



Workplace demands/resources, basic psychological needs, and police well-being: an extended integration of self-determination theory and job demands–resources models

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Abstract

We examined basic psychological need satisfaction and frustration in command-and-control organizations, often criticized for undermining autonomy. Using data from 3,891 NSW Police Force personnel, we integrated Self-Determination Theory (SDT) and the Job Demands–Resources (JD-R) model to investigate occupational stress and well-being. Psychometric analyses confirmed the six-factor structure of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS), based on a 3 × 2 framework that crosses three needs (autonomy, competence, relatedness) with two valences (satisfaction and frustration). We employed ANOVA-like orthogonal contrasts to disentangle content and valence effects, reducing multicollinearity and clarifying SDT’s dual-process model. Job-related resources (especially organizational support) were positively associated with need satisfaction and with outcomes such as job commitment, well-being, and life satisfaction. Conversely, job-related demands (especially workplace conflict) and personal demands (avoidant coping) predicted need frustration, PTSD symptoms, and poorer mental health. Psychological needs mediated substantial proportions of these associations, with mediation strongest for job-related predictors of job-related outcomes and weaker but still meaningful for personal outcomes. Need satisfaction most strongly predicted beneficial functioning, while need frustration most strongly predicted impaired functioning, a pattern consistent with SDT’s dual-process formulation. These findings demonstrate that autonomy satisfaction is achievable even in highly structured, hierarchical environments, and that autonomy-supportive leadership contributes to resilience, well-being, and retention. The integration of SDT and JD-R, along with methodological refinements to the BPNSFS, provides a comprehensive, practically relevant model of occupational functioning in policing and offers guidance for enhancing psychological health in other high-stress command-and-control organizations.

Keywords Self-Determination Theory · Job Demands–Resources (JD-R) model · Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) · ANOVA-like orthogonal contrasts · Moderation and mediation · Set exploratory structural equation modelling (SET-ESEM)

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“It probably won’t be a bullet that strikes an officer down, but the effects of chronic stress.” — Sgt. R. Klein (1989)

Policing is widely recognized as one of the most stressful occupations, exposing officers to cumulative operational strain as well as intense critical incidents. This ongoing stress increases risk for adverse psychological outcomes, including burnout, poor mental health, and post-traumatic stress symptoms, which appear at rates substantially higher than in the general population (Green, 2004). In addition to inherent job strain, command-and-control organisational structures constrain autonomy and interpersonal connectedness, further undermining resilience and well-being (Hart & Cotton, 2003; Police Association of New South Wales, 2011). Understanding pathways linking workplace dynamics to psychological health in such hierarchical environments remains a central research priority.

Recent studies (Abner et al., 2024; Loverre et al., 2024; Rauschmayr et al., 2023a, 2023b) provide critical insights into police well-being by examining the unique stressors and psychosocial factors affecting officers. These studies emphasize the need for a comprehensive understanding of how workplace characteristics interact with personal and organizational factors influencing outcomes such as job commitment, mental health, and life satisfaction. Despite these contributions, significant gaps remain, particularly in understanding the interplay of demands, resources, and psychological needs within command-and-control organizations.

Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2017) and Job Demands–Resources (JD-R) theory (Bakker & Demerouti, 2007, 2017) have increasingly converged in the study of employee well-being. Van den Broeck et al., (2008, 2016) provided a key empirical bridge between SDT and JD-R by demonstrating that job demands and resources exert much of their influence through basic psychological need satisfaction, such that autonomy, competence, and relatedness needs mediate the links between work conditions and outcomes. Recent JD-R formulations further differentiate challenge versus hindrance demands and emphasise cross-domain demands/resources and proactive job crafting (Bakker et al., 2023; Demerouti & Bakker, 2023).

Building on this work, the recent “architecture of basic needs” analysis (Marsh et al., 2025) elaborated a dual-process model in which need satisfaction and need frustration function as related but distinct constructs with different nomological networks. This dual-process framework aligns naturally with JD-R’s positive (resource-gain, engagement) and negative (strain, burnout) pathways. Here, we integrate this dual-process needs perspective with a broad set

of organizational and personal demands and resources in a policing context.

In policing and military settings, a growing SDT literature demonstrates that need-supportive supervision, need satisfaction, and autonomous motivation predict engagement, well-being, and retention, whereas need frustration and controlled motivation predict burnout, ill-being, and turnover intentions (Abner et al., 2024; Loverre et al., 2024). Loverre et al. (2024) systematically reviewed SDT applications across 29 police and military studies, concluding that basic psychological needs provide a coherent framework for understanding officers’ well-being, motivation, and organizational outcomes. Complementing this, a recent meta-analysis of motivation in law-enforcement agencies (Abner et al., 2024) showed that autonomy-supportive leadership, need satisfaction, and autonomous motivation are consistently associated with higher engagement and well-being and lower burnout and turnover intentions. Our study extends this emerging evidence by jointly modelling workplace and personal demands/resources, dual-process need satisfaction versus frustration, and a broad set of positive and negative outcomes in a large police sample.

The present study builds on these developments by integrating the JD-R model (Bakker & Demerouti, 2007) and SDT (Deci & Ryan, 2000; Deci et al., 2017; Gagné et al., 2017; Ryan & Deci, 2017). While JD-R emphasizes how characteristics of the work environment can undermine or facilitate health, SDT offers a psychological mechanism through which these characteristics exert their influence, specifically by satisfying or frustrating autonomy, competence, and relatedness. Although prior research has suggested compatibility between JD-R and SDT, their integration in hierarchical organizations remains underdeveloped.

Van den Broeck et al., (2008, 2016) provided a key empirical bridge between SDT and JD-R by showing that job demands and resources relate to engagement and burnout primarily through their effects on basic psychological need satisfaction. Their work suggested that autonomy, competence, and relatedness are core psychological processes through which work conditions influence well-being. Subsequent JD-R formulations have further distinguished challenge from hindrance demands: challenge demands (e.g., complex but meaningful tasks) can promote learning and growth when resources are available, whereas hindrance demands (e.g., role conflict, bureaucracy) primarily impede goal attainment and undermine motivation (Bakker et al., 2023; Tadić et al., 2015). In the current police context, work conflict and avoidant coping align more closely with hindrance demands that consume resources and thwart needs. In contrast, some personal resources (e.g., mindfulness, problem-focused coping) may help transform pressures into manageable challenges.

A refinement increasingly recognised in contemporary JD-R theory is the distinction between challenge demands, which may promote motivation and skill development, and hindrance demands, which impede progress and contribute to strain (Tadić et al., 2015). This distinction parallels SDT's dual-process account of need-supportive versus need-thwarting experiences. In the present work, workplace conflict functions primarily as a hindrance-type demand, whereas organizational support and coping-skill resources align with challenge-type motivational pathways. Future research may extend the present model by explicitly differentiating challenge and hindrance demands to examine whether need satisfaction mediates challenge-driven growth, whereas need frustration more strongly mediates hindrance-driven impairment.

Bakker and de Vries (2021) extended JD-R by emphasising the role of self-regulation. Job and personal resources support self-regulatory capacity—sustaining effort, managing affect, and engaging in adaptive coping—whereas resource depletion undermines these capacities and fosters maladaptive responses. From an SDT perspective, such resources are essential for officers to maintain autonomy (acting with volition rather than compulsion) and competence (feeling effective) when confronting high demands. In our model, mindfulness, problem-focused coping, and social-support seeking are conceptualised not only as personal resources but also as self-regulatory capacities that facilitate need-supportive responses to policing demands. In contrast, avoidant coping is a maladaptive regulation pattern associated with need frustration.

Given these theoretical foundations, we examine the Australian NSW Police Force to determine whether need satisfaction and need frustration mediate the effects of workplace and personal demands/resources on outcomes such as organizational commitment, intention to leave, well-being, life satisfaction, PTSD symptoms, and mental health. We extend prior work by simultaneously modelling dual-process psychological needs, diverse resources, hindrance demands, and multiple outcome types, providing the most comprehensive SDT–JD-R integration to date in a large police sample.

Job Demands–Resources model (JD-R)

The Job Demands–Resources (JD-R) model provides a comprehensive framework for understanding workplace dynamics by distinguishing between job demands and job resources (Bakker & Demerouti, 2007; Bakker et al., 2005; Demerouti et al., 2001). Job demands—such as high workload, emotional exhaustion, and repeated exposure to traumatic incidents—consume psychological energy and

contribute to burnout and mental health strain. In contrast, job resources—including autonomy, supervisory support, and peer cohesion—enhance motivation, resilience, and engagement, thereby counteracting the adverse effects of demands (Bakker et al., 2005; Barbier et al., 2013; Schaufeli & Taris, 2014).

Beyond the provision of resources, employees may also proactively shape and optimize their work environment. JD-R research has introduced the concept of job crafting—self-initiated modification of task demands, social resources, and role boundaries to align work with personal needs and capabilities (Wrzesniewski & Dutton, 2001). From an SDT perspective, job crafting represents an autonomy-enabling process through which need-supportive contexts allow officers to regulate workload demands, activate coping resources, and preserve psychological energy. Although job crafting is not directly measured here, acknowledging it clarifies how resourced contexts may sustain self-regulation, coping, and psychological energy—mechanisms closely aligned with our integration of JD-R and SDT.

Personal demands and resources

Extending JD-R, we distinguish job-related and personal demands/resources. Personal demands represent individual tendencies or circumstances that increase strain, whereas personal resources are individual strengths that support adaptive functioning (Ângelo & Chambel, 2014; Schreurs et al., 2010, 2011). In the present study, avoidance coping was treated as a personal demand, whereas problem-solving coping, support-seeking coping, and mindfulness were treated as personal resources. These were examined as predictors of the six job-related and personal outcomes.

Mechanisms and interaction effects

The JD-R model proposes that demands and resources shape outcomes through two primary mechanisms:

1. Buffering effects, wherein resources weaken the adverse association between high demands and negative outcomes such as PTSD symptoms.
2. Boosting effects, wherein resources amplify positive outcomes under demanding conditions. Although conceptually appealing, empirical support for boosting effects remains mixed (Hu et al., 2013).

While these pathways are central to JD-R, the model originally did not specify how demands and resources produced these effects. Recent work integrating JD-R with SDT indicates that basic psychological needs—autonomy,

competence, and relatedness—form the psychological mechanisms that mediate these relationships (Morin et al., 2023; Van den Broeck et al., 2008).

Relevance to policing

In hierarchical police organizations, officers face unique and often extreme job demands, including rapid decision-making, exposure to trauma, and high-intensity workload. Simultaneously, rigid command structures may limit autonomy and relatedness—needs central to motivation and well-being (Deci et al., 2017; Gillet et al., 2012). Thus, the JD-R model offers a useful framework for analyzing how resources may protect against these constraints.

Consistent with prior research, organizational support functions as a structural job resource that satisfies psychological needs and reduces burnout (Wolter et al., 2019b). Personal resources, such as mindfulness, buffer against role ambiguity and help maintain psychological functioning. Autonomy-supportive leadership, in turn, reduces need frustration and fosters engagement, even within hierarchical settings (Wolter et al., 2019a).

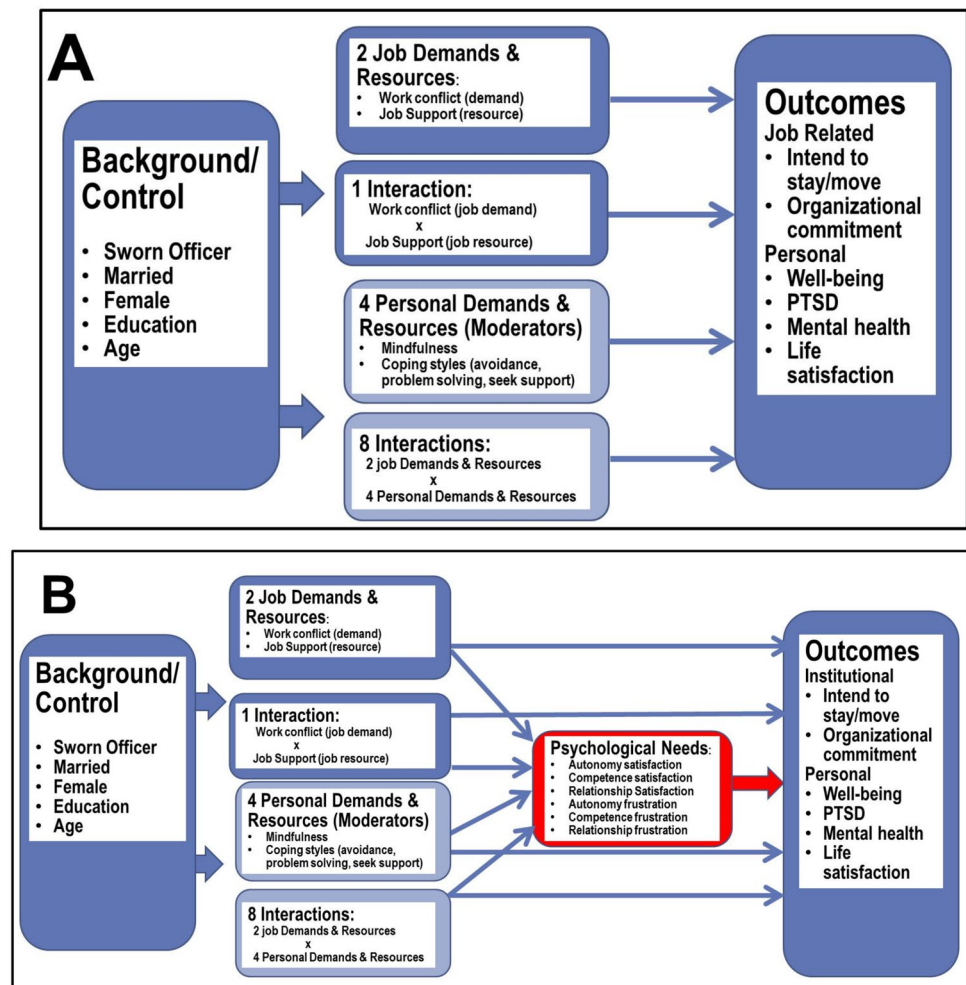
This study leverages JD-R to illuminate how job demands, job resources, and personal resources jointly relate to NSWPF personnel's psychological functioning. The present approach highlights organizational conditions associated with resilience and well-being.

Self-Determination theory and basic needs in the workplace

Classification of psychological needs in SDT

Self-Determination Theory (SDT) identifies three fundamental psychological needs—autonomy, competence, and relatedness—essential for intrinsic motivation, engagement, and overall well-being (Deci & Ryan, 2000; Gagné, 2014). These needs contribute to positive outcomes when satisfied and drive maladaptive behaviors when frustrated (Van den Broeck et al., 2016). Figure 1B presents a conceptual overview of the relationships among psychological needs, workplace demands/resources, and outcomes (see Supplemental Materials Sect. 3 for more detail).

Fig. 1 Conceptual models. Job Demands–Resources (JD-R) model incorporating interactions between job-related and personal demands and resources; integrated JD-R and Self-Determination Theory (SDT) model in which basic psychological need satisfaction and frustration mediate, in part or in whole, the effects of job-related and personal demands and resources on the outcomes



- Autonomy refers to the experience of volition and ownership over one's actions. Autonomy satisfaction supports motivation, while frustration undermines it, leading to disengagement and stress. In hierarchical organizations like police departments, fostering autonomy can be challenging due to rigid protocols and command structures (Rauschmayr et al., 2023a, 2023b). However, autonomy-supportive leadership—such as offering meaningful task rationales and opportunities for choice—can mitigate these challenges and promote well-being (Chan et al., 2017; Otis & Pelletier, 2005). Further details on autonomy in hierarchical contexts are discussed in Supplemental Materials Sect. 3.
- Competence involves feeling effective in overcoming challenges and achieving desired outcomes. Competence satisfaction enhances motivation and resilience, but without concurrent autonomy and relatedness, it may not fully alleviate stress (Sheldon & Krieger, 2014). Policing presents unique challenges to competence satisfaction due to its unpredictable and high-stakes nature. For specific examples of competence satisfaction in policing, see Supplemental Materials Sect. 3.
- Relatedness reflects the human need for meaningful connections and belonging. Relatedness satisfaction involves strong interpersonal bonds with peers and supervisors, critical in high-stress occupations like policing. Relatedness satisfaction buffers the adverse effects of workplace stressors, such as role conflict and excessive workload, while frustration exacerbates feelings of isolation and disengagement. In policing, team cohesion and peer support emerge as vital protective factors against occupational stress. Additional discussion on relatedness as a buffer in policing is provided in Supplemental Materials Sect. 3.

Need-satisfaction vs. need-frustration: a dual process model

Need-satisfaction and need-frustration represent two partially independent processes within SDT, each associated with distinct psychological outcomes (Van den Broeck et al., 2008, 2016; Vansteenkiste & Ryan, 2013). Need satisfaction supports adaptive functioning, engagement, and well-being, whereas need frustration predicts ill-being, dysregulation, and maladaptive responses to strain. Recent research clarifies this distinction by demonstrating that need satisfaction and frustration are not conceptual opposites but rather operate through different nomological pathways that jointly contribute to psychological functioning (Marsh et al., 2025). In this dual-process model, satisfaction reflects experiences of volition, efficacy, and belonging that facilitate resource gain, while frustration reflects pressures, constraints, and

interpersonal threats that promote strain and depletion. The effects of workplace conditions may thus accumulate in two directions: resources enhance satisfaction and buffer against the erosion of psychological strengths, whereas demands amplify frustration and undermine adaptive regulation. Supplemental Materials Sect. 3 elaborates this dual-process logic and shows how it aligns with the JD-R distinction between positive (resource-gain) and negative (strain) pathways.

Consistent with this framework, supportive work environments tend to foster need satisfaction while attenuating frustration (Gillet et al., 2012; Trépanier et al., 2015). In contrast, excessive demands—including chronic workload imbalance, unresolved role conflict, and limited discretion—intensify need frustration and contribute to disengagement, burnout, and impaired well-being. These processes are particularly salient in hierarchical policing environments, where mismatches between demands and resources create strong conditions for need frustration but also opportunities for leadership, cohesion, and personal resources to support need satisfaction.

SDT and JD-R in workplace organizations

Workplace dynamics, particularly in hierarchical organizations like police forces, pose unique challenges to balancing the satisfaction of autonomy, competence, and relatedness. Autonomy-supportive environments have been associated with enhanced employee satisfaction and productivity (Baard et al., 2004; Deci et al., 1989). In policing, where autonomy is often constrained by rigid command structures, fostering competence and relatedness becomes especially important for mitigating stress and promoting resilience.

For example, organizational resources such as supportive leadership and team cohesion foster need satisfaction, enhancing well-being and reducing turnover. Conversely, workplace conflict can undermine these needs, increasing need frustration and contributing to PTSD symptoms and poorer mental health. This dynamic is further illustrated in Fig. 1B and detailed in Supplemental Materials Sect. 3.

Recent integrative developments within the JD-R and SDT literatures increasingly conceptualize workplace and personal resources as antecedents of psychological need satisfaction, while emphasizing proactive self-regulation and need-based job crafting as mechanisms through which employees shape more adaptive work experiences (Bakker et al., 2023; Demerouti & Bakker, 2023). Across occupational settings, autonomy-supportive leadership, procedural fairness, and peer support have been linked consistently to higher autonomy, competence, and relatedness satisfaction, whereas hindrance demands and chronic conflict are associated with need frustration, burnout, and disengagement

(Loverre et al., 2024; Rauschmayr et al., 2023a, 2023b). However, relatively little research has simultaneously examined need satisfaction and need frustration within highly structured command-and-control organizations such as policing. The present study extends this emerging literature by integrating workplace and personal demands/resources, distinguishing dual-process need pathways, and applying orthogonal contrast methods to clarify SDT's 3 × 2 need architecture.

Implications for the present study

The dual-process structure of need satisfaction versus need frustration, combined with distinctions between job-related and personal demands/resources, provides a strong conceptual foundation for understanding officers' functioning in hierarchical settings. The present study investigates whether need satisfaction and need frustration mediate the effects of demands and resources on outcomes, including organizational commitment, intention to leave, well-being, life satisfaction, PTSD symptoms, and mental health. This approach allows us to examine two theoretically distinct pathways: (a) how resources support need satisfaction, promoting commitment, well-being, and resilience, and (b) how demands intensify need frustration, contributing to strain and impaired functioning. By evaluating both pathways simultaneously, we aim to clarify the motivational, regulatory, and interpersonal mechanisms through which workplace conditions shape psychological outcomes among NSWPF personnel. Complete measurement and modelling details are provided in Supplemental Materials Sect. 2 and Tables S1A–S1B.

Relevance to policing

In hierarchical, command-and-control settings, officers are exposed to substantial operational demands while simultaneously experiencing constraints on autonomy, social connection, and self-regulation. Integrating JD-R and SDT provides a theoretically grounded basis for understanding these challenges by linking demands and resources to outcomes through need satisfaction and need frustration (Van den Bakker & Demerouti, 2007; Broeck et al., 2008, 2016). For example, organizational support and autonomy-supportive leadership can facilitate need satisfaction, reducing burnout and enhancing motivation (Gillet et al., 2019; Wolter et al., 2019a), whereas unresolved workload pressures, role conflict, and emotionally charged encounters undermine needs and increase risk for burnout and PTSD symptoms (Fernet et al., 2013; Otis & Pelletier, 2005). Personal regulatory capacities, such as mindfulness and

proactive coping, may also mitigate demand-related strain (Ângelo & Chambel, 2014; Chan et al., 2017).

By combining JD-R and SDT within a dual-process perspective, the current study evaluates how job and personal resources support need satisfaction, while escalating demands intensify need frustration. This approach yields actionable implications for leadership and organizational practice by identifying conditions under which NSWPF personnel's well-being, organizational commitment, and resilience can be promoted within real-world policing contexts.

Present investigation

This study integrates the Job Demands–Resources (JD-R) model and Self-Determination Theory (SDT) to explore how workplace and personal demands/resources influence psychological needs and downstream outcomes. Using a sample of 3,891 NSW Police Force personnel, we examine key psychosocial mechanisms within a hierarchical (command-and-control) workplace.

Figure 1A and B provide a conceptual overview of the integrated JD-R and SDT frameworks. In line with recent dual-process formulations of basic psychological needs, these models distinguish need satisfaction from need frustration and specify how job-related and personal demands/resources are expected to influence positive resource-gain pathways, including commitment and well-being, versus negative strain and ill-being pathways. These conceptual models guide the hypotheses outlined below.

Innovative contributions

The present study makes several contributions to the literature:

- *Application to Policing.* This study focuses on the unique challenges of policing—an organizational setting characterized by rigid hierarchies, high operational demands, and significant exposure to critical incidents. By examining how workplace demands and resources relate to need satisfaction and need frustration, this work extends SDT to command-and-control contexts where autonomy is often constrained. These insights provide practically relevant guidance for leadership strategies that balance operational structure with more autonomy-supportive and need-supportive practices to improve officer well-being, resilience, and performance.
- *Broader Relevance to High-Stress Workplaces.* The study's findings extend beyond policing to other hierarchical and high-stress environments, such as emergency services, healthcare, and the military. By

demonstrating how the configuration of demands and resources is linked to both the satisfaction and frustration of basic psychological needs, the study clarifies how balancing operational demands with need-supportive practices can foster organizational commitment, resilience, and mental health in similarly demanding contexts.

- *Integration of JD-R and SDT Frameworks.* Bridging the Job Demands–Resources (JD-R) model with Self-Determination Theory (SDT), this study develops a comprehensive framework for understanding how demands and resources influence outcomes through basic psychological needs. The integration explicitly distinguishes positive and negative pathways, linking workplace and personal demands/resources to outcomes such as organizational commitment, intention to leave, well-being, life satisfaction, PTSD symptoms, and mental health via the dual processes of need satisfaction and need frustration.
- *Orthogonal Contrasts, ESEM, and 3 × 2 Design.* The study employs advanced methodological innovations to examine the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS). Using Exploratory Structural Equation Modelling (ESEM) together with orthogonal contrasts based on the 3 × 2 structure (autonomy, competence, relatedness × satisfaction, frustration), we address issues of cross-loadings, multicollinearity, and model fit. This approach allows us to disentangle the independent contributions of need satisfaction and need frustration across the three needs, consistent with recent dual-process work on the architecture of basic psychological needs.
- *Distinct Roles of Job-Related and Personal Constructs.* The study differentiates between job-related and personal demands/resources to examine their unique roles in shaping psychological needs and outcomes:
 - Job-related demands and resources are examined as predictors of job-related outcomes, specifically organizational commitment and intention to leave.
 - Personal demands and resources, including mindfulness and coping, are evaluated in relation to more personal outcomes, such as life satisfaction, mental health, and PTSD symptoms.

This distinction highlights how organizational and individual factors jointly influence well-being and resilience, extending the traditional JD-R framework by showing how personal regulation capacities complement workplace resources.

Research hypotheses

1. Basic Psychometric and Preliminary Analyses

- *Factor Structure.* We anticipate a strong factor structure for 18 latent variables, encompassing six demands/resources, six psychological needs (autonomy, competence, relatedness × satisfaction, frustration), and six outcomes. These results are expected to confirm the validity of the BPNSFS and the broader construct measurement, supporting convergent and discriminant validity within a dual-process framework.
- *Core Relationships.* Demands and resources are expected to correlate systematically with psychological needs and outcomes, with stronger relationships when valence (satisfaction vs. frustration) and locus (job-related vs. personal) align. For example, job resources should relate more strongly to organizational commitment and intention to leave than to purely personal outcomes. In contrast, personal resources should show relatively stronger links with life satisfaction and mental health.

2. Direct Effects of JD-R and psychological needs

- *JD-R Constructs.* Job-related demands/resources will primarily predict job-related outcomes, while personal demands/resources will be more strongly associated with personal outcomes. Effects are expected to follow the valence of the constructs (e.g., job resources enhancing organizational commitment and reducing intention to leave; personal resources supporting life satisfaction and mental health).
- *Interactive Effects (Exploratory).* Interactive effects between job-related demands and resources (buffering or boosting) are examined within the JD-R framework, but, given prior evidence, they are expected to be modest at best and are therefore treated as exploratory rather than central to our hypotheses.
- *Psychological Needs.* Need satisfaction is hypothesized to predict positive outcomes, including well-being, life satisfaction, and organizational commitment, whereas need frustration is expected to predict negative outcomes, including PTSD symptoms, poorer mental health, and intention to leave. Aggregated need indices (overall satisfaction vs. overall frustration) are expected to explain less

variance than the full six-construct model, reflecting the differentiated contributions of autonomy, competence, and relatedness satisfaction and frustration.

3. Integration of JD-R and psychological needs (Mediation Effects)

- *Psychological Needs as Mediators.* The effects of demands/resources on outcomes are hypothesized to be mediated by basic psychological needs (Fig. 1B). Specifically, job-related demands/resources should influence job-related outcomes through need satisfaction and need frustration. In contrast, personal demands/resources should operate through the same need processes to influence personal outcomes.
- *Valence-Specific Mediation.* In line with dual-process SDT, we expect that need satisfaction will primarily mediate positive pathways, such as those from resources to organizational commitment, well-being, and life satisfaction, whereas need frustration will primarily mediate negative pathways, such as those from demands to intention to leave, PTSD symptoms, and poorer mental health. Interactive demand $\times$ resource effects in mediation are explored but, given their typically small size in JD-R research, are not treated as primary hypotheses.

Methodology

Participants

The study included 3,891 members of the New South Wales Police Force (NSWPF), comprising both sworn and unsworn personnel across a wide range of roles and ranks. Participants had a mean age of 44.3 years (median = 44.0, SD = 9.6), with 57% identifying as male, 38% as female, and 5% not reporting gender. Participants had served in the NSWPF for an average of 16.7 years (median = 15.0, SD = 9.7). Educational attainment ranged from not having completed high school (7%), high school completion (11%), post-secondary technical or vocational qualifications (44%), undergraduate degrees (21%), and postgraduate degrees (17%).

NSW Police distributed the invitation and survey link internally, and data were collected through the online survey. Based on age, gender, years of service, and sworn status, NSW Police advised that the responding sample was demographically diverse. However, because response rates were unavailable, representativeness could not be established, and generalization to the NSWPF workforce should

be cautious. Further procedural details, including survey distribution, informed consent procedures, and matrix sampling methods, are provided in Sect. 1 of the Supplemental Materials.

Measures

As shown in Fig. 1, predictor measures comprised background and demographic variables (age, gender, education, and sworn-officer status), job-related demands (workplace conflict) and resources (organizational support), and personal demands (avoidance coping) and resources (problem-solving, seeking support, and mindfulness). These were related to job-related positive and negative outcomes—organizational commitment and intention to leave—as well as personal positive and negative outcomes—well-being, life satisfaction, PTSD symptoms, and mental health. As shown in Fig. 1B, the theoretical model comprises three sets of variables: first, six job-related and personal demands/resources; second, six psychological need-satisfaction and need-frustration variables; and third, six job-related and personal outcomes.

Basic psychological needs were measured using a job-related adaptation of the Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS; Chen et al., 2015) to ensure that items clearly focused on the work context. For example, the item “I feel a sense of choice and freedom in the things I undertake” was adapted to “At work, I feel a sense of choice and freedom in the things I undertake.” The instrument consists of six scales measuring satisfaction with autonomy, competence, and relatedness, as well as frustration with autonomy, competence, and relatedness.

The background/demographic variables and life satisfaction constructs were single-item measures, while all other constructs were measured with multiple items (see Supplemental Materials). Specific measures included:

- *Organizational Support:* Assesses the degree to which employees believe their work organization values their contribution and cares about their well-being (Eisenberger et al., 1986).
- *Coping Strategy:* Measured as part of a scale assessing coping styles adapted by Marsh et al. (2011) from earlier work by Amirkhan (1990).
- *Workplace Conflict:* Scale developed by Morin et al. (2006).
- *Affective Commitment:* Assessed using six items adapted from two scales (Morin et al., 2009; see also Meyer, 2014).
- *Intention to Leave the Job:* Based on the Intent to Quit Scale (Becker & Billings, 1993).

- *Well-being*: Assessed using the Warwick-Edinburgh Mental Wellbeing Scale (Stewart-Brown et al., 2009; Warwick Medical School, 2015).
- *Overall Life Satisfaction*: Assessed using a single question adopted from the World Values Survey (Bjørnskov, 2010). Single-item life satisfaction measures are widely used in large-scale surveys and have demonstrated acceptable validity and convergence with multi-item assessments of subjective well-being (Cheung & Lucas, 2014), while substantially reducing respondent burden.
- *PTSD*: Measured using the PTSD Checklist (Wilkins et al., 2011).
- *Mental Health*: Assessed using the K6 mental health screening tool (Kessler et al., 2010).

Statistical analyses

We used set exploratory structural equation modelling (SET-ESEM) with target rotation to analyse the factor structure (Marsh et al., 2014). Cross-loadings were permitted within each of four theoretically defined construct sets—demands/resources, psychological need satisfaction, psychological need frustration, and outcomes—but were constrained to zero between sets. This approach combines the flexibility of ESEM within conceptually related sets with the separation of distinct construct blocks (Marsh et al., 2014). It is particularly valuable for the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS), where related need dimensions can otherwise produce inflated factor correlations. We estimated the model in Mplus 8 (Muthén & Muthén, 1998–2017) using the robust maximum likelihood estimator (MLR), which is robust to deviations from normality.

Missing data handling

The study used a matrix-sampling design in which subsets of items were randomly assigned to respondents to minimise survey length and participant burden. Most missingness therefore arose from the planned design and was missing by design. The small amount of non-design missingness was handled under the missing-at-random assumption. Under MAR and correct model specification, FIML provides consistent estimates while retaining cases with partially missing responses.

Measurement invariance

Although not directly relevant to our core research hypotheses, we examined measurement invariance across gender and sworn status using multi-group ESEM models. The full 18-factor multigroup models did not converge, so

invariance was evaluated separately for theoretically coherent construct blocks, consistent with the SET-ESEM structure. For gender and sworn status, the block-wise models supported configural, metric, and scalar invariance for the six demand/resource constructs, the six psychological-need constructs, and the five multi-item outcome constructs. Full details, including model specifications and fit indices, are provided in Supplemental Materials Sect. 7 and Table S7.1.

Goodness of fit

We evaluated model fit using the Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). Following best practices (Hu & Bentler, 1999; Marsh et al., 1988, 2004), model fit was deemed acceptable when TLI and CFI exceeded 0.90 (preferably 0.95), and RMSEA was below 0.08 (preferably below 0.06). As Marsh et al. (2004) cautioned, fit indices should be regarded as rules of thumb, not golden rules; they provide useful signals but must always be interpreted in light of substantive theory and a close inspection of model parameters.

Orthogonal contrasts

To capture differentiation within the six basic need dimensions, we re-expressed the BPNSFS in accordance with the 3×2 need architecture using contrast-based modelling (cf. Marsh et al., 2025). Marsh et al. specifically designed this strategy to test SDT's dual-process model, which is confounded with content when the six psychological need scales are used to predict outcomes. Rather than treating the six need subscales as independent indicators, we computed five orthogonal contrasts from standardized factor scores. One contrast represented overall valence (need satisfaction vs. frustration). Two contrasts captured content differentiation—autonomy versus the combined competence and relatedness needs, and competence versus relatedness. The remaining two contrasts reflected valence-moderated content distinctions, equivalent to interaction-type refinements of the previous contrasts. Each contrast was derived using unit-weighted coefficients constrained to sum to zero and then standardized to facilitate effect comparison. This representation emphasizes SDT's dual-process structure while reducing redundancy among highly correlated subscales and enabling more straightforward interpretation of mediation pathways. Full derivations, formulas, and interpretive details are presented in Supplemental Materials (Sect. 6).

In addition to supporting SDT's dual-process theoretical structure, the orthogonal contrasts served key methodological purposes. We employed an ANOVA-like contrast decomposition to mitigate method bias commonly associated with self-report data. Mutually orthogonal, zero-sum

contrasts enabled separate estimation of content, valence, and valence-by-content effects. This decomposition reduces multicollinearity and clarifies associations otherwise obscured by shared variance in multidimensional self-report scales (Rosenthal & Rosnow, 1985). It also distinguishes specific within-person need processes from broad aggregates, although it does not eliminate common-method bias.

Definitions of the five orthogonal contrasts

$$\begin{aligned}
 \text{C1 (Valence):} & (AS + CS + RS) - (AF + CF + RF) \\
 \text{C2 (Autonomy vs Competence-Relatedness):} & 2 \cdot (AS + AF) - (CS + CF + RS + RF) \\
 \text{C3 (Competence vs Relatedness):} & (CS + CF) - (RS + RF) \\
 \text{C4 (Valence} \times \text{Autonomy):} & [(AS - AF) - \frac{1}{2}(CS - CF) - \frac{1}{2}(RS - RF)] \\
 \text{C5 (Valence} \times \text{Competence Relatedness):} & [(CS - CF) - (RS - RF)]
 \end{aligned}$$

Ethical approval and participant protection

Ethical approval for the study was granted by the Australian Catholic University Human Research Ethics Committee (Ethics Register Number: 2017-281HE) and by the New South Wales Police Force Research Coordinating Unit. The online information sheet emphasized voluntary participation, anonymity, and confidentiality. Participants were informed that they could decline to participate, skip any question, or withdraw at any point without consequence. To reinforce confidentiality, all responses were returned directly to the university research team; no individual-level data were accessible to NSWPF leadership. Because the survey included items on trauma exposure, PTSD symptoms, and mental health, participants were provided with a detailed list of support options, including the NSW Police confidential counselling services (Employee Assistance Program) and external 24-h crisis and counselling services (Lifeline and Beyond Blue). A summary of the results was previously presented to NSW Police management and approved for publication. The study was conducted under a formal research partnership between ACU and NSWPF and funded by the Australian Research Council Linkage Grant (LP140100100).

Results

Factor structure of psychological needs (Hypothesis 1)

The 18-factor SET-ESEM model—including six demands/resources, six psychological needs, and six

outcomes—demonstrated strong construct validity. Factor loadings were substantial (range=.41–.97) and clearly defined all latent constructs (Table 1). Model fit was very good: $\chi^2(4191)=10,653.230$, $p<.001$; RMSEA=.020, 90% CI [.019,.020], $p(\text{RMSEA} \leq .05)=1.00$; CFI=.942; TLI=.934; SRMR=.031. These results indicate excellent absolute fit (RMSEA, SRMR) and acceptable incremental fit (CFI, TLI) given the model's high dimensionality. Omega reliability coefficients for the 17 multi-item constructs were strong (range=.87–.96; $M=.91$), supporting their internal consistency. Collectively, these results provide compelling evidence for the adequacy of the factor structure and justify its use in subsequent mediation and structural analyses.

Correlations among constructs

The latent correlations among the 18 factors showed systematic and theoretically coherent patterns (Table 1).

Overall valence patterning. Positively valued constructs (e.g., resources, need satisfaction, positive outcomes) correlated positively with one another.

- Negatively valued constructs (e.g., demands, need frustration, adverse outcomes) also correlated positively with one another.
- As expected, positive and negative constructs correlated negatively. For example, organizational support correlated negatively with workplace conflict (–.47) and avoidance (–.32) but positively with autonomy satisfaction (.56).

Patterns in psychological needs

Within-dimensional structure

- Need-satisfaction dimensions correlated moderately to strongly (.41 to .63), and need-frustration dimensions also correlated strongly (.51 to .54).
- Correlations between satisfaction and frustration dimensions were negative (–.29 to –.68), with the strongest negative associations observed for corresponding need pairs (e.g., autonomy satisfaction vs. autonomy frustration, –.57 to –.68).

Relations to demands and resources

- Positive resources (e.g., organizational support) correlated strongly with need satisfaction (e.g., autonomy satisfaction,.56).

Table 1 Summary of factor analysis: factor loadings, reliabilities, and latent factor correlations

Panel A. Factor loading and reliability summary																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Number of items	4	10	6	5	4	5	4	4	4	4	4	4	7	6	17	6	3	1
Minimum target loading	.83	.60	.65	.61	.75	.49	.69	.58	.73	.68	.73	.71	.67	.44	.50	.41	.73	1.00
Maximum target loading	.89	.91	.94	.89	.88	.72	.78	.94	.91	.86	.88	.83	.72	.91	.96	.97	.85	1.00
Omega reliability	.91	.95	.89	.91	.88	.90	.90	.93	.93	.91	.93	.91	.93	.87	.96	.92	.91	—
Panel B. Latent factor correlation matrix																		
Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Demands and Resources																		
1 Organizational Support	1																	
2 Workplace Conflict	-.47	1																
3 Copes: Avoid	-.32	.35	1															
4 Copes: Problem Solve	.26	-.16	-.46	1														
5 Copes: Seek Support	.23	-.12	-.20	.38	1													
6 Mindfulness	.17	-.16	-.26	.06	.03	1												
Psychological Needs																		
7 Autonomy Satisfaction	.56	-.41	-.33	.29	.18	.20	1											
8 Competence Satisfaction	.22	-.18	-.30	.31	.09	.20	.56	1										
9 Relatedness Satisfaction	.48	-.43	-.29	.23	.30	.11	.63	.41	1									
10 Autonomy Frustration	-.55	.48	.37	-.22	-.25	-.29	-.57	-.30	-.39	1								
11 Competence Frustration	-.31	.28	.44	-.31	-.15	-.33	-.44	-.66	-.34	.51	1							
12 Relatedness Frustration	-.41	.55	.38	-.20	-.20	-.17	-.44	-.29	-.68	.52	.54	1						
Outcomes																		
13 Well-Being	.49	-.48	-.50	.38	.27	.34	.64	.50	.57	-.52	-.52	-.51	1					
14 Commitment	.58	-.33	-.22	.22	.20	.05	.55	.25	.48	-.41	-.21	-.34	.37	1				
15 PTSD	-.46	.46	.53	-.26	-.24	-.44	-.36	-.27	-.35	.49	.43	.43	-.59	-.25	1			
16 Mental Health	-.40	.46	.53	-.28	-.20	-.39	-.43	-.37	-.38	.46	.54	.50	-.73	-.26	.70	1		
17 Intention to Leave	-.50	.40	.33	-.18	-.14	-.21	-.52	-.23	-.39	.50	.32	.38	-.42	-.55	.41	.40	1	
18 Life Satisfaction	.30	-.27	-.39	.29	.21	.29	.43	.29	.38	-.34	-.35	-.36	.61	.24	-.46	-.57	-.29	1
Omega reliabilities	.91	.95	.89	.91	.88	.90	.90	.93	.93	.91	.93	.91	.93	.87	.96	.92	.91	—

The factor analysis used a SET-ESEM model with target rotation based on four construct sets: demands/resources, psychological need satisfaction, psychological need frustration, and outcomes. Target loadings and within-set cross-loadings were freely estimated, whereas cross-loadings between different construct sets were constrained to zero. All latent correlations shown are from the 18-factor SET-ESEM model

- Demands (e.g., workplace conflict) correlated strongly with need frustration (e.g., relatedness frustration,.55).

Relations to outcomes

- Need-satisfaction dimensions were positively correlated with positive outcomes (e.g., well-being,.64; commitment,.55) and negatively correlated with adverse outcomes (e.g., intention to leave, -.52).
- Conversely, need-frustration dimensions correlated positively with negative outcomes (e.g., PTSD,.49; mental health screener,.54).

Interpretation

Taken together, these patterns provide strong support for Hypothesis 1. Correlations aligned cleanly by both valence (positive vs. negative) and locus (job-related vs. personal), reinforcing the theoretical structure of the JD-R and SDT frameworks. The clarity of these correlation structures provides a strong platform for evaluating SDT's dual-process model within JD-R dynamics. We next tested whether psychological need satisfaction and frustration mediate the effects of demands and resources on job-related and personal outcomes.

Direct effects of demands and resources (Hypothesis 2)

In the second stage of analyses, we predicted six outcome variables using a hierarchical 6-step model (see Table 2, top segment). At each step, we report the variance explained (MR^2), improvement in total explained variance (MR^2 Change), and the unique variance attributable to that step in the full model. For clarity, results are presented for the first outcome (commitment), followed by summary highlights for the other outcomes. Steps 1–3 represent the typical JD-R sequence (see Fig. 1A).

Step 1: Background/Demographic Variables. The background variables explained minimal variance in commitment ($MR^2=.015$) and similarly low variance for all six outcomes (Mean $MR^2=.015$). Their unique contributions in the full model were negligible (Mean MR^2 Unique=.002).

Step 2: Job-Related Demand and Resource. The two job-related predictors—workplace conflict and organizational support—together contributed substantially to outcome prediction (MR^2 Change=.452 for commitment), although some predictive power overlapped with downstream constructs entered later.

Step 3: Job-Related Demand $\times$ Resource Interaction. The workplace conflict $\times$ organizational support interaction contributed little incremental variance in commitment (MR^2 Change=.002) and was similarly small across outcomes.

Step 4: Personal Demands/Resources. Personal demands/resources contributed meaningfully to personal outcomes (MR^2 Change=.118–.195) and modestly to job outcomes (MR^2 Change=.011–.019). Among the personal resources, problem-solving showed one of the clearest positive relations and was positively correlated with competence satisfaction ($r=.31$).

Step 5: Interactions among Demand/Resource Variables. Demand $\times$ resource interactions were generally small and mostly nonsignificant ($\Delta R^2=.001$ –.009 across the six outcomes; mean $\Delta R^2=.004$), providing little evidence of buffering or boosting effects. Given that the interaction effects explained very little variance, it would be inappropriate and potentially misleading to conduct post-hoc probing (e.g., simple-slope or Johnson–Neyman analyses). Likewise, psychological needs did not substantially mediate these small interaction effects. This pattern aligns with recent reviews showing that demand $\times$ resource effects in JD-R research are typically weak, inconsistent, and far less stable than main-effect pathways (Bakker & Demerouti, 2017; Demerouti & Bakker, 2023; Marsh et al., 2025).

Psychological needs

The six psychological needs explained substantial additional variance in commitment (MR^2 Change=.082) and contributed meaningfully across all six outcomes (Mean MR^2 Change=.076). Effects were strongest for positive outcomes and weakest for PTSD, although the effect on PTSD remained statistically meaningful (MR^2 Change=.017).

Prediction of the Six Psychological Needs. Next, we examined how well the six demands/resources predicted the six psychological needs (bottom of Table 2; Fig. 1B). Predictors explained nearly half of the variance in the six need variables ($MR^2=.212$ to .562; Mean=.418). Job-related demands/resources uniquely predicted autonomy and relatedness needs, whereas personal demands/resources explained more unique variance in competence.

Alternative Conceptualizations of Psychological Needs and Relations to Outcomes. To evaluate whether different representations of psychological needs altered predictive performance, we compared several conceptualizations:

1. *Six Needs Individually.* Paths from the six needs to outcomes (Fig. 1B) explained substantial variance across all outcomes ($R^2=.262$ –.606; Table 3). Need satisfaction

Table 2 Effects of resources, demands, moderators, psychological need variables, and their interactions on each outcome variable

Panel A. Prediction of six outcomes					
Step and predictors	Commitment		Intention to Leave		Mean over 6 Outcomes
	MR ²	Unique Chg	MR ²	Unique Chg	
1. 5 Background	.015	—	.005	.007	MR ² .015 .006
2. 2 Job-related D/R	.467	.452	.368	.028	MR ² .345 .329 .028
3. 1 Job D × R	.469	.002	.369	.001	MR ² .347 .003 .001
4. 4 Personal R & D	.480	.011	.387	.019	MR ² .458 .110 .044
5. 8 Personal × Job interactions	.481	.001	.390	.002	MR ² .462 .004 .002
6. 6 Psychological Needs	.562	.082	.455	.065	MR ² .537 .076 .068
Panel B. Prediction of six psychological needs					
Step and predictors	Autonomy Satisfaction		Competence Satisfaction		Mean over 6 Needs
	MR ²	Unique Chg	MR ²	Unique Chg	
1. 5 Background	.019	.019	.023	.023	MR ² .016 .016 .004
2. 2 Job-related D/R	.444	.425	.089	.066	MR ² .339 .323 .143
3. 1 Job D × R	.444	.000	.089	.000	MR ² .339 .000 .000
4. 4 Personal R & D	.471	.026	.207	.117	MR ² .415 .076 .069
5. 8 Personal × Job interactions	.472	.002	.212	.006	MR ² .418 .003 .003

MR² = squared multiple correlation (proportion of variance explained); MR² Chg = change in MR² for variables entered at that step; Unique = unique variance attributable to that step in the full model. Step 1 included five background variables (age, gender, education, marital status, and sworn-officer status). Step 2 included the two job-related demand/resource predictors (workplace conflict and organizational support). Step 3 included their demand × resource interaction. Steps 4 and 5 added personal demands/resources and their interactions with the job predictors. Step 6 added the six psychological needs. Underlined values are nonsignificant ($p > .05$)

Table 3 Relations Between Six Outcomes and Alternative Conceptualizations of the Six Psychological Needs

Psychological-need representation	Commitment (+)	Intention to Leave (-)	PTSD (-)	Mental Health (-)	Life Satisfaction (+)	Well-Being (+)
1. Six Need Factors: Paths From Each Psychological Need to Each Outcome						
Autonomy Satisfaction (+)	.459	-.435	.027	-.175	.345	.306
Competence Satisfaction (+)	-.038	.192	.078	.108	-.157	.025
Relatedness Satisfaction (+)	.208	-.014	-.084	.067	.077	.211
Autonomy Frustration (-)	-.218	.285	.362	.078	.046	-.143
Competence Frustration (-)	.162	.087	.248	.418	-.283	-.238
Relatedness Frustration (-)	.005	.045	.101	.267	-.071	-.026
Total Variance (Multiple R ² across 6 Needs)	.461	.432	.378	.465	.262	.606
Total Multiple R (across 6 Needs)	.679	.657	.615	.682	.512	.778
Unique Variance: 3 Satisfaction Factors	.172	.069	.002	.008	.054	.113
Unique Variance: 3 Frustration Factors	.017	.073	.193	.208	.041	.063
2. Discrete Need Aggregates: Correlations Relating Each Need Aggregate to Each Outcome						
Mean 3 Satisfaction Factors	.578	-.501	-.421	-.505	.453	.729
Mean 3 Frustration Factors	-.460	.550	.605	.672	-.455	-.702
Mean 2 Autonomy Factors (Satisfaction—Frustration)	.629	-.645	-.533	-.560	.461	.724
Mean 2 Competence Factors (Satisfaction—Frustration)	.297	-.341	-.417	-.538	.372	.613
Mean 2 Relatedness Factors (Satisfaction—Frustration)	.521	-.474	-.466	-.524	.425	.647
Mean Total (3 Satisfaction—3 Frustration)	.560	-.565	-.550	-.631	.489	.770
3. Orthogonal Need Contrasts: Variance Components of Need Domain, Valence, and Their Interaction						
One Valence Contrast (representing 2 Valences)	.283	.283	.295	.358	.199	.545
Two Domain Contrasts (representing 3 Domains)	.001	.004	.010	.007	.018	.004
Two Domain × Valence Interactions	.105	.097	.006	.002	.004	.007

The first section reports paths from the full set of six psychological needs and summarizes total and unique variance. The second reports correlations for discrete aggregate scores. The third reports variance components from five orthogonal contrasts representing valence, domain, and the valence × domain interaction. Underlined coefficients are nonsignificant ($p > .05$)

factors explained more variance in positive outcomes incrementally, whereas need frustration factors more strongly predicted adverse outcomes. Matching need valence to outcome valence generally strengthened prediction, although non-matching effects remained meaningful.

2. *Aggregate Scores.* Single-variable aggregates (e.g., total autonomy, total frustration, total needs) were then evaluated against the six-factor representation.

- Total autonomy (with frustration reversed) was the strongest predictor of job-related outcomes (e.g., commitment, intention to leave).
- Total frustration most strongly predicted adverse personal outcomes (e.g., PTSD, mental health screener).
- Total needs performed best for the two positive personal outcomes—life satisfaction and well-being—whereas total autonomy was the strongest aggregate predictor of the job-related outcomes.

Representation of BPNSFS with ANOVA-like orthogonal contrasts

To reconceptualize the six psychological needs assessed by the BPNSFS, we adopted a 2 (valence: satisfaction vs.

frustration) × 3 (content: autonomy, competence, relatedness) ANOVA framework (see Marsh et al., 2025). This model allows for a systematic analysis of the main effects of valence and content, as well as their interaction, through five orthogonal contrasts. These contrasts provide insights into the unique and combined contributions of need valence and content across outcomes, enriching our understanding of how psychological needs influence well-being and work-related outcomes. Details of contrast construction and scaling are reported in the Methods section and Supplemental Materials (Sect. 6).

All contrasts—main effects and interactions—were statistically significant across the six outcomes, underscoring the robustness of this framework. Valence effects (satisfaction vs. frustration) consistently emerged as the strongest predictors, revealing the profound impact of need satisfaction versus frustration on outcomes. Although smaller in magnitude, content effects (autonomy, competence, relatedness) were significant, demonstrating the differential influence of specific psychological needs.

Critically, the valence × content interaction contributed unique explanatory power, indicating that the effects of satisfaction and frustration vary systematically across autonomy, competence, and relatedness domains rather than reflecting a uniform valence effect. For instance:

- *Job commitment*: Autonomy satisfaction had a markedly larger positive effect than autonomy frustration's adverse effect.
- *Competence*: The nonsignificant positive effect of competence satisfaction was overshadowed by the more substantial negative effect of competence frustration.

These interaction patterns demonstrate that valence effects are domain-dependent and often asymmetric, with frustration exerting disproportionately stronger effects on adverse outcomes.

Implications of the framework

This ANOVA-like contrast approach highlights the distinct and combined effects of valence and content, showing that the predictive influence of satisfaction versus frustration depends not only on valence but also on the specific need domain. The resulting nuanced representation offers a more refined theoretical account of psychological needs. It provides a precise analytic basis for interpreting how these needs drive both job-related and personal outcomes.

Mediation analyses: indirect effects mediated through psychological needs (Hypothesis 3)

Total effects of demands/resources on outcomes

We first examined the overall predictive power of demands/resources on outcomes (Table 4; Fig. 1A). Total effects averaged across outcomes revealed positive contributions from resources, including organizational support (.303), mindfulness (.166), support-seeking coping (.057), and problem-solving (.038), alongside negative contributions from demands such as avoidance (-.211) and workplace conflict (-.135). Averaged across all demands/resources, we observed positive total effects for positive outcomes (e.g., commitment,.113; well-being,.187; life satisfaction,.130), and adverse effects were observed for negative outcomes (e.g., intention to leave, -.131; PTSD, -.179; mental health, -.170). These results justified further exploration of mediation via psychological needs. (Expanded path-model and interaction results are provided in Supplemental Table S3; comprehensive mediation results, including total, direct, and indirect effects, are provided in Supplemental Tables S4 and S5 and discussed in Supplemental Materials Sects. 4 and 5.)

Mediated effects of demands/resources on outcomes

Indirect Effects and Interpretive Criteria. Table 4 summarises the total and total indirect effects of each demand/resource on the six outcomes, accompanied by 95% bootstrap confidence intervals. Following best practice recommendations (Preacher & Kelley, 2011), we emphasize the indirect effects and their 95% confidence intervals as the primary basis for evaluating mediation. For descriptive purposes, we also report indirect/total effect ratios, but note that they should be interpreted cautiously, as they become unstable when total effects are near zero and are not bounded by a 0–1 range. Accordingly, the substantive conclusions reported here focus on (a) the sign of the indirect effect, (b) its magnitude, and (c) the statistical significance of the bootstrapped 95% CI, rather than on the mediation ratios themselves.

Psychological needs mediated many, but not all, associations between demands/resources and outcomes. Indirect effects were generally larger and more consistent for organizational support and for positive outcomes, whereas several indirect effects involving PTSD, mental health, and individual personal predictors were small or nonsignificant. In line with best practice, interpretation focuses on the sign, magnitude, and bootstrapped 95% confidence intervals of indirect effects; indirect-to-total ratios are reported in Table 4 but are not used for core inference.

Discussion

Integration of theoretical frameworks and support for hypotheses

This study integrates Self-Determination Theory (SDT) and the Job Demands–Resources (JD-R) model to examine psychological needs and workplace dynamics in a large, command-and-control organization. The findings robustly support the key hypotheses:

- *Hypothesis 1*: Factor structure analyses validated the robustness of the 18 latent variables (six demands/resources, six psychological needs, and six outcomes), confirming convergent and discriminant validity. Correlations reflected distinctions by valence (positive/negative) and locus (job-related/personal), with stronger associations when valence and locus matched.
- *Hypothesis 2*: Demands/resources significantly predicted outcomes. Job-related constructs (e.g., organizational

Table 4 Mediation analysis: indirect effects of work demands, resources, and their interaction on six outcomes via the six basic psychological needs

Outcome	Effect	Demands (DEM) and Resources (RES)						Mean DEMs & RESs	DEM×RES Interaction
		Organizational Support	Workplace Conflict	Cope: Avoid	Mindfulness	Cope: Problem Solve	Cope: Seek Support		
Commitment	Total	.669	-.033	.027	-.088	.056	.035	.113	.050
	Indirect	.194	-.091	.015	.000	.038	.021	.055	-.006
	95% CI	.170,.220	-.120, -.070	.000,.030	-.020,.010	.020,.060	.010,.040	—	-.020, -.001
	Indirect/Total	—	—	—	—	—	—	.485	—
Intention to Leave	Total	-.466	.139	.145	-.076	.040	.003	-.131	-.022
	Indirect	-.227	.074	.026	-.052	-.023	-.020	-.070	.005
	95% CI	-.260, -.190	.040,.110	.010,.050	-.080, -.030	-.050,.000	-.040,.000	—	.000,.010
	Indirect/Total	—	—	—	—	—	—	.539	—
Well-Being	Total	.233	-.223	-.211	.214	.158	.081	.187	.014
	Indirect	.209	-.079	-.049	.053	.073	.032	.083	-.008
	95% CI	.180,.240	-.100, -.060	-.060, -.030	.030,.080	.060,.090	.020,.040	—	-.020, -.001
	Indirect/Total	—	—	—	—	—	—	.442	—
Life Satisfaction	Total	.130	-.045	-.208	.206	.117	.073	.130	.012
	Indirect	.153	-.098	-.029	.010	.029	.013	.055	-.003
	95% CI	.120,.180	-.120, -.070	-.040, -.020	.000,.030	.020,.040	.010,.020	—	-.010,.000
	Indirect/Total	—	—	—	—	—	—	.426	—
PTSD	Total	-.196	.159	.364	-.325	.067	-.097	-.179	-.071
	Indirect	.007	.035	.028	-.017	.004	-.007	-.013	-.002
	95% CI	-.010,.020	.020,.050	.020,.040	-.030, -.010	.000,.010	-.010,.000	—	-.010,.000
	Indirect/Total	—	—	—	—	—	—	.071	—
Mental Health	Total	-.126	.210	.362	-.261	-.003	-.059	-.170	-.074
	Indirect	-.037	.067	.089	-.059	-.051	.017	-.048	-.002
	95% CI	-.060, -.020	.040,.090	.070,.100	-.080, -.040	-.070, -.050	.010,.030	—	-.010,.000
	Indirect/Total	—	—	—	—	—	—	.280	—
Mean of 6 Outcomes	Total	.303	-.135	-.211	.166	.038	.057	.152	—
	Indirect	.136	-.074	-.034	.032	.035	.013	.054	—
	Indirect/Total	.448	.548	.161	.193	.947	.228	.356	—

Entries are standardized total and total indirect effects through the six psychological needs. Bootstrap 95% confidence intervals are reported for the indirect effects; statistical inference was based on the unrounded confidence limits. Detailed estimates, standard errors, Wald tests, direct effects, and effects involving background variables are reported in Supplemental Table S4. Means and indirect/total ratios were calculated from unrounded estimates. For means across outcomes, intention to leave, PTSD symptoms, and mental health problems were reverse-scored; for means across demands/resources, workplace conflict and avoidant coping were reverse-scored. Indirect/total ratios are descriptive and should be interpreted cautiously because they become unstable when total effects approach zero and are not constrained to the 0–1 range

support, workplace conflict) were stronger predictors of job-related outcomes (e.g., commitment, intention to leave), while personal constructs (e.g., mindfulness, coping strategies) were more relevant for personal outcomes (e.g., well-being, life satisfaction). Negative demands, such as avoidance coping, were particularly salient predictors of adverse outcomes like PTSD and poor mental health.

- *Hypothesis 3:* Psychological needs mediated much of the effects of demands/resources on outcomes, with more substantial mediation observed for job-related demands/resources and outcomes compared to personal

constructs. Mediation was weakest for personal demands/resources and adverse personal outcomes like PTSD and mental health.

Contributions and practical implications

Expanding psychological need assessments in SDT

Expanding SDT assessments to include both satisfaction and frustration provides a more complete understanding of psychological functioning in high-stress workplaces. Across outcomes, negative consequences were more strongly

associated with need frustration, whereas positive consequences were more closely tied to need satisfaction. Crucially, analyses showed that the optimal representation was the complete six-dimensional framework, which consistently outperformed aggregate indices or single need scores. This dual-focus approach addresses an important gap in SDT research by clarifying how satisfaction and frustration operate as *distinct* pathways to well-being and ill-being.

Taxonomic Framework of Demands/Resources and Outcomes. Classifying demands/resources and outcomes by valence (positive/negative) and locus (job-related/personal) provided important conceptual clarity. Job-related demands/resources were most strongly predictive of job-related outcomes (e.g., commitment, intention to leave). In contrast, personal constructs were more salient for personal outcomes (e.g., well-being, life satisfaction). Interestingly, job-related constructs also mediated positive personal outcomes, suggesting that workplace environments affect personal well-being through spillover processes. This taxonomy, therefore, provides a structured basis for understanding how workplace dynamics shape both organizational functioning and individual health.

Complementarity With Conservation of Resources Theory. Our taxonomic framework also aligns well with Conservation of Resources (COR) theory (Hobfoll, 1989, 2011), which proposes that individuals strive to acquire and protect valued resources and that resource gains and losses tend to unfold in reinforcing spirals. In our findings, organizational and personal resources (e.g., organizational support, mindfulness, problem-solving, social-support seeking) appear to initiate *gain spirals*, being associated with greater need satisfaction and reduced need frustration, which in turn promote well-being, commitment, and life satisfaction. Conversely, hindrance-like demands and avoidant coping align with *loss spirals*, in which reduced resources and increased need frustration reinforce each other and undermine mental health. Integrating COR with SDT and JD-R, therefore, helps explain both the direct and mediated pathways through which resources and demands influence NSWPF personnel's well-being.

Innovations in Moderation and Mediation Analyses. We combined SDT's emphasis on mediation with tests of demand/resource interactions motivated by JD-R models. Although the interaction terms explained very little incremental variance, some individual effects were statistically significant. Their indirect effects through psychological needs were uniformly small, indicating that mediation occurred primarily for the additive effects of demands and resources rather than their interactions. These results align with recent reviews showing that demand $\times$ resource interactions in JD-R research are typically small, unstable, and substantially weaker than main-effect pathways (Bakker & Demerouti, 2017; Demerouti & Bakker, 2023; Marsh et al., 2025). Our findings are theoretically coherent: SDT posits

that basic psychological needs represent the primary valence-based pathways through which job demands and resources influence well-being (Ryan & Deci, 2017; Van den Broeck et al., 2016), but does not conceptualize needs as the universal mechanism through which resources buffer the impact of high demands. Correspondingly, we observed strong mediation of the additive effects of demands and resources on outcomes through need satisfaction and need frustration, but negligible mediation of the demand $\times$ resource effects. This is consistent with JD-R evidence indicating that buffering processes—when detectable—typically operate through mechanisms such as role clarity, procedural justice, job crafting, emotional regulation, or broader resource reservoirs rather than basic psychological needs (Bakker & Demerouti, 2017; Demerouti & Bakker, 2023; Parker et al., 2023). Thus, the present findings clarify that psychological needs robustly explain the overall impact of demands and resources on well-being. In contrast, moderation under high demand is rarely mediated by needs and generally operates through non-need mechanisms. Taken together, these findings suggest that psychological needs are the primary mechanisms linking demands and resources to well-being, whereas JD-R buffering effects typically operate through mechanisms other than need satisfaction and frustration.

Methodological advances in conceptualizing BPNSFS

A central methodological innovation of this study lies in reconceptualizing the BPNSFS within an ANOVA-like 2×3 design, enabling more precise estimation of valence (satisfaction vs. frustration), content (autonomy, competence, relatedness), and their interactions. This approach addresses a long-standing challenge in SDT measurement, namely, the difficulty of separating content from valence while maintaining interpretability and reducing multicollinearity.

Although CFAs have consistently validated the six-factor BPNSFS structure across diverse samples (e.g., Chen et al., 2015; Holmquist et al., 2024a, 2024b), traditional approaches have struggled to parse how satisfaction and frustration operate as distinct mechanisms. One-facet or bifactor models, for example, are prone to multicollinearity between satisfaction and frustration and often fail to capture valence-by-content interactions. These limitations can obscure theoretically meaningful distinctions among need domains.

To address these gaps, the present study implemented orthogonal contrasts that recast the six-factor BPNSFS into five planned orthogonal contrasts:

1. One valence contrast (satisfaction vs. frustration)
2. Two content contrasts (autonomy vs. competence-relatedness; competence vs. relatedness)

3. Two valence-by-content interaction contrasts

This contrast-based representation substantially reduces redundancy, clarifies both main and interaction effects, and enables detection of theoretically meaningful asymmetries. For example, findings demonstrated that autonomy satisfaction had a disproportionately strong association with job commitment, whereas competence frustration showed stronger associations with PTSD and impaired mental health. The orthogonal contrast framework produces a cleaner mapping between psychological need processes and workplace outcomes. It extends SDT methodology by:

- isolating valence and content contributions that otherwise blur together,
- avoiding the interpretational ambiguities of aggregates or bi-factor models,
- enabling theoretically precise tests of SDT's dual-process model.

Beyond policing, this methodological advance has broad relevance for SDT applications in emergency services, healthcare, education, defense, and other hierarchical contexts where psychological needs play critical roles in employees' well-being and functioning.

Narrative Insights into Autonomy in Command-and-Control Organizations.

Strategies that simultaneously enhance job resources and mitigate excessive demands are crucial for improving NSWPF personnel's well-being and performance (Wolter et al., 2019b). Across all analyses, autonomy satisfaction emerged as a key predictor of both job-related and personal outcomes—even in a hierarchical, command-and-control environment such as policing. This finding challenges the assumption that autonomy is inherently incompatible with highly structured organizational contexts.

During survey development, a senior officer commented, "*We can't let officers decide for themselves, or it would be chaos,*" reflecting a common misconception about autonomy in SDT. Autonomy does **not** imply unrestricted freedom or lack of structure; rather, it reflects a sense of volition and ownership within clearly defined parameters. For example, the strict rules governing firearm discharge do not contradict autonomy—officers still exercise judgment in how best to implement those rules in real situations. In such cases, structure can actually support both competence and autonomy rather than frustrate them.

Autonomy also encompasses feeling heard and having input, even when final decisions rest with leadership. Supervisor autonomy support—providing rationales, acknowledging viewpoints, and allowing constructive

discretion—aligns strongly with this principle. The robust associations observed between autonomy satisfaction/frustration and outcomes such as well-being, job commitment, and intention to leave indicate that participants' responses were consistent with this interpretation.

Practical recommendations for supporting autonomy in command-and-control organizations

For leaders in command-and-control organizations, the implications are practical and actionable. Autonomy does not imply unstructured freedom; rather, it reflects volition and meaningful discretion within operational constraints. Autonomy and structure are not opposing forces—when implemented thoughtfully, they complement each other and enhance resilience, commitment, and well-being. Autonomy can be fostered by:

1. Creating structured opportunities for officers to contribute insights (e.g., input into procedures, scheduling, and operational improvements), thereby strengthening ownership and internalization of organizational goals.
2. Explaining the rationale behind policies rather than defaulting to authority, which increases acceptance, motivation, and internalization of decisions.
3. Encouraging discretion within clearly articulated operational boundaries, which allows autonomy to reinforce competence rather than undermine discipline.
4. Training supervisors to adopt autonomy-supportive leadership, including acknowledging officer perspectives, offering choices when feasible, and avoiding micromanagement.
5. Supporting competence-building opportunities, such as targeted training that reinforces effective decision-making in complex situations, enabling autonomy and competence to work synergistically.

These recommendations highlight that autonomy-supportive practices can be implemented without weakening command structures. Instead, they align with organizational goals and contribute meaningfully to improved well-being, resilience, and performance.

Limitations

Although our structural model is theoretically grounded, several limitations should be noted:

- Cross-sectional design limits causal inference even though the structural model is theoretically grounded; the results represent associations consistent with

theoretical pathways proposed by SDT and JD-R models. Indirect effects represent associational rather than temporal mediation.

- Possible reciprocal processes cannot be excluded (e.g., well-being influencing perceptions of resources rather than vice versa).
- Causal Inference and Temporal Directionality. Participants experiencing distress, burnout, or poorer mental health may perceive workplace demands and organizational resources more negatively (“gloomy perception” bias), thereby potentially inflating some observed associations.
- Unmeasured third-variable processes may contribute to associations (e.g., trauma history, organizational climate, supervisory practices).
- Selection bias/response rate cannot be ruled out because the number of invited respondents was not available; caution is warranted in generalizing to the entire NSW-PF population.
- Matrix-sampling design minimized respondent burden but results in Missing-by-Design patterns that reduce precision of parameter estimates relative to full data.
- Self-report methodology introduces possible shared-method variance; the orthogonal contrast approach reduces (but cannot eliminate) these risks.
- Organizational and cultural specificity: findings derive from a relatively high-resource Western policing system and may not generalize fully to less hierarchical organizations, other emergency services, or policing contexts characterized by different socio-political climates, institutional trust, resource availability, or operational stressors.
- Single-item measures: Life satisfaction was assessed using a single-item indicator. Although single-item life satisfaction measures have demonstrated acceptable validity in large-scale survey research (Cheung & Lucas, 2014), associations involving life satisfaction should be interpreted somewhat more cautiously than findings based on the more robust multi-item constructs used for PTSD, well-being, and mental health.

Conclusion

This study integrates Self-Determination Theory (SDT) and the Job Demands–Resources (JD-R) framework to highlight the central role of psychological needs—particularly autonomy—in shaping both job-related and personal outcomes. Including both need satisfaction and need frustration captures SDT’s dual-process architecture: satisfaction strongly predicts positive outcomes, whereas frustration more strongly predicts negative outcomes. These findings

are consistent with theoretically predicted SDT–JD-R associations, although causal directionality cannot be established from the present cross-sectional design.

The reconceptualization of the Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS) as a two-facet (2×3) model using ANOVA-like orthogonal contrasts represents a methodological innovation. This approach systematically decomposes valence and content, reducing multicollinearity and clarifying valence-by-content interactions. In doing so, it provides a more precise and theoretically coherent way to assess psychological needs, advancing SDT research.

From a practical perspective, autonomy-supportive leadership—including participatory decision-making, providing rationales, and supporting discretion within structured boundaries—emerges as a promising strategy even in command-and-control organizations. Implementing such practices can improve well-being, enhance performance, and reduce adverse outcomes such as PTSD symptoms and poor mental health. These findings have direct relevance for policing, emergency services, and the military, where operational discipline coexists with opportunities to support volition and competence.

The findings further suggest that interventions should not focus solely on increasing need satisfaction through supportive organizational practices, but also on actively reducing systemic need frustrators that undermine professional efficacy, resilience, and well-being. In particular, the comparatively strong effects associated with competence frustration highlight the importance of minimizing chronic workplace conflict, excessive bureaucratic barriers, and organizational climates that reinforce avoidance and disengagement.

Future research should employ longitudinal and experimental designs, explore a broader range of demands and resources, and test the model across diverse organizational contexts. By refining theoretical frameworks while addressing real-world challenges, the present study provides actionable strategies for improving employee well-being and operational effectiveness and sets the stage for further innovations in psychological needs research.

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Data availability The data that support the findings of this study are not publicly available due to organizational and ethical restrictions but are available from the corresponding author upon reasonable request and with appropriate approvals.

Declarations

Ethics approval Ethical approval for this study was granted by the Australian Catholic University Human Research Ethics Committee (Ethics Register Number: 2017-281HE) and by the New South Wales Police Force Research Coordinating Unit.

Consent to publish All participants provided informed consent for the anonymous use of their data for research and publication purposes.

Informed consent Informed consent was obtained from all individual participants included in the study. Participation was voluntary, anonymous, and confidential. Participants were informed that they could decline to participate, skip any question, or withdraw at any time without consequence.

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Use of generative AI During preparation of this manuscript, the authors used ChatGPT for proofreading, language editing, and reference checking. The authors reviewed the resulting text and take responsibility for the final content.

Conflict of interest The authors declare that they have no conflicts of interest.

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