 month employment anniversary dates were not significantly correlated with β_1–β_5. Biodata item responses exhibited convergent and discriminant validity with policy weights derived for their respective job characteristics – the more frequently nurse had negative past experiences with job characteristic k, the larger β_k estimates became in her decisions to quit. $\bar{r} = .59$ between biodata items and β estimated for the item's root job characteristic, while $\bar{r} = .27$ between biodata items and β for other job characteristics, supporting Hypothesis 5's remaining convergent and discriminant validity inferences. Note, conscientiousness, biodata, and g scores did not significantly differ across Groups.

H6: Job perception shock, quit rates, and job satisfaction

61% of nurses quit after experiencing $\Delta X \geqslant 1.5$ *SD* drops in one or more job perception, 36% quit after experiencing $0 < \Delta X < 1.5$ *SD* drops, and 2% quit after experiencing perceptual increases (significantly different proportions at $p < .01$). Proportional differences became more extreme when comparisons are limited to those experiencing changes in their most important job characteristic

Table 4
Characteristics of homogeneous voluntary turnover decision groups.

		Group 1		Group 2		Group 3		Group 4		Group 5		
Type of nursing degree	B.S.N.	67%		22%		72%		70%		40%		
	Diploma	2%		6%		0%		1%		1%		
	A.A.	31%		72%		28%		29%		58%		
	Range	$\overline{X}$	*sd*	$\overline{X}$	*sd*	$\overline{X}$	*sd*	$\overline{X}$	*sd*	$\overline{X}$	*sd*	
g	15–36	26.2	6.3	24.5	5.9	25.1	6.0	25.9	5.9	23.9	7.1	
Biodata scale score	42.19–55.68	50.2	11.6	49.6	13.7	53.5	11.9	54.1	12.2	54.9	14.4	
Conscientiousness	19–39	29.5	4.0	29.6	4.1	30.9	4.6	30.5	4.4	27.7	5.1	
Age	20–56	27.4	2.4	36.8	4.1	23.1	2.1	28.1	3.6	24.6	2.9	
Prior experience	9–253	30.1	4.2	184.4	45.7	15.2	3.3	81.0	10.5	24.3	6.5	
Time since degree	9–298	80.0	8.4	202.3	80.8	16.3	4.0	82.2	11.8	28.2	5.4	
Prior nursing jobs	1–12	1.1	.7	4.4	1.4	1.2	.5	3.0	1.0	1.3	.4	
Children	0–5	1.0	.6	2.8	1.5	0.2	.01	1.2	.09	0.3	.1	α
Pay fairness												
6 months	6–21	12.1	3.2	15.0	4.3	14.3	4.0	13.2	2.7	14.0	4.1	.82
12 months	6–21	12.5	2.9	14.3	3.9	14.2	3.1	12.7	3.3	13.1	3.8	.88
18 months	6–22	13.8	2.5	14.0	3.9	14.0	3.7	12.8	3.3	13.7	3.6	.90
24 months	6–23	13.7	2.3	13.9	3.0	13.8	3.5	13.0	3.4	13.9	4.0	.85
Promotion probability												
6 months	5–20	14.1	3.6	15.2	4.0	13.3	3.7	13.1	3.9	14.2	4.3	.81
12 months	6–21	13.9	3.5	14.8	3.3	14.1	3.0	12.3	3.3	12.1	3.8	.80
18 months	5–22	13.3	2.9	14.5	3.6	14.0	3.0	12.9	3.0	12.7	3.6	.92
24 months	5–24	13.2	2.8	14.1	3.5	14.1	3.1	13.0	3.1	12.8	3.5	.88
Autonomy/variety[2]												
6 months	5–21	14.1	3.0	15.2	4.1	14.1	4.0	14.0	2.4	13.1	4.2	.89
12 months	5–20	13.0	4.1	14.9	3.2	13.2	3.3	13.7	3.1	13.2	3.8	.79
18 months	5–21	11.9	4.3	14.9	3.9	12.0	3.5	13.8	3.1	13.7	3.9	.88
24 months	5–22	12.0	4.2	14.4	3.8	12.1	3.4	13.5	3.3	13.5	3.8	.87
Instrument. comm.												
6 months	5–19	12.4	4.0	15.0	4.2	12.3	4.0	14.2	2.9	14.3	4.1	.80
12 months	6–18	14.0	3.1	14.1	3.1	12.2	3.7	13.7	3.1	14.1	3.5	.82
18 months	5–19	14.3	2.6	14.0	3.2	12.0	3.4	13.8	3.0	13.7	3.9	.95
24 months	5–19	14.1	2.7	14.1	3.3	12.2	3.1	13.6	2.9	13.5	3.6	.86
Scheduling flexibility												
6 months	5–23	15.0	4.1	13.6	4.1	13.2	3.9	12.9	4.3	14.1	4.0	.82
12 months	6–24	14.3	3.6	13.2	3.6	12.7	3.3	13.1	3.3	13.8	3.1	.84
18 months	5–25	14.0	3.5	13.0	3.0	12.8	3.4	13.2	3.3	13.8	3.0	.90
24 months	5–26	13.6	3.3	13.1	3.1	13.1	3.6	13.2	3.2	13.6	3.1	.82
Job availability												
6 months	7–25	15.1	4.0	12.3	3.1	12.2	2.8	13.7	4.0	14.0	3.1	.85
12 months	7–25	14.1	3.7	12.2	2.6	12.8	3.2	13.1	3.2	13.7	3.2	.80
18 months	7–26	14.7	3.6	12.0	2.1	12.8	2.0	13.3	3.4	13.8	3.2	.80
24 months	7–27	14.5	3.4	11.8	2.0	12.9	2.1	13.2	3.3	13.5	3.3	.89
Overall job satisfaction												
6 months	6–25	14.0	3.3	13.3	3.1	13.2	2.9	14.1	3.1	14.1	4.0	.92
12 months	6–24	13.3	2.9	14.2	3.7	12.7	3.1	14.5	3.7	13.1	3.7	.88
18 months	5–25	13.0	3.7	13.0	3.1	12.8	3.0	13.7	3.7	13.3	3.7	.91
24 months	5–25	12.8	3.5	13.1	3.0	12.9	2.9	13.5	3.5	13.5	3.4	.89
Turnover intention (TI_{ques})												
6 months	5–25	16.0	6.0	15.8	6.1	16.2	5.9	15.8	5.5	16.5	6.0	.90
12 months	5–25	16.3	6.1	16.3	6.6	15.9	6.0	15.7	6.7	16.2	6.4	.91
18 months	5–25	16.1	6.1	16.0	5.9	15.6	6.5	16.5	6.0	16.1	6.0	.90
24 months	5–25	16.5	6.7	16.8	6.5	16.6	6.4	17.0	6.7	16.8	6.3	.95
Job tenure (days)[a]												
78–2211	724.1	122.8	661.1	130.5	512.6	170.8	270.2	80.6	425.7	189.8		

Note: At 6 months of job tenure Groups 1–5 exhibited N = 165, 120, 91, 30, and 31, respectively. At 12 months N = 150, 109, 78, 18, and 24, respectively. At 18 months N = 125, 81, 50, 7, and 9, respectively. At 24 months N = 100, 60, 33, 5, and 5, respectively.

[a] Average job tenure of those who turned over after 6 months of job tenure – post employment survey data was not available for N = 49 who turned over before 6 months of job tenure and they were excluded from subsequent analyses.

[b] Autonomy and variety scale scores were averaged to yield the Autonomy/Variety scores reported here.

(i.e., the one receiving the highest β estimate in their simulation decision model). No significant differences were found in job satisfaction scores, hence, Hypothesis 6's unfolding model "shock" predictions were only partially supported.

Cluster analyses using the centroid and Ward's distance measures of job characteristic score profiles revealed no large changes in root mean square standard deviation indices and no distinct peaks in pseudo F statistics for hierarchical solutions between 1 and 100 clusters. Thus, no groups were identified with common job characteristic perception profiles. This may have been caused by a small portion of the sample starting work on each of 104 "starting Mondays" over a 2 year period. True change in one of the job characteristics, e.g., a change in hospital scheduling policy, could have occurred in month 20 for some portion of the sample (showing up in $Z_{sched.\ flex.}$ at month 24) and at months 8 and 14 for those hired more recently (showing up in $Z_{sched.\ flex.}$ at month

12 and 18, respectively). Re-organization of job perception data by date and hospital floor did not yield any more interpretable cluster or Q-factor analysis results. Hence, data reduction procedures did not reveal homogeneous job characteristic perception profiles, inconsistent with unfolding model expectations.

Discussion

The current study's major contribution was in estimating models of voluntary turnover decision processes and testing hypotheses about these models in a large sample of hospital floor nurses hired over a 2 year period. Hypothesis 1 addressed whether a policy capturing simulation could model turnover decision processes. All internal validity estimates (e.g., multiple correlations for individual nurses' decision models, test–retest reliability, and manipulation checks) indicated decisions within the simulation were accurately modeled. Further evidence of internal validity occurred when model parameters converged/diverged in expected ways with construct-oriented biodata items and conscientiousness (Hypothesis 5). Individual nurses' simulation-based turnover decision model, when combined with subsequent survey measures of the five job characteristics to estimate $\widehat{TI}_{sim}$, accurately predicted who would quit and when.

Hypothesis 3 addressed whether $\widehat{TI}_{sim}$ incrementally contributed to turnover prediction beyond levels obtained from predictors found in attitudinal path models. $\widehat{TI}_{sim}$ was by far the dominant predictor, though biodata scores and perceived job availability also significantly contributed. $\widehat{TI}_{sim} \rightarrow$ tenure correlations were 190% larger than the best predictor (TI_{ques}) from attitudinal path models. $\widehat{TI}_{sim}$ enjoyed an average 127% advantage in forecasting who would turnover relative to TI_{ques}. These results are consistent with those reported in the cognitive psychology literature suggesting global survey measures of "intentions" often fail to converge with predictions made from carefully designed decision simulation models (Konecni & Ebbesen, 1992). Notably, variables central to attitudinal path models – job satisfaction and TI_{ques} – along with conscientiousness and general cognitive ability failed to significantly contribute to logistic regression predictions beyond levels reached by $\widehat{TI}_{sim}$.

Lee and Mitchell's (and others') frustrations with attitudinal path models were clearly justified, though current results suggest it was premature to throw out the "rational decision making" baby with the attitudinal survey research bath water. Direct estimation of turnover decision models hypothesized by March and Simon (1958) added significant and meaningful predictive power to the best attitudinal path model predictors.

Results also indicated biodata inventories predicted job tenure very well at $r = .42$. Most items were developed a priori to be multidimensional, i.e., "How often have family demands caused you to ask to reschedule work at a nursing-related job?" tapped both scheduling flexibility and family circumstance content domains. The multidimensional nature of biodata items was historically thought to contribute to their incremental criterion validity when combined with more monolithic construct domain measures (Nichels, 1994), and probably contributed to moderate correlations with both job characteristic perceptions and $\widehat{TI}_{sim}$ (r ranging from .31 to .53) in the current study. Construct based, empirically keyed, and cross validated biographical information inventories are likely to add considerable incremental power in predicting job tenure (Barrick & Zimmerman, 2005). The relative ease of item development and ease of use with applicants make biodata inventories the low cost, high ease of use solution to increasing new hire job tenure.

Evidence also suggested groups of nurses used similar processes in deciding to quit (H4). Post hoc analyses indicated actual turnover occurred in ways predicted by group membership, e.g., perceived decreases in heavily weighted job characteristics over time were strongly related to subsequent turnover. Post-hoc examination of group characteristic profiles suggested why groups differ in how they decide to quit. For example, Economically Strapped New Parents (Group 1) appeared to be early career B.S.N. graduates (late 20s) who had one prior nursing position, took some time out from their careers to have a child, then re-entered the profession with an emphasis on pay fairness and scheduling flexibility. Meaningful distinctions among groups may lead to HR interventions (e.g., recruiting) aimed at labor market segments with maximum expected job tenure.

Findings also supported one unfolding model prediction – nurses tended to voluntarily quit after large perceived decreases in desired job characteristics and tended not to quit after perceived increases. However, both March and Simon's (1958) and Lee and Mitchell's (1994) models suggest large changes in key decision variables are likely to lead to voluntary turnover. Future research modeling non-optimal information monitoring and decision making will determine whether the unfolding model adds meaningful incremental prediction and explanation.

Even stronger support for causal inferences underlying simulation models will occur if, for example, interventions aimed at increasing instrumental communication actually result in decreased voluntary turnover among nurses who weigh it heavily in their decisions to quit (i.e., Committed Nursing Professionals). Future research also needs to explore exactly how shock effects unfold. Specifically, do all shocks have the same lag in influencing employee decisions to quit? Do shocks affect decision processes, i.e., can large sudden ΔX cause employees to reconsider and possible change decision weights (a violation of assumptions required for unbiased β estimates)? What happens to those with exceedingly high $\widehat{TI}_{sim}$ who, due to personal circumstances, cannot quit (Bowen, 1982)? How do turnover decision models change over the course of a career?

At least three additional implications for practice are evident. First, policy capturing simulations may not be needed to model future applicant's turnover decision models, as post hoc analyses found average cross validities >.85 in predicting β_1, β_2, β_3, β_4, and β_5 from biodata item responses.[12] Post hoc generation of $\widehat{TI}_{sim_{\hat{\beta}}}$ from $\hat{\beta}$ estimates derived from biodata item responses yielded 90% of the predictive power of $\widehat{TI}_{sim}$ estimates derived directly from simulation-based β estimates. Periodic administration of both decision simulations and biodata inventories to small random applicant samples might permit accurate forecasts of future applicant's decision policies (β) without requiring every future applicant to complete a decision simulation.

Regardless of how decision models might be identified, administrators could then choose recruiting message content and media outlets to optimize target applicant impact. Job opening announcements targeting Seasoned Parents (i.e., associate degree graduates in their mid-30s with children at home) should focus on employer efforts to enhance scheduling flexibility. Toward this end, the host hospital re-allocated its recruiting budget to purchase advertisements in every west coast A.A. degree nursing program alumni magazine. Employers should monitor any performance differences (no performance measures were available in the current study) if they hope to select those expected to both perform well and have longer job tenure.

Second, if non-anonymous administration of the policy capturing simulation and subsequent surveys are possible, nursing supervisors could be notified when a current nurse's TI_{sim} exceeds some minimum threshold with suggestions on what actions might reduce turnover likelihood. A nurse with a high TI_{sim} for whom

[12] We thank John Delery for suggesting creation of biodata keys to predict β_1–β_5.

instrumental communication, scheduling flexibility, and promotion probability receive the most weight might be targeted with interventions including (1) increased reminders to other health care professionals (e.g., physicians) of the need for frequent, clear communication of key information (instrumental communication) with nurses, (2) nominating the nurse for internal or external management development courses, and/or (3) other efforts to find temporary or permanent changes needed to address the target nurse's scheduling concerns. Viability of these kinds of interventions will depend on both TI_{sim} accuracy when simulations and surveys are administered for "non-research" purposes and whether management is capable of actually changing conditions required to lower TI_{sim}.

Finally, average survey scores from current nurse incumbents could be plugged into applicants' simulated turnover decision models (or decision model estimated from biodata items) to predict job tenure before a job offer is made. If current nurse incumbents' job perceptions reflect what applicants' future perceptions will be, job offers could be made first to applicants expected to achieve some minimum job tenure.

The current effort suffers from at least five limitations. First, some nurses surely considered issues other than those manipulated in the simulation. Evidence showing perceived job opportunities slightly incrementally contributed to turnover prediction suggests the decision simulation was deficient. A 94 page simulation can be very intimidating, and the addition of just one more manipulation would have resulted in a 256 page instrument (including manipulation checks and scenario repeats to estimate test–retest reliability). While variables were selected for the simulation based on their high criterion validity, additional predictive power and different decision making groups may emerge if different job characteristics are manipulated.

Relatively immutable personal characteristics like number of children, marital status, race, and gender do not lend themselves to manipulations in real life ($N_{children}$ was correlated .28, $p < .01$, with job tenure – nurse administrators attributed this to child rearing demands limiting available job search time). Careful pilot research is needed to unearth relevant personal characteristic covariates (number of children and other demographic variables were examined here as possible covariates in prediction equations reported in Table 2 – none contributed significantly to prediction). $\widehat{TI}_{sim}$ criterion validity will be attenuated if it is not based on key turnover decision inputs. Future work also needs to address when new graduates can provide reliable turnover decision simulation responses – the current results do not generalize to that population.

Second, all measures used (including $\widehat{TI}_{sim}$ and TI_{ques}) were obtained from nurse responses to non-anonymous surveys for research purposes, though they were assured individual responses would only be available to the primary investigators. Nonetheless, fear of management retaliation may have caused them to say they did not intend to quit even though they did, resulting in lower $r_{logistic}$ and $\Delta R_{logistic}$ for TI_{ques}. Fear of management retaliation may have also inflated responses to items tapping pay fairness, scheduling flexibility, promotion probability, variety/autonomy, and instrumental communication perceptions. These demand effects are always possible in research using non-anonymous responses about employment relationships. Systematic error of this kind may have influenced all prior research examining TI_{ques}, contributing to the relative low meta-analytic $\bar{r} = .35$ and its wide 95% credibility interval (.00–.71, Griffeth et al., 2000). Regardless, if systematic error affected both job characteristic perception and TI_{ques} scales, estimates of $\widehat{TI}_{sim}$ incremental criterion validity should have been minimally affected.

Third, the current results are specific to voluntary turnover exhibited by experienced R.N.'s in tertiary care hospital facilities using primary care delivery systems. While high levels of predictive accuracy may occur when similar studies are conducted on other high voluntary turnover occupations, these decision models will substantively differ – call center employees are not likely to consider "instrumental communication of other health care professionals" in deciding to quit. Employee groups who decide to quit in the same way will likely exist in different forms for other occupations and work environments.

Fourth, it remains to be seen whether turnover decision simulation responses are affected by applicant motivation to "fake good" prior to receipt of job offers in non-research settings. Recent concerns suggest applicant motivation to fake good may severely attenuate effects on conscientiousness criterion validities (Morgeson et al., 2007). This should not pose a concern with the biodata scale, as Kluger et al. (1991) showed response option-based biodata keys were unaffected by "fake good" response bias.

Fifth, only coarse changes in job perception trajectories over time were examined, as measures were only available on four occasions spaced over 6 month intervals. A better operationalization would capture departures due to unexpected spouse transfers, planned/unplanned pregnancies, and other non-job related events. While turnover results were consistent with unfolding model expectations, expected differences in job satisfaction did not occur. Future research with broader and more frequent input measures will permit use of sophisticated latent growth curve or HLM estimation procedures and be more likely to reveal any latent groups with homogeneous perception profiles.

In sum, the current study directly estimated models of voluntary turnover decision making described by March and Simon (1958). Results indicated $\widehat{TI}_{sim}$ was the dominant predictor of actual voluntary turnover outcomes. Modeling voluntary turnover decisions in pre-employment simulations provided a powerful alternative to traditional attitudinal path models. Pre-employment biodata scores combined with $\widehat{TI}_{sim}$ and post-employment measures of job availability achieved extremely high levels of predictive power (e.g., $R_{logistic} = .68$). Future research should replicate the current study with other jobs, employers, and labor markets as well as explore whether HR interventions influence employees' voluntary turnover decisions in predicted ways. Examination of what predicts group membership might also shed light on how group differences evolve in voluntary turnover decision making (i.e., current Economically Strapped New Parents, with any luck, should someday be Seasoned Parents).

References

Ashton, R., & Brown, P. (1980). Descriptive modeling of auditors' internal control judgments: Replication and extension. *Journal of Accounting Research, 18*, 1–15.
Atwood, J. R. & Hinshaw, A. S. (unpublished). *Nursing job satisfaction instrument*. Department of Nursing, University Hospital, University of Arizona.
Barrett, P. & Rollan, J. P. (2009). *The meta-analytic correlation between the big five personality constructs of emotional stability and conscientiousness: Something is not quite right in the woodshed*. Hogan assessment systems: Tulsa, OK.
Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*, 1–26.
Barrick, M. R., & Zimmerman, R. D. (2005). Reducing voluntary, avoidable turnover through selection. *Journal of Applied Psychology, 90*, 159–166.
Beach, L. R. (1990). *Image theory: Decision making in personal and organizational contexts*. Chichester, England: Wiley.
Bobko, P., & Schemmer, F. M. (1984). Eigenvalue shrinkage in principal components based factor analysis. *Applied Psychological Measurement, 8*, 439–451.
Bowen, D. E. (1982). Some unintended consequences of intention to quit. *The Academy of Management Review, 7*, 205.
Brayfield, A. H., & Rothe, H. F. (1951). An index of satisfaction. *Journal of Applied Psychology, 35*, 307–315.
Cochran, W. G., & Cox, G. M. (1957). *Experimental designs*. New York: Wiley.
Colihan, J., & Burger, G. K. (1995). Constructing job families: An analysis of quantitative techniques used for grouping jobs. *Personnel Psychology, 48*, 563–587.
Cox, D. R., & Snell, E. J. (1968). A general definition of residuals. *Journal of the Royal Statistical Society, 30*, 248–275.
Dawes, R. M., & Corrigan, B. (1974). Linear models in decision making. *Psychological Bulletin, 81*, 95–106.

Dudley, N., Orvis, K., Lebiecki, J. E., & Cortina, J. M. (2006). A meta-analytic investigation of conscientiousness in the prediction of job performance: Examining the intercorrelations and the incremental validity of narrow traits. *Journal of Applied Psychology, 91*, 40–57.

Efron, B., & Tibshirani, R. J. (1993). *An introduction to the bootstrap*. Boca Raton, FL: Chapman & Hall.

Efron, B., & Tibshirani, R. (1997). Improvements on cross-validation: The 632 plus bootstrap method. *Journal of the American Statistical Association, 92*, 548–560.

Feldman, J. (1981). Beyond attribution theory: Cognitive processes in performance appraisal. *Journal of Applied Psychology, 66*, 127–148.

Felps, W., Mitchell, T. R., Heckman, D. R., Lee, T. W., Holtmon, B. C., & Harman, W. S. (2009). Turnover contagion: How coworker's' job embeddedness and job search behaviors influence quitting. *Academy of Management Journal, 52*, 545–561.

Frei, R. L., & McDaniel, M. A. (1998). Validity of customer service measures in personnel selection: A review of criterion and construct evidence. *Human Performance, 11*, 1–27.

Goff, S. J., Mount, M. K., & Jamison, R. L. (1990). Employer supported child care, work/family conflict, and absenteeism: A field study. *Personnel Psychology, 43*, 793–809.

Grams, R., & Schwab, D. P. (1985). An investigation of systematic gender-related error in job evaluation. *Academy of Management Journal, 28*, 279–290.

Griffeth, R. W., Hom, P. M., & Gaertner, S. (2000). A meta-analysis of antecedents and correlated of employee turnover: Update, moderator tests, and research implications for the next millennium. *Journal of Management, 26*, 463–488.

Grover, S. L., & Crooker, K. J. (1995). Who appreciates family-responsive human resource policies: The impact of family-friendly policies on the organizational attachment of parents and non-parents. *Personnel Psychology, 48*, 271–288.

Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis*. Saddle River, NJ: Prentice Hall.

Hammer, L. B., Neal, M. B., Newsom, J. T., Brockwood, K. J., & Colton, C. L. (2005). A longitudinal study of the effects of dual-earner couples' utilization of family-friendly workplace supports on work and family outcomes. *Journal of Applied Psychology, 90*, 799–810.

Hogan, R. (1992). Hogan personality inventory. *Psychological Test Bulletin, 5*, 130–136.

Hom, P. M., & Griffeth, R. W. (1991). A structural equations modeling test of turnover theory: Cross-sectional and longitudinal analysis. *Journal of Applied Psychology, 76*, 350–366.

Hom, P. M., & Kinicki, A. J. (2001). Toward a greater understanding of how job satisfaction drives employee turnover. *Academy of Management Journal, 44*, 975–987.

Hunter, J. E. (1984). *The Wonderlic Personnel Test as a predictor of training success and job performance*. Chicago: Wonderlic Corporation.

Kammeyer-Mueller, J. D., Wanberg, C. R., Glomb, T. M., & Ahlburg, D. (2005). The role of temporal shifts in turnover processes: It's about time. *Journal of Applied Psychology, 90*, 644–658.

Kluger, A. N., Reilly, R. R., & Russell, C. J. (1991). Faking biodata tests: Are option-keyed instruments more resistant? *Journal of Applied Psychology, 76*, 889–896.

Konecni, V. J., & Ebbesen, E. B. (1992). Methodological issues in research on legal decision-making, with special reference to experimental simulations. In F. Losel, D. Bender, & T. Bliesnener (Eds.), *Psychology and law: International perspectives*. Oxford England: Walter De Gruyter.

Kossek, E. E. (1990). Diversity in child care assistance needs: Employee problems, preferences, and work-related outcomes. *Personnel Psychology, 43*, 769–791.

Lee, T. H., Gerhart, B., Weller, I., & Trevor, C. O. (2008). Understanding voluntary turnover: Path-specific job satisfaction effects and the importance of unsolicited job offers. *Academy of Management Journal, 51*, 651–671.

Lee, T. W., & Mitchell, T. R. (1994). An alternative approach: The unfolding model of voluntary employee turnover. *Academy of Management Review, 19*, 51–89.

Lee, T. W., Mitchell, T. R., Holtom, B. C., McDaniel, L. S., & Hill, J. W. (1999). The unfolding model of voluntary employee turnover. *Academy of Management Journal, 39*, 5–36.

Lee, T. W., Mitchell, T. R., Sablynski, C. J., Burton, J. P., & Holtom, B. C. (2004). The effects of job embeddedness on organizational citizenship, job performance, volitional absences, and voluntary turnover. *Academy of Management Journal, 47*, 711–722.

Lee, T. W., Mitchell, T. R., Wise, L., & Fireman, S. (1996). An unfolding model of voluntary employee turnover. *Academy of Management Journal, 39*, 5–36.

Libby, R. (1976). Man versus model of man: Some conflicting evidence. *Organizational Behavior & Human Performance, 16*, 1–12.

Lum, L., Kervin, J., Clark, K., Reid, F., & Sirola, W. (1998). Explaining nursing turnover intent: Job satisfaction, pay satisfaction, or organizational commitment? *Journal of Organizational Behavior, 19*, 305–320.

Mabon, H. (1998). Utility aspects of personality and performance. *Human Performance, 11*, 289–304.

Maertz, C. P., & Campion, M. A. Jr., (2004). Profiles in quitting: Integrating process and content turnover theory. *Academy of Management Journal, 47*, 566–582.

Mano-Negrin, R., & Kirschenbaum, A. (2000). Spousal interdependence in turnover decisions: The case of Israel's medical sector employees. *Journal of Family and Economic Issues, 21*, 97–122.

March, J. G., & Simon, H. A. (1958). *Organizations*. New York: Wiley.

Marram, G. D., Schlegel, M. W., & Bevis, E. O. (1975). *Primary nursing: A model for individualized care*. St. Louis: C.V. Mosby Co.

Milligan, G. W., & Cooper, M. C. (1985). An examination of procedures for determining number of clusters in a data set. *Psychometrika, 50*, 159–179.

Mitchell, T. R. (1974). Expectancy models of job satisfaction, occupational preference and effort: A theoretical, methodological, and empirical appraisal. *Psychological Bulletin, 81*, 1053–1077.

Mitchell, T. R., Holtom, B. C., Lee, T. W., Sablynski, C. J., & Erez, M. (2001). Why people stay: Using job embeddedness to predict voluntary turnover. *Academy of Management Journal, 44*, 1102–1121.

Mobley, W. H., Griffeth, R. W., Hand, H. H., & Meglino, B. M. (1979). Review and conceptual analysis of the employee turnover process. *Psychological Bulletin, 86*, 493–522.

Morgeson, F. P., Campion, M. A., Dipboye, R. L., Hollenbeck, J. R., Murphy, K., & Schmitt, N. (2007). Are we getting fooled again? Coming to terms with limitations in the use of personality tests for personnel selection. *Personnel Psychology, 60*, 1029–1049.

Mowen, J. C., & Gaeth, G. J. (1992). *The evaluation stage in marketing decision making*. Spring.

Nickels, B. J. (1994). The nature of biodata. In Stokes, Mumford, & Owens (Eds.), *Biodata handbook: Theory, research and use of biographical information in selection and performance prediction*. Palo Alto, CA: Consulting Psychologists Press, Inc.

Nunnally, J. C., & Bernstein, I. (1994). *Psychometric theory*. New York: McGraw-Hill.

Peterson, C. R., & Beach, L. R. (1967). Man as an intuitive statistician. *Psychological Bulletin, 68*, 29–46.

Prestholdt, P. H., Lane, I. M., & Mathews, R. C. (1987). Nurse turnover as reasoned action: Development of a process model. *Journal of Applied Psychology, 72*, 221–227.

Price, J. L., & Mueller, C. W. (1981a). *Professional turnover: The case of nurses*. New York: SP Medical & Scientific Books.

Price, J. L., & Mueller, C. W. (1981b). A causal model of turnover for nurses. *Academy of Management Journal, 24*, 543–565.

Russell, C. J. (1985). Individual decision processes in an assessment center. *Journal of Applied Psychology, 70*, 737–746.

Russell, C. J. (1994). Biodata item generation procedures: A point of departure. In G. Stokes, M. Mumford, & W. C. Owens (Eds.), *Biodata handbook: Theory, research and use of biographical information for selection and performance prediction* (pp. 18–38). Orlando, FL: Consulting Psychologist Press.

Russell, C. J. (2010). The unfolding model of turnover, research design, and analysis choices: A Monte Carlo study. *Presented at the annual meeting of the Academy of Management*, August, Montreal, Canada.

Russell, C. J., & Bobko, P. (1992). Moderated hierarchical regression and Likert scales: Too coarse for comfort. *Journal of Applied Psychology, 77*, 336–342.

Steel, R. P. (2002). Turnover theory at the empirical interface: Problems of fit and function. *Academy of Management Review, 27*(3), 346–360.

Slovic, P., & Lichtenstein, S. (1971). Comparison of Bayesian and regression approaches to the study of information processing in judgment. *Organizational Behavior and Human Performance, 6*, 649–744.

Waite, L. J. (1980). Working wives and the family life cycle. *The American Journal of Sociology, 86*, 272–294.