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On States and Traits in Work-Family Research

Charles E. Lance[a,b], Tracy L. Griggs[c], YoungAh Park[d], Seonghee Cho[e], Michael Szeman[c], George Michaelides[f], and Stephen Wood[g]

[a]Organizational Research and Development, LLC; [b]University of the Western Cape; [c]Winthrop University; [d]University of Illinois at Urbana-Champaign; [e]Sungkyunkwan University; [f]University of East Anglia; [g]University of Leicester

ABSTRACT

Latent state-trait research on work-family conflict confirms that occasion-specific variation in work-related demands is related to corresponding variations in perceptions of work interfering with family (WIF), but WIF also displays moderate (~35%) to substantial (~80%) trait-like stability over time. What is not clear to date is whether this cross-situational stability in WIF is due to stable respondent characteristics (e.g. personality traits) or intrinsic situational stability in the work environment (e.g. work demands). Results from secondary analyses of four diary study data sets indicated that Trait-based (time-invariant) WIF primarily reflects intrinsic stability in work situations (e.g. especially workload) and to a lesser extent Negative (but not Positive) affect. Results support recent theory and add to a growing body of research on stability in work-family conflict across both daily and weekly assessments. Implications for interventions aimed at ameliorating WIF are discussed.

Work and family represent two central life domains for many employees, thus prompting significant scholarly attention to work-family conflict (WFC) – the extent to which participation in one role interferes with participation in the other role (Greenhaus & Beutell, 1985). While it is well established that WFC is associated with mental and physical ill-being, job attitudes, performance, and turnover intentions, this literature continues to evolve with a growing emphasis on repeated measures of WFC across various time frames. These range from several decades, years, and months to shorter periods within and across days (e.g., French & Allen (2020); Li et al. (2023); Matthews et al. (2014); Shockley & Allen (2013); Smith et al. (2022)). Such over-time studies seek to elucidate the nature of relationships between WFC and its correlates (e.g., predictors and outcomes), including the relevant causal intervals over which these relationships hold.

Recent work by Smith et al. (2022) provided initial evidence for both stability and change in work-family conflict, revealing that WFC may be quite stable, albeit with some meaningful changes over time. Specifically, using two longitudinal datasets spanning over 5 months and 3 years, Smith and colleagues revealed that about 75% to 79% of the variance in WFC represents stable or chronic WFC. These findings underscored the importance of studying enduring levels of WFC, especially over longer time frames. However, what is not yet well understood is the primary source of this stability, particularly the degree to which stable individual difference factors (e.g., personality, affect) versus intrinsic stability in the situation itself (e.g., work demands) contribute to this stability in WFC over time. Additionally, it remains unclear whether the findings of Smith et al. (2022) might be replicated when WFC is measured over

CONTACT Charles E. Lance clancephd@gmail.com Organizational Research & Development, LLC, 173 Crystal River Dr. Lawrenceville, GA 30043, USA

much shorter periods with shorter time lags (e.g., daily, weekly). From a theoretical standpoint, addressing these research gaps is essential to move the WFC literature forward. In particular, there is a need to develop a time-sensitive theory in the work-family literature to better explain and predict when WFC occurs, when it changes, and to what extent it becomes stable over time (Allen et al., 2019). To accomplish this, it is imperative that researchers assess the degree of stability across a variety of time frames, and determine what predicts stability and variability in WFC across these time frames.

The purpose of this study is two-fold. First, we utilize latent-state trait (LST) theory and trait-state occasion (TSO) modeling to analyze four multi-wave data sets across shorter time frames than those used by Smith et al. (2022). By parsing WFC data into stable "trait-like" variance and labile "state-like" variance, we assess the extent to which WFC remains relatively stable versus fluctuations over days and weeks. LST theory and the TSO methodology allow us to overcome limitations inherent to typical cross-sectional studies that confound stable and labile aspects of the measured constructs while answering the call for more research on the dynamic nature of work-family conflict over time.

Second, we employ a novel multivariate TSO modeling approach to explore the extent to which the *stable* variance in WFC is better explained on the basis of trait-like person characteristics (e.g., personality, negative and positive affect) versus stability in situational characteristics (e.g., workload, work hours). By including both personality and work demands, we aim to explore whether person or situational factors better explain the stable "trait-like" variance in WFC. We begin by reviewing the fundamentals of LST and then develop our hypothesis and primary research question.

LST fundamentals

The LST theory was developed as an extension of Classical Test Theory (CTT, Lord & Novick, 1968) that expands the true-score domain beyond the individual to also recognize situational influences and person × situation interaction effects on test scores (Kenny & Zautra, 1995; Ormel & Schaufeli, 1991; Steyer et al., 1992, 1999). The basic LST model involves two fundamental decompositions of longitudinal data (Revelle & Condon, 2019). First, the observed test score variance is decomposed into state true-score variance and non-systematic measurement error variance (as in CTT). Second, state true-score variance is then decomposed into cross-occasion stable trait-like variance and state residual variance that represents occasion- or situationally specific components of the construct, along with trait × occasion interactions (Steyer, 1989; Steyer et al., 2015). As such, LST theory was developed in recognition that most psychological attributes reflect both stable trait (i.e., cross-situational or time-invariant) and more labile state (cross-situational, time-varying) components (Cattell, 1946; Hertzog & Nesselroade, 1987).

Like CTT, LST theory begins with the foundational idea that observed test scores represent both a true score component and non-systematic measurement error:

$$Y_{ijk} = T_{ik} + E_{ijk} \tag{1}$$

where Y_{ijk} is the *j*th realization of the *i*th person's observed score obtained in the *k*th measurement occasion, T_{ik} is the expected value of Y_{ijk} upon an infinite number of repeated testings, and E_{ijk} represents non-systematic measurement error. However, unlike CTT, LST theory defines T_{ik} "is the *expectation . . . of* Y_{ijk} *conditional on the person in the situation*" (Steyer et al., 1999, pp. 393–394, italics original) rather than the person only. Like CTT the variance of Y_{ijk} ($VAR[Y_{ijk}]$) is partitioned into true score variance ($VAR[T_{ik}]$) and non-systematic error variance ($VAR[E_{ijk}]$). However, LST theory partitions T_{ik} further into stable/time-invariant and situationally specific time-varying true score components:

$$T_{ik} = t_i + r_{ik} \tag{2}$$

where τ_k is the cross-occasion stable portion of T_{ik} (corresponding to the CTT notion of true score) and r_{ik} is a residual (i.e., $r_{ik}=T_{uk}-\tau_i$) that represents a combination of situation-specific portion of T_{ik}, plus a person × situation interaction component.

Initially, LST theory was applied in the clinical and personality areas of psychology to assess the relative stability versus volatility of a number of different factors, many of which had traditionally been thought of as being stable, trait-like constructs such as anxiety (Spielberger, 1983), depression (LaGrange et al., 2011), Big Five personality dimensions (Dienzer et al., 1995), attributional style (Cole et al., 2008), self-esteem (Donnellan et al., 2012), panic disorder (Conway et al., 2016), and acquiescence (Wetzel et al., 2016). Applications of LST theory in these areas almost invariably indicated that the focal construct demonstrated both trait consistency (as was assumed) but also occasion specificity. Even constructs considered to be very stable (e.g., intelligence) demonstrated significant occasion-specificity (Hermes & Stelling, 2016) and others that were thought to be intrinsically labile (e.g., mood), show non-negligible trait consistency (Windle & Dumenci, 1998). As such, these early findings challenged traditional assumptions that (a) psychological constructs can be dichotomized into those that are inherently stable and others that are inherently labile, and (b) individuals' personality characteristics need only be assessed once in longitudinal research due to their presumed intrinsic stability.

Subsequently, LST theory has been applied to identify stable trait and labile state components of a wide variety of additional phenomena, including self-management skills (Schuler et al., 2014), justice sensitivity (Bondü et al., 2016), mind wandering (Rummel et al., 2021), saccadic eye movements (Meyhöfer et al., 2016), and belief in the paranormal (Irwin et al., 2018). LST has yet to become widely adopted in IO psychology (Perinelli & Alessandri, 2020), but it has seen application in the analysis of trait and state components of constructs such as job satisfaction (Dormann et al., 2006), propensity to trust others in the workplace (van der Werff et al., 2019), career burnout (Schaufeli et al., 2011), employee well-being (Brauchli et al., 2013; Körner et al., 2014), and applicant cognitive ability (Hermes & Stelling, 2016). Table 1 lists LST theory applications in IO of which we are aware and as is shown here, the identification of both state and trait components in IO-related constructs (including WFC) is a ubiquitous finding. Periodic fluctuations in IO-related constructs is assumed to reflect corresponding variations in various demands and resources in the work environment, while observed stability in these same constructs is interpreted as stemming from "stable attributes of the person and his or her social environment" (Brauchli et al. (2013), p. 119), that is person characteristics (e.g., disposition, personality, or affect) stable situational characteristics (e.g., regular job duties and responsibilities), or both. We discuss this idea further with respect to WFC specifically, but first, we summarize analytic models in LST theory research.

LST analytic models

The earliest LST analytic models were Kenny and Zautra's (1995) state-trait-error (TSE) model and Steyer and Schmitt's (1994) latent state-trait model with autoregression (LST-AR). Both of these models conceptualize a general model component representing common (i.e., stable) variance across measurement occasions, residual components that represent measurement-occasion-specific variance, and a non-systematic error component. Cole et al. (2005) studied these two models using simulated data and introduced a more general and flexible latent variable model –1994 the state-trait-occasion (TSO) model that overcame many of the problems of nonconvergence and improper estimates that the TSE and LST-AR models often encountered. Several other analytic models have been developed, including adaptations of the multitrait-multimethod matrix and a number of "special purpose" models (e.g., parameterization of both random and fixed situations; (Geiser et al., 2014, 2020), but Cole et al.'s TSO model is the most widely adopted model in practice.

Table 1. LST theory applications in IO psychology.

Source	Construct Studied	% Trait Variance
Schaufeli et al. (2011) *JOOP*	Burnout	25%
Brauchli et al. (2013) *JVB*	Job resources	48–69%
	Job demands	30–35%
	Work engagement	40–45%
Körner et al. (2014) *SIR*	Work demands	9–12%
Seppälä et al. (2015) *EJWOP*	Work engagement	39–77%
	Job resources	46–49%
Hermes and Stelling (2016) *IJSA*	Mental arithmetic	95%
	Auditory memory	93%
	Visual memory	95%
	Visual perception	94%
	Selective attention	93%
Gnambs and Buntins (2017) *EJPA*	Life satisfaction	69–97%
van der Werff et al. (2019) *FIP*	Trust propensity	41% & 90%
Ock (2019) *IJSA*	Job Satisfaction	48%
Perinelli and Alessandri (2020) *IJSA*	Self-esteem	59%
	Work engagement	69%
	Affective commitment	65%
	Extra-role performance	73%
Smith et al. (2022) *JOOP* Study 1	WIF	79%
	Autonomy	85%
	Workload	77%
	Neuroticism	94%
Smith et al. (2022) *JOOP* Study 2	WIF	75%
	Perceived Org. Support	38%
	Challenge stressors	79%
	Hindrance stressors	60%
	Ethical leadership	44%
Matthews et al. (2022) *JOHP*	Workplace incivility	66%

JOOP = Journal of Occupational and Organizational Psychology, JVB = Journal of Vocational Behavior, SIR = Social Indicators Research, EJWOP = European Journal of Work and Organizational Psychology, IJSA = International Journal of Selection and Assessment, EJPA = European Journal of Psychological Assessment, FIP = Frontiers in Psychology, JOHP = Journal of Occupational Health Psychology. WIF = Work interfering with family.

The TSO model

The TSO model's longitudinal measurement structure (Figure 1) parameterizes a unidimensional factor structure for each measurement wave that represents construct-in-situation State, where the first-order factor (FOF) loadings are fixed at 1.0 in order to pass the indicators' covariance structure up to the level of the State FOFs. Loadings for Trait and Occasion (Occ) factors are also fixed at 1.0 and State first-order factors' variances are fixed at 0 so that they are apportioned entirely into either cross-occasion stable trait or occasion-specific components. An autoregressive function (β) that distinguishes the TSO model from a simpler multiple-indicator LST model (Cole et al., 2005) is sometimes included to account for stable variance between adjacent States that is not stable across the entire timeframe studied, and therefore is not accounted for by the general trait SOF. Also, a congeneric measurement structure is often tenable, implying equality constraints on the manifest indicators' uniquenesses across measurement waves (these are testable assumptions, see below), and stationarity is usually assumed for the occasion factors, implying equality constraints on β over time, where appropriate (Cole et al.). As such, the TSO model partitions State FOF variance into a SOF trait portion representing stability of the construct over the entire course of the study, a residual occasion portion that represents unstable variance unique to each measurement period, and (perhaps) some third portion (β^2) that represents residual stability between adjacent measurement periods that is not captured by the global trait stability SOF.

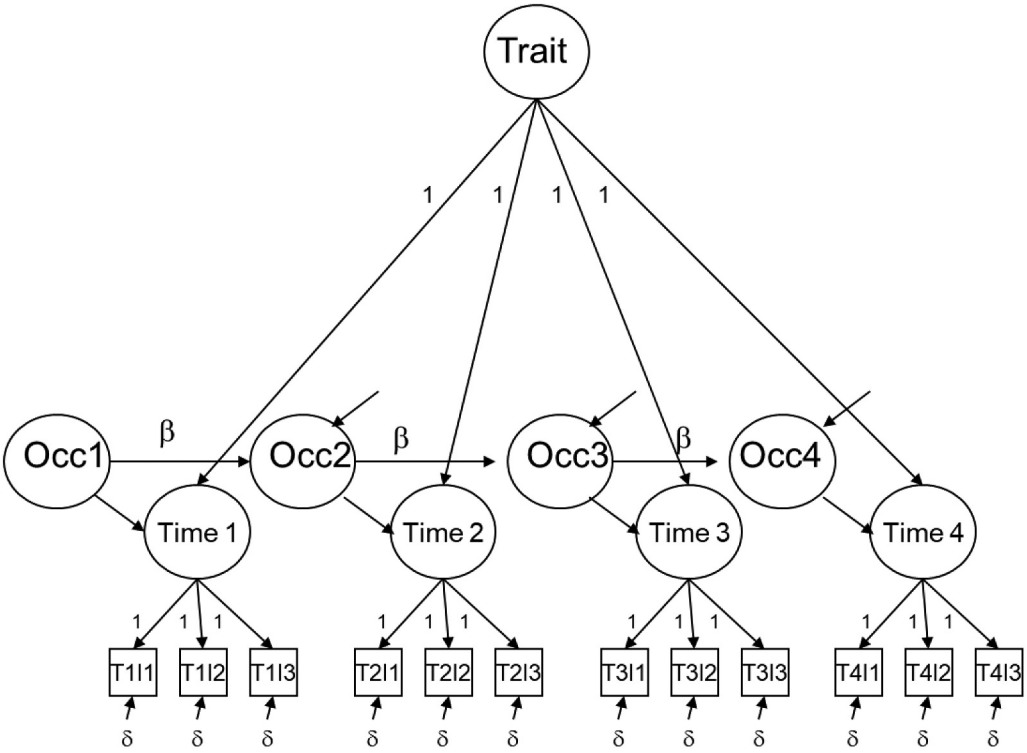

Figure 1. Four wave, three-indicator TSO model.

Hypothesis development

Applications of LST theory in IO psychology have been reasonably consistent in interpreting labile occasion factors as resulting from changes in demands and resources in the work environment (Körner et al., 2014; Ormel & Schaufeli, 1991; Schaufeli et al., 2011), or more generally as "the effects of various social, psychological, and biological *external change events* (emphasis added; Brauchli et al., 2013, p. 119). In other words, unstable occasion components of focal constructs are seen as arising from episodic influences in the external environment. Likewise, Job-Demands Resources theory (Bakker & Demerouti, 2007; Demerouti et al., 2001), suggests that repeated exposure to work demands over time can lead to psychological and/or physical costs for individuals, resulting in strains such as WFC. Therefore, it is generally accepted in the WFC literature that experienced WFC increases or decreases from occasion to occasion "because of a fluctuating mix of demands and resources across work and family roles" (Allen et al., 2019, p. 252).

Job Demands-Resources theory defines job demands as those physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort (Bakker & Demerouti, 2007). Therefore, work demands can be operationalized in two slightly different ways. The most common approach is to measure individuals' *perceived* work demands or workloads, such as the amount of effort put in and perceived overload (Spector & Jex, 1998). Alternatively, more objective indicators, such as the number of work hours or overtime hours required, are also often available. In previous meta-analyses, work time demands and perceived overload each explained over 20% of the variance in WFC (Michel et al., 2011). It is important to note that WFC is not only experienced due to strain from overwork but also due to the lack of time for the family role when excessive time is spent on work (Greenhaus & Beutell, 1985). Thus, including both subjective and objective measures is crucial in

understanding WFC. In line with this reasoning, a recent meta-analytic study on WFC found that both perceived work demands ($r = .36$ and $\rho = .46$) and work hours ($r = .24$ and $\rho = .27$) were positively related to WFC (Allen et al., 2020).

In this research, we expect that work demands (i.e., perceived work demands, perceived overload, work hours, overtime) will fluctuate when measured on a daily and weekly basis. While Smith et al. (2022) suggest that work demands exhibit stability when repeatedly measured over longer time frames (months, years), they may vary even more when examined across much shorter periods (days, weeks). This short-term variation may depend on the specific job situations faced by employees within days and weeks, such as important meetings, project deadlines, high versus low customer traffic, and impromptu feedback from supervisors. As most employees' work schedules are typically organized around daily and/or weekly structures (Monday to Friday), previous experience sampling studies have assessed work demands on both a daily and weekly basis and found their fluctuations were associated with the fluctuations in WFC (e.g., Ilies et al., 2007; Wood et al., 2013). Thus, we hypothesize:

Hypothesis 1: Situational variation in work demands will be associated with corresponding situational variation in WFC.

The results of our brief review in Table 1 indicate that the majority of constructs studied in IO psychology have non-negligible, and in some cases substantial trait-like components. Most important for the present study are results from Smith et al. (2022) suggesting that upwards of 75% of the variance in perceptions of work interfering with family (WIF) is trait-like (stable) over periods ranging from 5 months to 3 years. Researchers implicitly acknowledge that stable WIF can be " ... based on stable personal characteristics (e.g., personality, affect) and stable environmental conditions" (Seppàlà et al., 2015, p. 361), but it is unclear whether personal or situational characteristics (or perhaps both) are primary determinants of trait-like WIF. First, work-family scholars have found robust effects for individual difference factors such as the Big Five, and positive affect and negative affect as predictors of WFC (see Michel et al., 2011; Allen et al., 2012 for meta-analyses). Allen et al. (2012) argue that "negative affect impacts how individuals perceive their jobs" and can "predispose individuals to negative exposures and reactions" including perceptions of WIF (p. 18). Similarly, Michel and Clark (2009) found evidence that negative and positive affect shape how people interpret their work-family experiences as either conflicting or enriching. Regarding WFC and Big Five personalities, Li et al. (2023) found that the most robust change-related reciprocal relationships observed from two longitudinal datasets involve neuroticism and Extraversion. They speculated that this may be due to the fact that neuroticism and Extraversion mainly represent affective traits among other Big Five. Thus, person-variables, which are often thought to be reasonably stable, are likely to explain some of the stability in WFC.

On the other hand, stability in situations may also explain stability in WFC. Given that WFC arises from incompatible role demands between work and family, work demands have been commonly viewed as a key predictor of WFC in the literature, particularly concerning the direction of work interfering with family (see Allen et al., 2020, for a meta-analytic review). While individuals certainly experience fluctuations in work demands, many of life's circumstances are quite stable (Luhman et al., 2011), including work, where major changes in leadership, work climate, salary, co-workers and rules and regulations are relatively rare (James & Jones, 1976). Thus, it is not clear whether stability in person or stability in situation is the primary driver of stability in WFC. The answer to this question holds significance not only in a theoretical context but also in practical terms, when considering the potential efficacy of various interventions aimed at mitigating WFC. If WFC levels are predominantly influenced by *persons*, then interventions should be aimed at individuals (e.g., mindfulness, work-family balance training, job crafting). If they are driven by the *situation*, then interventions should focus on the organization (e.g.,

reduction of work demands, increasing family-friendly policies and supervisor support). Thus, the key question addressed in the present study:

Research Question: Will stable, time-invariant, trait-like components of WFC be better predicted on the basis of enduring individual differences (e.g., personality, affect) or, on the basis of intrinsic stability in the work environment itself (e.g., hours worked, perceptions of overload)?

Method

Data reported here represent secondary analyses of portions of larger datasets collected previously for other purposes and which are described in more detail in the original studies. Reporting of archival data, including secondary analysis, is increasingly recognized as an important adjunct to primary data in organizational research (Barnes et al., 2018; Kessler & Shoss, 2022). We chose the primary datasets that we report here because they contained previously unanalyzed and unreported portions of rigorously collected data that we required for the present study, that is, periodic measures of WFC and personal and work environment predictors. All data were diary-type studies with data collected either daily or weekly, in order to represent the two most often-reported data collection intervals in studies summarized by Allen et al. (2019). Also, we limited the number of measurement waves reported here to four or five in order to (a) keep this aspect of the data constant across datasets, (b) represent the modal number of waves reported in Allen et al. (2019) review, and (c) represent a typical number of measurement waves in TSO modeling (Castro-Alvarez et al., 2022). Below, we provide brief descriptions of the original studies, indicate the subsets of data that we report here and describe our general data analysis strategy.

Cho et al. (2020)

Full-time employees were recruited through website postings (e.g., Facebook) to participate in a 2-phase daily diary study on the effects of multidimensional information and communication technology (ICT) demands on daily work and nonwork-related outcomes. Phase 1 baseline measures included demographic information, personality, work climate perceptions, general ICT demands and support, leisure activities, and various health-related information. Phase 2 diary-study data were collected on 10 consecutive days measuring affect, recovery, sleep patterns, work environment perceptions, workload, and WIF. We report Days 1–5 diary data from the same 98 participants included in the original study.

Park et al. (2020)

Data were collected in 2017 from full-time public elementary school teachers in the American Midwest in two phases. Phase 1 baseline assessed demographics, boundary control, work environment perceptions, and personality. Phase 2 diary-study data were collected weekly on five consecutive Fridays assessing ICT demands, work environment perceptions, workload, insomnia, and WIF. Data reported here are from 426 study participants who completed four or more of the weekly diary surveys.

Totterdell et al. (2006)

Data were obtained in the UK by recruiting portfolio workers (self-employed freelancers with multiple clients) by postings in newspapers, magazines, online, and through personal contacts in two phases. The Phase 1 baseline survey assessed factors such as personality, optimism, problem solving, social support, and job-related strain. Phase 2 diary data were collected for 26 consecutive weeks assessing factors such as work demands, job control, social support, psychological strain, and WFC. Data reported here were from 52 respondents who provided data on at least two occasions in Weeks 6–10.

Table 2. Study measures.

Cho et al. (2020):

Baseline measures

Watson et al. (1988) PANAS scale: "Indicate to what extent you generally feel this way, that is, how you feel on the average?" (1 = very slightly or not at all, to 5 = extremely). 10 items each measuring *positive affect* (e.g., confident, enthusiastic, active, M = 36.87, SD = 5.52,α = .82) and *negative affect* (e.g., irritable, upset, nervous, M = 22.85, SD = 13.29, α = .98).

Daily measures

Work to family conflict (Netemeyer et al. (1996): Five items, e.g., "This evening, the demands of my work interfered with my home and family life" (1 Strongly disagree to 5 = Strongly agree, M = 1.95, SD = 1.28, α = .97)

*Number of Hours Worked (*Demerouti et al., 2012):"How many hours did you work today? ___hours" (M = 7.57, SD = 1.53).

Daily workload (Spector & Jex, 1998): Three items, e.g., "Today I had a lot of work to do" (M = 3.06, SD = 0.99, α = .83).

Park et al. (2020):

Baseline measures

Watson et al. (1988) PANAS scale: "Indicate to what extent you *generally* feel this way." 10 items each measuring positive affect (e.g., confident, enthusiastic, active, M = 35.53, SD = 6.40, α = .89) and negative affect (e.g., irritable, upset, nervous, M = 20.28, SD = 6.48, α = .87).

Weekly measures

Work to Family Conflict (Matthews et al., 2010): Three items, e.g., "This week, my job demands and responsibilities interfered with my family/personal life" (1 = Strongly disagree 5 = Strongly agree, M = 3.12, SD = 1.19, α = .84).

Overtime Hours Worked "How many hours did you overwork this week? ___Hrs." (M = 7.28, SD = 6.56).

Quantitative Work Demands (Peeters et al., 2005): Four-items, e.g., "Did you have to work very hard this week?" (1 = Strongly disagree 5 = Strongly agree, M = 4.08, SD = 0.88, α = .89).

Totterdell et al. (2006):

Baseline measures

Conscientiousness, Agreeableness, Neuroticism/Emotional stability, Openness, and Extraversion each measured as the sum of 8 items from the Big-Five Mini-Marker Set (Saucier, 1994), e.g., "Are you . . . Careless, Moody, Imaginative, etc.?" (1 = Extremely inaccurate to 5 = Extremely accurate) (C: M = 58.69, SD = 10.13, α = .86; A: M = 56.38, SD = 8.13,α = .76; N: M = 45.27, SD = 12.67, α = .85; O: M = 54.33, SD = 10.69, α = .85; E: M = 44.87, SD = 12.77, α = .86).

Weekly measures

Work Interfering with Non-work (Totterdell et al., 2006): "How often you feel work interfered with non-work activities in last 7 days?" (1 = Never to 5 = Very often) (M = 2.19, SD = 1.14).

*Number of Hours Worked (*Totterdell et al., 2006):"Approximately, how many hours did you spend doing paid work the last 7 days?" (M = 27.67, SD = 15.83).

Work Demands (Totterdell et al., 2006): Four-item scale measuring the extent to which participants experienced conflicting demands on their time and tasks at work, e.g., "The extent you experienced conflicting demands on your time in last 7 days?" (1=Not at all to 5 = A great deal, M = 2.48, SD = 0.85, α = .76).

Szeman and Griggs (2021)

Baseline measures

Donnellan et al. (2006) measures (5=Strongly agree to 1= Strongly disagree) of *Extraversion*: mean of four items, e.g., "I make friends easily," and "I am the life of the party" (M = 3.77, SD=.87, α = .87) and *Neuroticism*: mean of five items, e.g., "I have frequent mood swings," and "I am often down in the dumps" (M = 2.76, SD=.87, α = .76).

Watson et al. (1988) PANAS scale: "Indicate to what extent you generally feel this way, that is, how you feel on the average?" (1 = very slightly or not at all, to 5 = extremely). 5 items each measuring *positive affect* (e.g., confident, enthusiastic, active, M = 3.13, SD=.90, α = .88) and *negative affect* (e.g., irritable, upset, nervous, M = 1.86, SD=.88, α = .88).

Daily measures:

Work Interfering with Family (Matthews et al., 2010): Sum of three items, e.g., "Today, I was so emotionally drained when I got home from work that it prevented me from contributing to my family" 5=Strongly agree to 1=Strongly disagree), (M = 2.19, SD=.80, α = .79).

Number of Hours Worked: Daily report of the number of hours worked that day (M = 7.95, SD = 2.04)

Perceived Overload (Reilly, 1982): Sum of three items, e.g., "Today, I had too much work and not enough time to do it." 5=Strongly agree to 1=Strongly disagree), M = 2.51, SD=.96, α = .82).

Szeman and Griggs (2021)

Data were collected over a period of six consecutive days from 76 full-time (mostly university) employees in the southeast US for a study on leisure, stress and work-family conflict and balance. Surveys were administered online by hyperlinks to Qualtrics surveys distributed by SMS text messages and/or e-mail. Baseline measures obtained on Day 1 included basic demographic information, respondents' typical time spent at work, with family, and in leisure, and personality (Extraversion, Neuroticism, Positive and Negative Affectivity). Phase 2 diary data were collected on Days 2–5 on total time spent at work, with family, and in leisure, as well as their perceptions of work overload and WFC. Day 6 measures were retrospective

Table 3. Sample characteristics overview.

	Cho et al. (2020)	Park et al. (2020)	Totterdell et al. (2006)	Szeman and Griggs (2021)
Participants	"General sample of working adults"	Public elementary school teachers	Portfolio (freelance) workers	University faculty and staff
Location	United States	Midwestern US	United Kingdom	Southeastern US
% Female	50%	93.2%	69%	77%
Race	NA	93% Caucasian	NA	84% Caucasian
Age *M* (*SD*)	35.41(7.62)	41.84(10.87)	.63(10.54)	"25–34 yrs."
Work hours	7.68(.96)/day	49.07(8.48)/week	32.11(13.47)/week	43.74(12.01)/week
Job Tenure	6.61(4.07) yrs.	15.02(9.25)	11.01(9.28)	NA
Education	BA 58% MA 31%	BA 23% MA 74%	Bachelors 69%	NA
# Waves	5	5	5	4
Intervals	Days	Weeks	Weeks	Days
Duration	One week	Five weeks	Five weeks	Four Days

NA = Not available. BA = Bachelor's degree. MA = Master's degree.

summary measures of variables measured on Days 2–5. Specific measures reported here are summarized in Table 2.

Study measures

Table 2 summarizes the subsets of data that we report in the present study. In each case, we report (a) both objective (work hours) and perceptual (workload) measures of the work situation, and (b) respondent personal characteristics (personality and/or affect).

Table 3 provides a side-by-side summary of the studies' sample characteristics. Generally speaking, participants were predominantly college-educated women that represented typical ranges of employee ages, job tenure, and working hours. Also, note that the studies' data collection frequencies and durations were representative of diary-type data in the WFC area (Allen et al., 2019; Castro-Alvarez et al., 2022). More importantly, however, we chose studies with these measurement structures as representative of most workers' natural work structures (daily and/or weekly goals) so as to match as closely as possible the measurement cycles with naturally-occurring causal cycles among the variables assessed (Hopwood et al., 2022; Mitchell & James, 2001).

General analytic strategy

Data manipulation, transformations, scale analyses and descriptive statistics were effected using SPSS Version 28. We used LISREL-8 (Jöreskog & Sörbom, 1996) to (a) establish longitudinal measurement invariance (Vandenberg & Lance, 2000), and (b) select an appropriate univariate TSO model for each of the studies' measures, testing for (i) autoregressive effects between occasion factors, (ii) Method effects for like manifest indicators over time (Geiser & Lockhart, 2012; LaGrange & Cole, 2008), and (iii) homoscedasticity between occasion factors. Finally, we (c) estimated bivariate TSO models for WIF and work hours and workload separately (see Figure 2), (d) combined the bivariate models into a trivariate TSO model of WIF and work environment variables, and (e) augmented this trivariate model with exogenous personality predictors of the trait-WIF SOF (Figure 3). Following Newman's (2014) recommendations, we used LISREL's expectation-maximization algorithm applied to missing data using FIML.

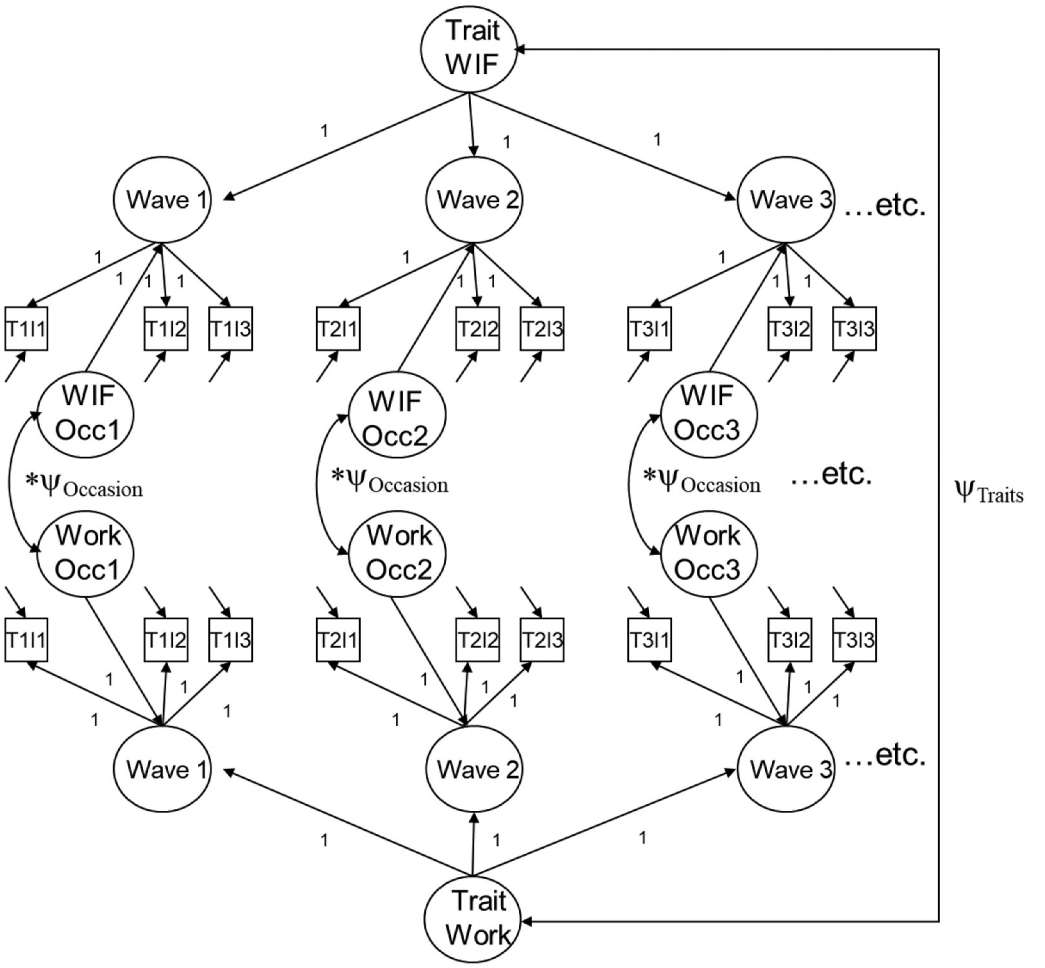

Figure 2. Generic bivariate TSO model for WIF and work characteristics (work).

Results

Measurement invariance

As recommended by Vandenberg and Lance (2000) we began with an omnibus test of the equality of covariance matrices for study variables with multiple indicators across repeated measurement waves using their recommended multi-sample approach (these tests are irrelevant for single-item measures). Analyses failed to reject the omnibus null hypothesis of no measurement differences over time, indicating that measures were substantially invariant over time and that "further tests of specific aspects of ME/I are neither needed nor warranted" (Vandenberg and Lance, p. 36). As such, we proceeded further to our main analyses.

Univariate TSO models

We first selected appropriate univariate TSO models for use in subsequent analyses. We tested for three variations on the basic univariate TSO model shown in Figure 1: (a) the possible presence of Method effects, parameterized as correlations between like items' uniquenesses across measurement waves (this option is moot for single-indicator models), (b) homoscedastic FOF residuals across measurement waves, and (c) the

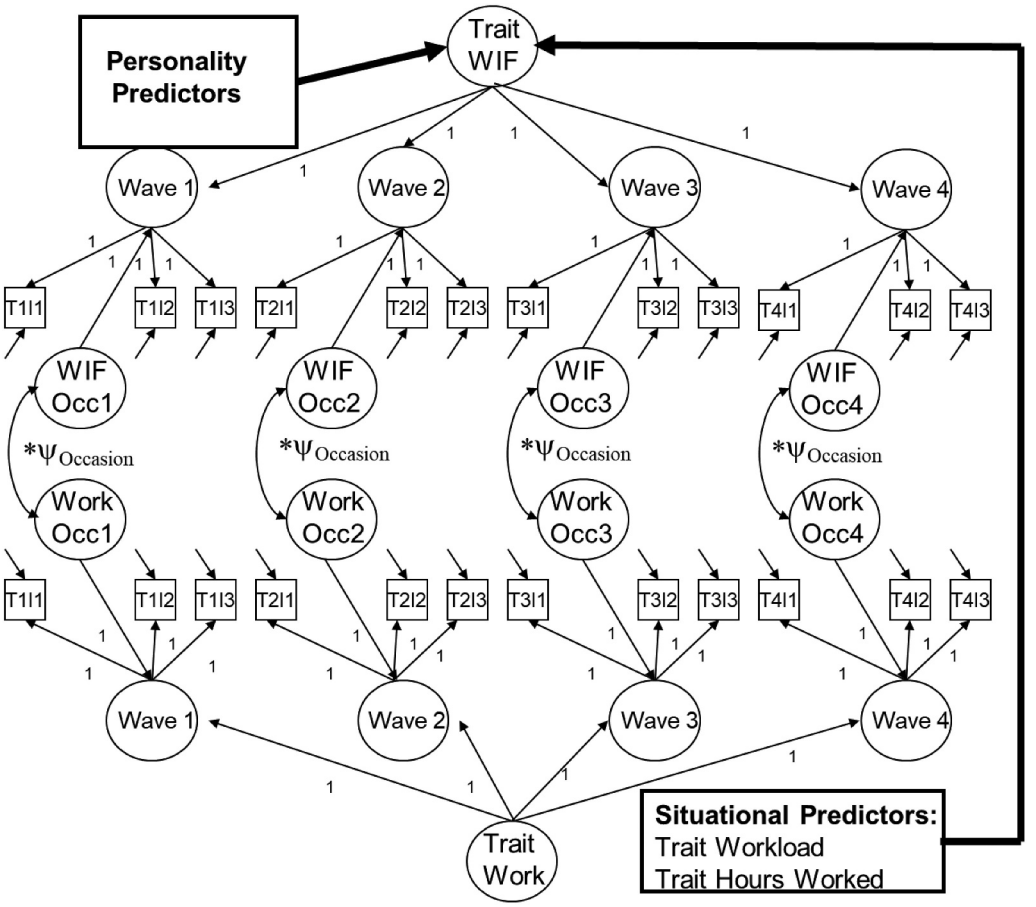

Figure 3. Trivariate TSO model with exogenous predictors.

Table 4. Univariate model selection summary.

	Method Effects	Homoscedastic Uniquenesses	Autoregressive Effects	% Variance Trait	% Variance Occasion
Cho et al. (2020):					
WIF	No	Yes	No	81	19
# Hours Worked	N/A	Yes	No	70	30
Perceived Workload	Yes	Yes	No	77	23
Park et al. (2020)					
WIF	Yes	No	Yes	57	43
Overtime Hours	N/A	Yes	Yes	37	63
Work Demands	Yes	No	Yes	82	18
Totterdell et al. (2006)					
WIF	N/A	Yes	No	58	42
# Hours Worked	N/A	Yes	No	70	30
Perceived Workload	N/A	Yes	No	78	22
Szeman and Griggs (2021)					
WIF	Yes	Yes	No	36	64
# Hours Worked	N/A	Yes	No	33	67
Perceived Overload	Yes	Yes	Yes	58	42

WIF = Work interfering with family.

Table 5. Bivariate TSO model results.

	Correlations with WIF	
	Trait-Trait	Occasion-Occasion
Cho et al. (2020):		
#Work Hours	−.139	.245**
Perceived Workload	.818**	.274**
Park et al. (2020):		
#Overtime Hours	.340**	.338**
Perceived Work Demands	.608**	.324**
Totterdell et al. (2006):		
#Work Hours	.342**	.750**
Perceived Workload	.794**	.700**
Szeman and Griggs (2021):		
#Work Hours	.161	.470**
Perceived Overload	.550**	.435**

*$p < .05$, **$p < .01$.

presence of residual stabilities between adjacent measurement waves (βs in Figure 1). As Table 4 shows, Method effects were commonly supported for multiple-item measures, (b) a homoscedastic structure was supported for most of the models' FOF uniquenesses, and (c) except for the Cho et al. (2020) data, residual stability (i.e., autoregressive) effects were not indicated. These results defined the optimal univariate models for variables measured longitudinally that were combined into subsequent multivariate TSO models.

Also shown in Table 4, each variable evidenced both stable trait-related and labile occasion-specific variance components, contributing further to the accumulating LST theory literature indicating that psychological constructs (at least almost) invariably reflect both stable trait and labile occasion-specific components. Also notable from Table 4 are the facts that (a) estimates of the magnitude of stable trait-based variance in WIF perceptions ranged widely from 36% (Szeman & Griggs, 2021) to 81% (Cho et al., 2020), and that, (b) in general, workload *perceptions* were more highly trait-like than were objective estimates of workload (#hours). We can only speculate that the wide range of stability for the daily studies (36% vs. 81%) as compared to weekly studies (57% and 58%) may result from respondents forming subjective averages at the week's end in the weekly studies.

Bivariate TSO models

Optimal univariate TSO models from the previous step were next combined into bivariate models of relationships between WIF and workload predictors whose results are shown in Table 5. Significant occasion–occasion correlations in Table 5 ($^{*}\psi_{Occasions}$ in Figure 2, where "*" indicates equality constraints on estimates), supported H1 and the idea that fluctuations in WIF are related to corresponding fluctuations in both objective and perceived workload characteristics. Significant trait–trait correlations (ψ_{Traits} in Figure 2) were also supported in two of the four data sets, partially answering our RQ. In particular, however, the WIF-Perceived Workload correlations were noticeably larger than the WIF-WorkHours correlations. This finding is consistent with meta-analyses of WFC antecedents (Michel et al., 2011) which place workload among the strongest predictors of WFC, and nearly twice as predictive (r =.45) of WFC as work hours (r =.27). This is also consistent with the classic idea from the psychological climate literature that effects of objective work environment characteristics (e.g., #Hours) on individual outcomes (WIF perceptions) are mediated by individuals' perceptions of the work environment (perceived workload; James & Jones, 1974).

Table 6. Standardized regression results predicting "Trait" or Stable WIF.

	Totterdell et al. (2006)		Cho et al. (2020)		Park et al. (2020)		Szeman and Griggs (2021)	
Situational	#Work hours	−.014	#Work hours	−.523**	#Overtime hours	.278**	#Work hours	.013
Predictors	Perc'd Demands	.799*	Perc'd Workload	.380*	Perc'd Demands	.566**	Perc'd Overload	.305**
Person	Conscientiousness	.218	Pos. Affectivity	−.078	Pos. Affectivity	−.114	Extraversion	.111
Predictors	Agreeableness	.056	Neg. Affectivity	.360**	Neg. Affectivity	.175*	Neuroticism	.069
	Neuroticism	.251					Positive Affectivity`	−.053
	Openness	−.147					Negative Affectivity	.109
	Extraversion	−.095						

*$p < .05$, **$p < .01$.

Trivariate TSO models

Finally, bivariate TSO models from the previous stage were combined into trivariate models of longitudinal relations between WIF and both objective and perceptual measures of workload characteristics, which were also augmented with exogenous baseline measures of personality predictors of WIF (see Figure 3). For each sample, we compared three regression models with trait-like (Stable) WIF as the outcome variable: (a) a Situational model that regressed WIF on work characteristics, (b) a Personality Model that regressed WIF on exogenous baseline personality variables, and (c) a Combined Model that included all predictor constructs. The Situational Model indicated that work characteristics were significant predictors of WIF in each sample, whereas the Personality Model indicated that both positive and negative affectivity (PA and NA) were significant predictors of WIF in two samples (Cho et al., 2020; Park et al., 2020), but the Big Five were not.[1] When estimated together in the Combined Model (Table 6), NA (but not PA) remained a significant predictor of WIF in two cases, but these effects were far overshadowed by effects for work situation characteristics. Together, results in Tables 6 suggest that, primarily, stability in individuals' work environments and, to a lesser extent, stable NA give rise to stable, trait-like aspects of WIF.

Discussion

Since the advent of LST theory over 30 years ago (Steyer, 1989; Steyer et al., 1992), perhaps the most consistent finding in its application is that both trait-like consistency and occasion-specificity are supported for almost every psychological characteristic studied. As Hertzog and Nesselroade (1987) are often quoted "Generally it is certainly the case that most psychological attributes will neither be, strictly speaking, traits or states. That is, attributes can have both trait and state components" (p. 95). Even attributes assumed to be essentially fixed (e.g., cognitive ability) have been shown to evidence occasion-specific components (Hermes & Stelling, 2016), and other attributes thought to be ever-fluctuating (e.g., mood) have been shown to exhibit trait-like consistency (Windle & Dumenci, 1998). This basic finding has remained true as LST theory has been imported into IO psychology a little over a decade ago (Schaufeli et al., 2011), and it has been extended into the WFC literature (Smith et al., 2022) to include psychological perceptions of experiences. The current study contributes to this still emergent yet growing body of research by demonstrating its applicability to diverse employee populations, varying temporal intervals, and different operationalizations of WFC (here, WIF). This study suggests that WFC exhibits moderate (~35%) to substantial (~80%) trait-like consistency over days and weeks. The results also support the idea that stability in individuals' work environments and, to a lesser extent, stable individual characteristics predict trait-like aspects of WIF.

[1]The relatively small sample sizes and corresponding reduction in power in the Szeman and Griggs and Totterdell et al. datasets may have led to Type-II errors.

Theoretical implications

Our study answers intriguing inquiries for WFC research, particularly regarding the over-time fluctuations in WFC in short-term multi-wave diary investigations (i.e., "shortitudinal studies") using experience sampling methods (Dormann & Griffin, 2015). The study of the dynamic nature of WFC is crucial as it helps us understand the corresponding fluctuations in various work- and family-related factors, which further influence various individual outcomes (Allen et al., 2019). In the limit, if WFC were shown to be predominantly trait-based (stable over time), there would be limited remaining occasion-specific variance to covary with over-time fluctuations in work- and family-related factors, thus potentially attenuating estimates of these relationships. Fortunately, severe range restriction of this ilk has yet to be widely demonstrated, but LST research is still in its nascent stages in the WFC literature and IO more generally.

Nonetheless, this raises the fundamental question of how trait-like consistency in WFC emerges in the first place. It is tacitly acknowledged that trait-consistency in WIF can arise from either "stable personal characteristics" or "inherent stability within certain aspects of work situations." The main purpose of the present study was to address the question, "which is it?" Our findings indicate that trait-consistency in WIF perceptions stems more consistently from stability in subjective perceptions of the work environment, and to a lesser extent, objective characteristics of the work environment, than from personality factors. These findings are aligned with the long-accepted idea that psychological climate perceptions mediate the work environment–employee outcomes relationship (James & Jones, 1974). Additionally, the endorsement for situational factors aligns with findings from a recent study (Allen et al., 2023) that investigated the influence of heritable elements, dispositions (i.e., Big Five personality traits), and work environment (i.e., role demands) on WFC experiences. Specifically, Allen et al. controlled for genetic confounding to more accurately distinguish the person and situational determinants of WFC. While both personality traits and role demands demonstrated substantial influence, the results supported a dominant situational interpretation, as in our study. Thus, our results reinforce strong support for the impact of the (perceived) work environment on chronic WFC.

Recognizing the predominant influence of situational factors, our findings additionally highlight the non-negligible role of personality in producing WFC trait-like consistency. Specifically, we focused on the two most pertinent dispositional factors for WFC (i.e., affectivity and Big Five personality traits) to elucidate the contribution of individual dispositions to trait-consistency in WFC. Our trivariate TSO modeling analysis revealed significant effects of positive and negative affectivity on WIF in two samples (Cho et al., 2020; Park et al., 2020), whereas the Big Five personality traits did not show any significant effects. Notably, NA emerged as the sole significant predictor in the Combined Trivariate Model, indicating that among the dispositional predictors, stability in NA holds the greatest relevance for the trait-consistency in WFC. This finding is congruent with the selection effect (Caspi et al., 2005) and transactional model of stress (Lazarus & Folkman, 1984), which posits that individuals' subjective perceptions or appraisals of their environment shape their stress experiences. Individuals actively engage in self-selection, modification, and interpretation of their environment (Harden & Koellinger, 2020; Kendler & Baker, 2007; Li et al., 2016), such that the impact of situational demands is contingent upon the personal lens through which they are interpreted. In this case, it is possible that individuals with greater NA are more prone to self-select into stressful work and family experiences and perceive them as more stressful than individuals with lower levels of NA. This would be consistent with prior research, which demonstrated that affect engenders internal perceptions of situations as generally negative or positive, thus shaping how people interpret the work situation and work–family experiences (e.g., Li et al., 2023; Michel & Clark, 2009).

Finally, the disparity between the effects of NA and PA are not surprising, given that NA and PA are independent yet complementary dimensions of affect. This observation is consistent with the findings of Allen et al. (2012, 2020) that NA is more strongly related to WFC perceptions than is PA. It is widely recognized that NA, representing the *Unpleasant* pole of the valence dimension of Russell's (1980) Circumplex model of affect, predisposes individuals to negative exposures and reactions (Bruck &

Allen, 2003; Stoeva et al., 2002), making it a significant dispositional factor for undesirable aspects of work-family experiences. Conversely, PA is more closely linked to the pleasant aspects of work-family interface, such as achievements, celebrations, enrichment, thereby demonstrating stronger relevance to work-family facilitation and enrichment (Balmforth & Gardner, 2006; Michel & Clark, 2009; van Steenbergen et al., 2007; Wayne et al., 2007).

Practical implications

Research adopting a dynamic perspective on WFC offers valuable insights into the daily and weekly experiences of employees. Interventions aimed at reducing negative affect may be useful, such as boundary management, meditation, and mindfulness training, which have received a great deal of recent attention for their role in stress reduction and reduction of WIF (Kiburz et al., 2017). In particular, mindfulness training reduces stress and negative emotions by promoting present-moment awareness, regulating the stress response system, enhancing emotional regulation, fostering resilience, and encouraging self-care practices. Regular engagement in mindfulness activities may lead to long-term improvements in affect thereby improving WF management and subsequent well-being. However, based on our findings, practitioners should not overlook the enduring characteristics of work that contribute to the chronic experience of WFC. For instance, the cumulative effects of long hours and perceived overload on WFC perceptions may be attenuated in workplaces where paid time off and flexible work are not only available but where the use of such benefits is also supported by supervisors and cultural norms. Likewise, individuals who seek to alleviate their own work-family conflict might focus on job and career crafting which may increase perceptions of autonomy and self-control, thereby reducing work-family stress and increasing work-family balance (Ilies et al., 2012; Lyu & Fan, 2022).

Limitations and future research

Our study identifies a few limitations that warrant consideration for future research directions. While our focus was primarily on one representative operationalization of WFC, namely work-to-family interference (WIF), future research may broaden the scope to assess the degree of trait-consistency in family-to-work interference (FIW) perceptions to determine if parallel findings exist for FIW and if employees' family environments are the predominant source of trait-consistency in FIW. It is possible that, compared with the work domain, stability, and changes in the family domain (e.g., family member illnesses, developmental phases in children/child-rearing or eldercare, spouse mood) lead to variability or stability in FIW over time. Furthermore, while the current research examines mostly negative factors (i.e., demands) in relation to WIF, future research may test whether positive factors (i.e., resources) in the work environment (e.g., family-friendly supervisor support and organizational policies and programs like flextime or remote working) further explain trait-consistency in WIF. Such investigations would enhance our understanding of the influence of situational resources on WFC and help explain the effectiveness of organizationally focused interventions in mitigating work-family conflict.

We also see potential for further application of LST theory in IO Psychology. One of the strongest and most immediate payoffs of LST research may be the mere documentation of both state and trait components in familiar constructs. Indeed, several studies listed in Table 1 considered findings of substantial trait components in constructs traditionally thought of as being predominantly situationally dependent to be one of the major contributions of their findings (e.g., Donnellan et al., 2006; Perinelli & Alessandri, 2020). On the flip side, many of the early studies found it counterintuitive that alleged personality traits also exhibited occasion-specific manifestations (e.g., Borguis et al., 2017; Dienzer et al., 1995). As findings of the relative traitedness and statedness of IO constructs accumulate, reconceptualizations of the very nature of many IO constructs and their interrelatedness in theoretical models may emerge.

Second, LST modeling will be useful in determining whether measures of trait-oriented and state-oriented measures are successful in capturing the trait and state components of constructs as they are currently conceptualized or reconceptualized in the future. As one example of this line of research, Lance et al. (2021) used TSO modeling to determine the accuracy of Spielberger's state-trait anger and anxiety scales (Spielberger, 1983, 1988) in a sample of elder caregivers measured three times, 1 year apart each. They found that instructions intended to induce state ("as you feel right this very instant") versus trait ("as you usually feel") ideation made little difference as measurements using both the state and trait versions of the scales were dominated by trait variance components. As such, differences in state-based versus trait-based rating instructions may succumb to the inherent stability/variability of the population's subjective experiences and/or inherent stability/instability in the measurement situations. For example, Lance et al. interpreted their findings as indicating that the elder caregivers' anger and anxiety levels actually changed little across the three measurement waves, at least partially because their caregiving responsibilities had also changed very little. Situation strength (Cortina et al., 2022; Mischel, 1977) is likely one of the major determining factors of the effectiveness of state and trait measures' ability to discriminate the state and trait components of IO constructs.

Finally, LST modeling may prove to be useful in determining the potential viability of longitudinal modeling of intensive longitudinal designs (Zhou et al., 2021). One prerequisite for modeling changes over time is that there is sufficient variability in change in the measurement units to begin with. If not, longitudinal modeling applications such as latent growth or latent difference score modeling (Bolger & Laurenceau, 2013; Geiser, 2021) will be ineffective due to range restriction. Toward this end, extremely high percent trait variance components may signal restricted ranges of state variability and indicate that ensuing longitudinal modeling may be unable to detect what small amounts of change exist in the measurement units in the first place. Rules of thumb guidelines for potential range restriction from LST modeling results are, therefore, another area for future research. As such, we see a promising future for LST modeling in IO psychology.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethics statement

Research involving human subjects obtained formal, prospective, approval from an independent ethics committee.

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