

# Challenge and hindrance stressors and wellbeing-based work–nonwork interference: A diary study of portfolio workers

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**Stephen J Wood**

University of Leicester, UK

**George Michaelides**

University of London, UK

## Abstract

Stress-based work–nonwork interference, or negative spillover, is associated with transference of negative emotions from the work to the nonwork domain. It is argued that work–nonwork interference resulting from high work demands does not necessarily entail the reproduction of any affective states. First, calmness can result in lower work–nonwork interference and enthusiasm in higher levels. Second, hindrance stressors can be negatively related to enthusiasm and calmness, while challenge stressors are positively associated with them. Hypotheses about the relationship between stressors and interference that reflect this rationality are developed and tested using longitudinal data from a six-month diary study of portfolio workers. The results offer some support for them and indicate that both challenge and hindrance stressors are positively related to interference. However, for hindrance stressors the indirect effect is positive when mediated by calmness and negative for enthusiasm. In contrast, for challenge stressors the indirect effect is negative when mediated by calmness and positive when mediated by enthusiasm. The mediation paths are significant only for transient effects. Thus, there are indications that well-being can both increase or decrease interference depending on the nature of the stressor and whether it is mediated by calmness or enthusiasm.

## Keywords

work–nonwork interference, well-being, enthusiasm-based work–nonwork interference, challenge & hindrance stressors, portfolio work, diary study

## Corresponding author:

Stephen J Wood, School of Management, Ken Edwards Building, University of Leicester, University Road, Leicester LE1 7RH, UK.

Email: [s.j.wood@le.ac.uk](mailto:s.j.wood@le.ac.uk)

## Introduction

Greenhaus and Beutell's (1985) distinction between time-based work–family conflict and strain-based work–family conflict is now ubiquitous in the literature on the work–nonwork interface. Such conflicts are assumed to reflect conflicting role demands, so that meeting a demand in one domain (work or home) makes it difficult to meet those in the other. However, strain-based work-to-nonwork conflict implies that stress resulting from work will spill over to the nonwork domain, or vice versa, and have negative consequences. Strain in one role will affect the person's ability to perform another role. Strain-based work–family conflict is not then about conflicting roles: as Edwards and Rothbard (2000: 182) explain, 'Strain-based conflict does not connote conflicting demands per se but, rather, indicates that mere participation in a domain can produce strain that hampers role performance in another domain'. It may only be about conflict, therefore, in the sense that conflict at work or at home may create negative affective experiences.

Once strain-based conflict is distinguished from role conflict, it should be considered alongside positive-well-being spillover. Affective states at work or in the home can spill over whether they are negative or positive. States of ill-being and happiness in one domain may produce similar states in another that may hamper or harness performance. It is generally assumed that negative-well-being spillover will produce negative emotions in the other domain and thus the converse is true, that positive-well-being spillover will engender positive states. Thus, negative spillover is assumed to increase work–nonwork interference and positive spillover to reduce work–nonwork interference.

However, it is possible that negative affective experiences may reduce interference and positive moods increase it. For example, highly challenging demands at work may lead people to withdraw from them, or reduce their efforts to meet them, and in so doing reduce strain and free up energy and time for participation in nonwork activities. Or, such challenging work may generate positive, enthusiastic emotions that lead to increased interference as work reduces the enthusiasm and energy for nonwork activities. It is such possibilities as these that we pursue in this article. There has been a neglect of positive spillover, and the one study (Williams and Alliger, 1994) that investigated it concluded it was rare, perhaps justifying this neglect. Moreover, just as the umbrella concept of stress masks important differences in psychological states and between stressors, so its use in the label stress- or strain-based work–family conflict may do likewise. The concept is thus underdeveloped, and any related policy discussions largely focus on the need to eliminate stress or coping strategies.

Current spillover research has not sufficiently differentiated between dimensions of well-being, types of stressors or time frames. In this article, through differentiating these dimensions, we first develop theory on how work–nonwork interference may be affected by negative and positive spillover in diverse ways. Specifically, we differentiate well-being on the basis of circumplex theory (Warr, 2007), between anxiety–calmness and depression–enthusiasm; we differentiate between hindrance and challenge stressors following Cavanaugh et al. (2000) and LePine et al. (2007); and between transient and routine levels of stressors and interference as in Wood et al. (2013). The distinction between transient and routine levels of stressors and well-being is important for understanding how work–nonwork interference can result from both stable routines and fluctuations around those routines. In using it, we take more account of the potential for people to have irregular workloads and short-term uncertainties about their work and

income and of the value of within-person comparisons (Butler et al., 2005; Ilies et al., 2007a, 2007b; Williams and Alliger, 1994; Wood et al., 2013).

We then test the hypotheses developed through the theory using longitudinal data collected on a weekly basis from a sample of what are variously called portfolio workers, freelance workers or independent contractors. We define these as self-employed individuals who do assignments, either in series or in parallel, for a number of different organizations or clients, on a (typically short-term) commercial rather than employment contract basis. This under-researched group was selected because they are more likely to have fluctuations in their workloads over time and flexibility in their work scheduling than those in other occupations. Furthermore, work–nonwork interface may be an especially salient concern for portfolio workers, and managing this interface and having significant autonomy may be a strong reason for their becoming a freelancer (Clinton et al., 2006). Nonetheless, the fluctuations in workloads and changing requirements of clients may generate uncertainty and insecurities, which create pressures for portfolio workers and serve to dispel any notion that they are ‘free agents’ (Kirkpatrick and Hoque, 2006: 650).

Studies of portfolio workers or other nonstandard workers remain rare but are vital, as the numbers of some types (e.g. agency workers) may be growing in certain countries (Organisation for Economic Co-operation and Development [OECD] 2013). The reality of their lives may be very different from common stereotypes, which portray them at either end of the spectrum – as having richer lifestyles or as being in highly precarious economic circumstances. Our aim in studying them is to increase our understanding of their distinctiveness while unearthing features that perhaps may apply to other types of workers. In particular, supplementing the current focus on negative spillover with positive spillover and differentiating types of stressors will increase the theoretical and empirical understanding of work-to-nonwork interference beyond the portfolio worker case. This should have benefits for interventions and public policy. Work–life balance is currently of major concern to governments, organizations and individuals in most developed countries as its significance for health and the quality of life is increasingly recognized. But public and organizational discourses are often conducted in rather glib terms and research that differentiates reactions to stressors may stimulate a richer, evidence-based approach.

## Conceptual background and hypotheses

As the theory of conflicting role pressures may apply to time-based but not strain-based work–nonwork conflict, we will use the term work–nonwork interference. Moreover, following Carlson and Grzywacz (2008), we can distinguish work–nonwork conflict from work–nonwork interference on the basis that conflict refers to the pressures that workers are under, while interference is a result of how they react to these pressures. Greenhaus and Beutell (1985) indeed acknowledge this when arguing that the direction of any interference – whether it is from work to nonwork or nonwork to work – will depend on decisions taken by the individuals in the light of any inter-role conflict. They give the following example: a person who responds to simultaneous role pressures by working more is likely to perceive that work interferes with their family, while if they respond by fulfilling family obligations they will perceive the family as interfering with work. As the examples illustrate, interference is bidirectional (Bryon, 2005; Frone et al., 1992; Grzywacz and Marks, 2000).

We use the term work–nonwork interference when referring to both directions, and work-to-nonwork interference (WINW) and nonwork-to-work interference (NWIW) for the two unidirectional terms. Our operational language matched this theoretical terminology, as we asked respondents to assess their degree of WINW and NWIW over the previous week. This is consistent with other measures used in the literature, where the measures capture interference rather than conflict (e.g. Fisher et al., 2009; Netemeyer et al., 1996; O'Driscoll et al., 1992).

The term nonwork is appropriate, because it is more inclusive than work–family or work–home, and covers interference of work in leisure (Tsauro et al., 2013) and avoids biases toward married or partnered people, or treating parenting as the main nonwork activity. The work–nonwork perspective is especially relevant for our study in the light of claims that portfolio working is a promising means of balancing all aspects of one's life (Handy, 1995), and evidence that the desire to do so may be a reason for people adopting it (Clinton et al., 2006; Fraser and Gold, 2001).

We also use the term well-being rather than stress or strain, since we are concerned with positive and negative affect. Well-being is assessed on its two core dimensions under the circumplex model of affect: anxiety–calmness and depression–enthusiasm (Warr, 1990). These are differentiated on the basis of the distinction between pleasure and arousal. The calmness and enthusiasm ends of the two well-being dimensions are characterized by a state of high pleasure or positive affect, but they differ with respect to arousal. Anxiety entails high arousal and depression entails low arousal.

### *Well-being as a mediator of the demands–work–nonwork interference relationship*

We concentrate on work demands as a potential stressor, both in qualitative (job demands) and quantitative (hours worked) terms. The focus is on how these demands affect people's well-being, and how this in turn affects their work or nonwork behaviour. We thus follow the model of Edwards and Rothbard (2000) and view well-being as the mechanism, under spillover theory, that links work and, in their terms, the family. Anxiety or depression generated by high demands will mean that work interferes with nonwork or nonwork interferes with work. The implication of this view of negative interference is that positive spillover is associated with low levels of demands, and hence with no work–nonwork interference. For example, Williams and Alliger (1994) found that feelings of elation (but not calmness) generated in the home extended over the family boundary to produce similar feelings at work. Such a process of well-being generated by nonwork or work experiences could even produce work–nonwork enrichment, that is improve affect or performance in the other domain (Carlson et al., 2006).

The work–nonwork interference is typically taken to be the reproduction of the emotional state associated with the demands of one sphere in the other. These processes are best modelled by a mediation model – so the well-being generated by work demands mediates the link between these demands and work–nonwork interference. In Widmer et al.'s (2012: 424) terms the latter is a work-related outcome, as it refers to 'behaviors in terms of performance' that are clearly distinguishable from well-being. We might thus talk of negative and positive well-being spillover to work–nonwork interference. In these terms, negative well-being spillover to work–nonwork interference is when the stressors

increase anxiety or depression, leading to one or both of WINW and NWIW. Positive well-being spillover to work–nonwork interference is when demands increase calmness and enthusiasm, and decrease one or both of work–nonwork interference.

However, similarity of emotions might not be the outcome of spillover from work or nonwork. The role of well-being as a mediator of the relationship between work stressors and work–nonwork interference may not then always be positive. First, negative well-being spillover from high demands may not necessarily be in the direction of increased work–nonwork interference. It may be that the response of the individual to high job demands is to withdraw from fulfilling them, at least to the normal standards, or to reduce the time devoted to them. This may reduce the impact of the demands in the non-work domain and hence work–nonwork interference. For example, people may become angry and depressed by certain demands at work but may not show this outside of work, instead responding by, for example, withdrawing from the family. A person may retire to bed early rather than spend time with their children, perhaps precisely to avoid their own anger and frustration manifesting itself and affecting others. In such cases, the interference is not the negative emotion but the withdrawal. The well-being mediator is then clearly distinct from the interference. The example also illustrates that the work–nonwork interference can only really be gauged in the person's own terms. Second, positive well-being may be generated by high demands, and this could result in increased interference as increasing work demands may increase enthusiasm. For example, fulfilling high workloads may eat into nonwork time, or coping with challenging demands may reduce the energy a person has for nonwork activities.

Given these possible divergences from the standard negative and positive spillover processes it is best to use well-being work–nonwork interference as the generic term. The term strain-based interference associates interference solely with strain and negative affect when it can be related to enthusiasm and other positive states. Equally, the terms negative and positive spillover are traditionally defined by the emotion in the domain leading them with the assumption that the outcome in the other domain will be consistent with that. However, since such consistency may not occur, the terms mask alternative mediation paths from the initial trigger through the psychological state to the work–nonwork interference.

Which mediation path applies will depend, we argue, on the type of stressor – on whether they are challenge stressors or hindrance stressors. The distinction between these types of stressor emerged out of a realization that the effects of stressors may not always be as one expects, and that challenge stressors may have positive employee outcomes, while hindrance stressors may be associated with withdrawal behaviours (Cavanaugh et al., 2000; Le Pine et al., 2004, 2005). As we are considering well-being on the two dimensions of anxiety and depression, there are four possible mediation pathways between hindrance and challenge stressors and work–nonwork interference, which we now explore.

### *Challenge and hindrance stressors*

Hindrance stressors are work-related demands or circumstances that tend to constrain or interfere with an individual's achievements at work, and are not likely to be associated with potential gains for the individual (Boswell et al., 2004). Almost by definition they

are associated with negative outcomes, including negative effects on well-being, as they 'involve excessive or undesirable constraints' (Cavanaugh et al., 2000: 67). These will create anxieties and psychological strain, and dampen enthusiasm and motivation, as 'the effort expended to cope with them is unlikely to be successful' (Clarke, 2012: 388).

In contrast to hindrance stressors, challenge stressors are 'work-related demands or circumstances that . . . have associated potential gains for individuals' (Cavanaugh et al., 2000: 67). The benefits derive from the opportunities they can provide for growth, learning and goal attainment. Taking advantage of such opportunities so that valued outcomes are achieved is a source of positive emotions (Lazarus, 1991). The beneficial effects of challenge stressors are reflected in worker outcomes such as continuance commitment and organizational citizenship behaviour, or less withdrawal behaviour, turnover and absence. Such positive outcomes have been revealed in empirical studies (e.g. Boswell et al., 2004) and meta-analyses have confirmed that they are unique to challenge stressors, and that the reverse is the case with hindrance stressors as they have negative effects (LePine et al., 2005; Podsakoff et al., 2007). The explanation for this is rooted in the assumption that challenge stressors are associated with high motivation because they provide the opportunity for growth, and there is a positive association between effort and rewards (Clarke, 2012: 388; LePine et al., 2005).

Enthusiasm is a manifestation of high motivation, if not the same phenomenon. This is especially interesting since, in the circumplex model of affect, enthusiasm is at the opposite end of the spectrum to depression, which existing theory assumes will be positively related to challenge stressors. Indeed, it is reported to be included among the outcomes in the meta-analysis that showed challenge stressors are positively related to strain measures (Podsakoff et al., 2007: 442). That enthusiasm is at the opposite end of the spectrum to depression, and is associated with high motivation and arousal, suggests that perhaps the depression–enthusiasm dimension of strain does not behave as the anxiety–calmness one, and that movements along the dimensions may have different effects on work–nonwork interference. The enthusiasm may be at the expense of nonwork activities, as, for example, the person may not readily leave tasks uncompleted to be finished another time. In such ways, fulfilling challenging work or completing a long schedule may interfere with nonwork.

We would therefore expect challenge stressors to increase enthusiasm. In turn, we also expect enthusiasm to increase work–nonwork interference, and hindrance work stressors to decrease enthusiasm (or increase depression). This suggests the following two hypotheses:

*H1a:* Challenge work stressors are positively associated with work–nonwork interference and this is mediated by enthusiasm, which has a positive relationship with both challenge stressors and work–nonwork interference.

*H1b:* Hindrance work stressors are positively associated with work–nonwork interference, and this is mediated by enthusiasm, which has a negative relationship with hindrance stressors and a positive one with work–nonwork interference.

In a similar vein, challenge stressors can reduce anxiety and increase calmness, while hindrance stressors are more likely to do the opposite, increase anxiety and reduce calmness. For example, challenge stressors can reduce anxiety if individuals are concerned about a scarcity of work or opportunities for growth and mastery. Conversely, not having



enough challenging work, or even work of any kind, can be a source of anxiety. This is illustrated by workers doing routinized, potentially boring work being among the most stressed. Portfolio workers, like workers on piecework, might particularly be anxious about not having enough work to fill their preferred working day, or to earn sufficient money to maintain their standard of living. Increasing workloads may thus be associated with reduced anxiety. In this case, in contrast to increased enthusiasm, the increased calmness will reduce work–nonwork interference, as it enables the person to relax more readily in their nonwork. We therefore propose the following two hypotheses:

*H2a:* Challenge work stressors are positively associated with work–nonwork interference, and this is mediated by calmness, which has a positive relationship with challenge stressors and a negative relationship with work–nonwork interference.

*H2b:* Hindrance work stressors are positively associated with work–nonwork interference, and this is mediated by calmness, which has a negative relationship with hindrance stressors and work–nonwork interference.

A final possibility, alluded to earlier, is that hindrance demands may not necessarily influence work–nonwork interference, even if they increase anxiety or depression. When faced with constraints or conflicting demands, individuals may take short-cuts, reducing their effort so they just achieve the minimum standard for particular tasks, or even withdraw from certain tasks altogether. This is consistent with the observation that hindrance stressors are associated with reduced organizational citizenship behaviour (Webster et al., 2010). If these processes happen, the strain associated with hindrance stressors will not necessarily spill over to nonwork. The withdrawal behaviours are coping mechanisms that mean work–nonwork interference does not necessarily increase with the stressors or with associated affective experiences at work. This is less likely to be the case for anxiety–calmness than for enthusiasm–depression. The very meaning of work-related anxiety implies a negative or unpleasant affective state, but also that one cannot readily disengage from thinking about work, even outside of it. However, when the affective state resulting from increased demands is depression, then one may cope by disengaging and withdrawing. It is also possible that, in this case, individuals will not interpret their disengagement and spending time on nonwork activities as the results of depression from work. Instead, it is more likely that they will interpret nonwork to be interfering with work, preventing them from fulfilling their work obligations.

The evidence is nonetheless that the effects of work demands, being a work factor, are more likely to reside in the work than the nonwork domain, and thus we expect the well-being effects are more likely to be on WINW than on NWIW (Amstad et al., 2011; Bryon, 2005; Shockley and Singla, 2011). We therefore anticipate that the mediating role of well-being will be greater in the relationship between work demands and work–nonwork interference than between work demands and nonwork–work interference. Thus, we test:

*H3:* The indirect effects of work demands on work–nonwork interference mediated by well-being will be stronger than those of nonwork–work interference.

### *Differentiating the routine from the transient*

We will now introduce a temporal dimension to our discussion, a dimension that has been under-researched in the work–nonwork literature. While people may have fairly stable patterns to their lives, fluctuations in the factors that affect the work–nonwork interface may particularly impact upon their well-being precisely because of these routines. Variations in job demands and workloads are especially likely to have an impact. We thus address the temporal issue through differentiating between routine and transient levels of stressors and well-being.

Routine and transient levels of stressors may have varying effects. High levels of stable stressors are associated with chronic affect, while transient levels are associated with acute affect. Their nature and effects may differ, and how individuals cope with each may vary. Studies of work–nonwork interference tend to assume what Geurts et al. (2003: 535) call ‘normal circumstances’, and that people have relatively stable routines to their lives, though fluctuations will occur. Yet studies that have assessed between- and within-person variations find both are important, and in fact in Butler et al. (2005) the proportions of the total variation in work–family interference and job demands were almost identical. Transient stressors may be experienced as shocks, as they jar with the routine, and their very unfamiliarity may mean they create anxiety and fear precisely because they require adjustments. People’s normal circumstances may be built on what Moen and Wethington (1992) call family adaptive strategies, creating some social and psychological coherency to their lives. Moreover, violations of expectations in and of themselves may create anxiety and depression (Holtom et al., 2002).

Transient increases in hindrance stressors are especially likely to be perceived as intimidating, because people may not be used to them or have had experience of coping with them. Since anxiety is especially likely to increase if a challenging demand entails uncertain requirements or fresh skills, we might also expect transient levels of challenge stressors to have a stronger effect on anxiety–calmness than routine levels or than on depression–enthusiasm. In addition, and consistent with our association of challenge stressors with positive affect, out-of-the-routine challenge stressors may be interpreted as pleasant surprises and welcomed, and generate enthusiasm even in cases where there is some initial recognition of their unexpected nature.

In so far as people do have stable routines, the creation of which they have some control over, we might then expect the transient events to have a larger impact on their work–nonwork interference over time. The unpredictability of transient events may in turn increase spillovers and the need for recovery of energy levels. This can be formally stated thus:

*H4: The indirect effects of transient work stressors on work–nonwork interference, mediated through transient well-being, will be stronger than those for routine work stressors through well-being.*

This is not to say that routine levels have no effect, but only to state that by capturing unpredictable changes in demands, transient effects are more likely to result in work–nonwork interference.



## The study and methodology

We now test these hypotheses using data from our diary study of portfolio workers. Portfolio workers are an especially useful group for testing these hypotheses, as they typically have a lot of autonomy, and the potential to have this autonomy may have been a motivation for choosing this form of work. They are more likely than most to have fluctuations in their work demands, and awareness of these, and potential shortfalls, may generate insecurities about their income and even whether they should continue as portfolio workers.

In our study, we measure the degree of hindrance stressors by a qualitative job demands indicator that focuses on negative aspects of the work, and so its elements are concerned with conflicts, difficulties and barriers to achieving personal growth. Challenge stressors are measured by work hours, a quantitative measure of work demands, as high workload is a widely quoted challenge stressor (e.g. Clarke, 2012: 388; Pearsall et al., 2009: 19; Rowell and Judge, 2009: 1438; Widmer et al., 2012: 423).

### *Procedure and response rate*

The study was designed to test the six hypotheses simultaneously using data collected via the diary method with weekly observations over six months. We had three reasons for selecting a one-week interval. First, the pattern of people's work and nonwork responsibilities reflect a seven-day cycle (Zerubavel, 1985). This is consistent with the results of a prior qualitative study of portfolio workers in which a weekly planning cycle seemed to be the norm (Clinton et al., 2006). When respondents talked of fluctuations in work they were discussed in weekly not daily terms, and they tended to budget their time and in many cases estimate the time things would take in units of a week; for example, they talked of half-a-week's work. Second, we gauged that an interval of one week would produce a meaningful level of fluctuations for portfolio workers' work demands. Third, it would allow us to collect data for a longer time period than is typical in the daily diary study. Piloting of our research instrument and discussions with those involved in it confirmed that a week was a meaningful unit of analysis for the respondents.

Participants were required to complete a diary questionnaire every week for 26 weeks, and a survey questionnaire at the start and end. Of 65 participants, 54 completed the survey online, while 11 chose to use an identical paper version. Participants were instructed to: 'Complete the diary at approximately the same time each week. If you forget you can complete it the following day'.

We acquired the sample of portfolio or freelance workers through adverts in national and local printed media, and an online directory of portfolio workers, supplemented by our personal contacts. Participants had to be self-employed, have multiple clients and not have employees. Of those we contacted following their response to an advert, only one refused to participate in the study, on the grounds that he saw it as work and expected to be paid. Three more did not meet our criteria for being a portfolio worker.

Sixty-five participants completed the diary a total of 1164 times, which represents a response rate of 69 percent. Those participants that completed the diary on less than 13 occasions were removed from the study. The effective sample was reduced to 47 individuals who completed the diary on 941 occasions (77%). Six participants completed the

diary for each of the 26 weeks. The mean for our working sample was 20. Using a random effects model, we found no significant relationship between the number of responses and the level of key variables, indicating that the pattern of missing values was not systematic.

### *The sample*

The sample consisted of 13 males and 34 females with a mean age of 48.5 years. Seventy-seven percent had a degree or equivalent qualification, 72 percent were married or cohabiting, and 32 percent had children below 18. The participants contributed on average 64 percent of the household income (range: 20%–100%), had on average been self-employed for 10.40 years (range: 1.17–31.50) and been previously employed in organizations for 18.47 years (these last two figures are correlated with  $r = -0.25$ ). The majority (66%) said they had chosen to be self-employed, while only 2 percent (one individual) said they had been forced to become self-employed, and 32 percent reported that the decision was a mixture of choice and necessity. Only 6 percent of participants said that they would prefer permanent employment in an organization.

Twenty-eight out of the 47 participants had their first occupation in the field of publishing, while the others were coaches, accountants, salespeople, translators, psychologists or web designers. On average, participants worked 29 hours each week (range 0–103) with 66.5 percent of work hours being allocated to working on the person's main occupation. Participants worked on average 38 percent of Saturdays and 39 percent of Sundays, and 2.9 evenings per week. The majority (77%, range 10%–100%) of work was done at home and was done alone (76%, range 17%–100%). On average, each respondent had 2.75 (range: 0–18) clients per week and spent 58 percent of their time working for a primary client.

### *Measures*

The diary focused on experiences during the previous week, and included questions about job demands, hours of work, work–nonwork interference, calmness and enthusiasm, all answered using a five-point response scale ranging from 1 (*not at all*) to 5 (*a great deal*). The longitudinal nature of the data allows us to develop measures of routine and transient work demands and well-being. The routine measures are created by averaging the weekly data to form person-level measures of the same constructs, and the transient measures are the person-centred weekly scores calculated by subtracting the mean for each person from each observation for that person. Thus, the transient measures of work demands and well-being are the deviation of individuals from their routine. The routine measures depict the current parameters of people's lives, and in multilevel analysis terminology they are of the compilation type (Kozlowski and Klein, 2000), since there are distinct differences between the aggregate and non-aggregate data.

**Hindrance stressors.** This was measured by a four-item job demands scale ( $\alpha = 0.76$ ) that was adapted from Haynes et al. (1999) to be appropriate for freelance workers. This asked participants to rate the extent to which they had experienced conflicting and

varying levels of demands on their time, difficult work tasks and work tasks that they would prefer not to do.

**Challenge stressors.** This was measured by the total number of hours worked per week.

**Well-being.** This was measured using a two-item scale for calmness ( $\alpha = 0.67$ ) and a two-item scale for enthusiasm ( $\alpha = 0.72$ ). Participants were asked to rate the extent to which they had felt in the last seven days: anxious, calm, gloomy and enthusiastic. Responses for anxious and gloomy were reverse-scored to load on anxiety and depression respectively. The items were drawn from the modified versions (Sevastos et al., 1992) of the scales for anxiety–calmness and depression–enthusiasm developed by Warr (1990), which have subsequently been used in other studies.

**Perceived work–nonwork interference.** Perceived work–nonwork interference was measured through asking respondents how often in the last seven days they had felt that work had interfered with nonwork activities. Nonwork–work interference was measured by a similar question asking how often nonwork activities had interfered with work. These were adapted from the single-item measure of work–family conflict used by Voydanoff (1988), which is worded using the term *interfere*, not *conflict*.

These single-item measures capture whether people have experienced interference and unequivocally avoid integrating antecedents or causal factors into the measurement of interference, which some measures are seen to do as they incorporate hypothetical causes in the wording of their items' questions (Demerouti et al., 2013; Pichler, 2009; Tetrick and Buffardi, 2006). The use of single-item measures also reflected the practical constraints for the study with respect to completing the diary for 26 weeks, survey length and cognitive load (Rohland et al., 2004).

**Control variables.** Of the biographical and other individual-level controls, all but gender were excluded from the analysis, as in preliminary analysis they (age, marital status, number of dependents, extent of home working and number of clients) were insignificant predictors of well-being or work–nonwork interference. The effect of gender was very close to being significant in some of the models and therefore it was retained in the analysis for all the models. We included control and support as control variables, given their complementary status to job demands in Karasek's (1979) and associated theories of well-being (Johnson and Hall, 1988), as well as their inclusion in a number of studies of work–nonwork interference (e.g. Grzywacz and Marks, 2000; Selvarajan et al., 2013). Work control was measured using a seven-item reflective scale ( $\alpha = 0.92$ ) adapted from existing measures of control (Haynes et al., 1999; Jackson et al., 1993). The items captured aspects of both timing and method control and asked participants to rate the extent to which they could control the hours they worked, how much work they did, when they worked on tasks, what work they did, how they worked, the quality of work they did, and whether they could plan their work ahead of time. Social support was measured using a three-item formative scale that asked participants to rate the extent to which they received support from clients, family and friends, and colleagues and peers.

A confirmatory factor analysis was conducted to establish if the multi-item measures – hindrance stressors, control and social support – constitute discrete constructs. To account for the nested data, structure maximum-likelihood estimation with robust standard errors and a Satorra-Bentler scaled test statistic were employed. The results for the three-factor model were satisfactory but not ideal ( $\chi^2$  [degrees of freedom (d.f.) = 74] = 904.475, Comparative Fit Index [CFI] = 0.835, Root Mean Square Error of Approximation [RMSEA] = 0.111, Standardized Root Mean Square Residual [SRMR] = 0.092). A comparison with a single-factor model using all the indicators revealed that the three-factor model was preferable ( $\chi^2$  [d.f. = 3] = 1295,  $p < 0.001$ , CFI = 0.664, RMSEA = 0.155, SRMR = 0.125), indicating that the three constructs are discrete from each other. Similarly, a comparison with a two-factor structure that involves one factor for work demands and one factor combining control and social support ( $\chi^2$  [d.f. = 2] = 1346.9,  $p < 0.001$ , CFI = 0.747, RMSEA = 0.135, SRMR = 0.114), indicated that the three-factor model was preferable.

### Analysis procedure

Because weekly responses are embedded within individuals, the data are nested and therefore we use multilevel analysis. Before testing the hypotheses, a series of preliminary tests were used to decide the ideal specification of the random effects of the models. First, a comparison between a random intercept null model with a generalized least squares null model was significant for calmness ( $\chi^2$  [d.f. = 1] = 561.92,  $p < 0.001$ ) and enthusiasm ( $\chi^2$  [d.f. = 1] = 549.99,  $p < 0.001$ ), suggesting that a multilevel analysis was necessary. Second, to allow for the fact that observations are collected in a specific order, we included the weekly variable as an additional predictor. A random slope for weekly variables resulted in a more accurate model for both calmness ( $\chi^2$  [d.f. = 1] = 12.78,  $p < 0.01$ ) and enthusiasm ( $\chi^2$  [d.f. = 1] = 6.17,  $p < 0.05$ ), indicating that the rate of change for the dependent variables varied between individuals. Finally, specifying an autoregressive covariance structure of lag 1 (AR1) improved the model for calmness ( $\chi^2$  [d.f. = 1] = 75.49,  $p < 0.001$ ) and enthusiasm ( $\chi^2$  [d.f. = 1] = 52.61,  $p < 0.05$ ) indicating that the dependent variable depends linearly on its own values from the previous week. Therefore, all the subsequent models were tested with a random intercept, a random slope for the weekly variable and an autoregressive covariance structure.

To test for mediation, we use Zhang et al.'s (2009) adaptation of the three-step Baron and Kenny (1986) approach to mediation. This process means that in their first and second steps, predictors are split into between- and within-person components by person-mean centring in order to formulate the routine and transient measures. In the third step, the mediators are treated in the same way: that is they are person-mean centred and their means are added to the model as the routine variables. For each of these steps, the dependent variable, WINW or NWIW, is based on the raw score, which incorporates both within- and between-person variations.

In addition, we used the bias-corrected bootstrapping approach (MacKinnon et al., 2004) with 10,000 resampling iterations to calculate confidence intervals for the mediated or indirect effect. All the analyses were performed with R 3.1.2 (R Development Core Team, 2014) and the nlme package (Pinheiro et al., 2013).

To evaluate H3, we examine whether the WINW indirect effect confidence intervals overlap with the NWIW indirect effects. If the absolute value of the range of the indirect

effects for WINW, and specifically the lower limit of the confidence interval, is above the absolute value of the estimate of the indirect effect for NWIW we can reject the null hypothesis and accept that mediation is stronger for WINW rather than NWIW.

If there are significant mediation paths for transient and routine well-being, to test H4 we will adopt the same procedure as for H3, and examine if the confidence intervals for the indirect effect through transient well-being overlap with the estimate of the indirect effect for routine well-being. If the absolute value of the lower limit of the confidence interval of the indirect transient effect is above the estimate of the absolute value of the indirect routine effect, we can reject the null hypothesis and accept that mediation is stronger through the transient rather than the routine path.

## Results

Table 1 reports the correlation coefficients among the core variables. The majority of pairs are significantly correlated. The  $r_{WG}$  and intraclass correlation coefficient (ICC) scores were satisfactory, indicating that all the repeated measures can be aggregated to create the routine variables.

### *Three-stage mediation analysis*

Testing for mediation using the three-stage approach (H1a, H1b, H2a and H2b), we first found that both transient and routine hindrance stressors are positively related to both measures of work–nonwork interference [transient demands–WINW ( $\beta = 0.32$ ,  $p < 0.001$ ); routine demands–WINW ( $\beta = 0.45$ ,  $p < 0.001$ ); transient demands–NWIW ( $\beta = 0.39$ ,  $p < 0.001$ ); and routine demands–NWIW ( $\beta = 0.70$ ,  $p < 0.001$ )] (Table 2). However, only one of the four possible relationships involving challenge stressors is significant. The transient challenge stressors relationship with WINW is significant and positive ( $\beta = 0.27$ ,  $p < 0.001$ ).

At the second stage, we found that both transient demands (Calmness  $\beta = -0.19$ ,  $p < 0.001$ ; Enthusiasm  $\beta = -0.07$ ,  $p < 0.01$ ) and routine demands (Calmness  $\beta = -0.37$ ,  $p < 0.001$ ; Enthusiasm  $\beta = -0.26$ ,  $p < 0.05$ ) have negative relationships with both measures of well-being (Table 3). No such negative relationships were found for challenge stressors. For transient challenge stressors though, the significant relationships found are positive for both calmness ( $\beta = 0.06$ ,  $p < 0.01$ ) and enthusiasm ( $\beta = 0.07$ ,  $p < 0.01$ ). The relationships involving routine challenge stressors are not significant.

For the third stage, well-being variables were added to the WINW and NWIW models from step 1 (Table 4). The models revealed that transient calmness is significantly negatively related to both types of work–nonwork interference (WINW  $\beta = -0.09$ ,  $p < 0.001$ ; NWIW  $\beta = -0.09$ ,  $p < 0.01$ ). In contrast, transient enthusiasm is significantly positively associated with both types (WINW  $\beta = 0.06$ ,  $p < 0.05$ ; NWIW  $\beta = 0.09$ ,  $p < 0.01$ ). Routine levels of both well-being measures are unrelated to either kind of work–nonwork interference.

The significant relationships involving hindrance and challenge stressors revealed in step 1 remained significant when the well-being measures were included in step 3, and so did the significant control variables. However, small changes in the coefficients indicated that there could be partial mediations. Figure 1 illustrates these potential partial mediations by showing the coefficients of the direct effects from steps 2 and 3.

**Table 1.** Descriptive statistics, correlations, rwg scores, ICC1, ICC2 and analysis of variance *F*-values.

	rwg	ICC1	ICC2	F ( <i>p</i> < .001)	Mean	SD	1	2	3	4	5	6	7
1. Challenge stressors	.86	.51	.95	21.84	29.87	15.73							
2. Hindrance stressors	.72	.45	.94	17.09	2.13	0.81	0.29***						
3. Control	.71	.53	.96	23.82	3.41	0.89	-0.01	-0.23***					
4. Support	.73	.65	.97	39.54	2.69	1.02	0.14***	-0.01	0.24***				
5. WINW	.47	.37	.92	12.53	2.21	1.12	0.37***	0.62***	-0.28***	-0.10**			
6. NWIW	.50	.51	.965	21.84	2.28	1.25	0.11***	0.62***	-0.14***	-0.16***	0.54***		
7. Anxiety–calmness	.73	.53	.96	23.70	3.55	0.89	-0.05	-0.47***	0.15***	0.05	-0.39***	-0.38***	
8. Enthusiasm–depression	.75	.53	.96	23.25	3.74	0.88	0.04	-0.25***	0.11***	0.21***	-0.19***	-0.18***	.67***

N Observations = 941, N Individuals = 47, ICC = intraclass correlation coefficient, SD = standard deviation, WINW = work-to-nonwork interference, NWIW = nonwork-to-work interference.

\**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001.



**Table 2.** Step 1: Effects of transient and routine predictors on WINW and NWIW.

	WINW				NWIW			
	B	SE	95% CI		B	SE	95% CI	
<i>Fixed effects</i>								
Week	-.01	.00	-.01	.00	-.01*	.00	-.02	.00
Gender (male)	-.16	.16	-.47	.16	-.33	.18	-.69	.02
Transient challenge stressors	.27***	.03	.22	.32	-.03	.03	-.09	.02
Transient hindrance stressors	.32***	.03	.27	.37	.39***	.03	.34	.45
Transient control	-.08***	.02	-.13	-.03	.06*	.03	.00	.11
Transient support	.02	.03	-.03	.07	.01	.03	-.04	.07
Routine challenge stressors	.12	.07	-.02	.27	-.05	.08	-.22	.11
Routine hindrance stressors	.45***	.07	.30	.60	.70***	.08	.53	.87
Routine control	-.08	.08	-.24	.08	.01	.09	-.17	.18
Routine support	-.14	.07	-.29	.01	-.18*	.08	-.35	-.01
Intercept	2.33***	.11	2.12	2.54	2.49***	.12	2.26	2.73
		Estimate	95% CI			Estimate	95% CI	
<i>Random effects</i>								
Intercept (SD)		.56	.41	.76		.59	.43	.81
Week (SD)		.02	.01	.03		.01	.00	.10
Residual (SD)		.69	.66	.73		.78	.74	.82
r (intercept and B for week)		-.65	-.86	-.22		-.91	-.99	.99
Phi AR(1) correlation		.12	.05	.20		.18	.11	.26
Log likelihood	-1059.94				-1156.96			

Note: N Observations = 941, N Individuals = 47, SE = standard error, CI = confidence interval, WINW = work-to-nonwork interference, NWIW = nonwork-to-work interference, SD = standard deviation.  
\**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001.

*Bootstrap analysis of indirect effects*

We tested these potential mediating relationships using the bootstrapping approach (Table 5). The path from transient hindrance stressors to WINW through transient calmness is significant (*ab* = 0.018, 95% CI [0.006, 0.032]) but those from hindrance stressors to NWIW through calmness are not significant (*ab* = 0.016, 95% CI [-0.007, 0.025]). Conversely, the indirect effect of hindrance stressors through enthusiasm is significant for NWIW (*ab* = -0.016, 95% CI [-0.034, -0.004]) but not for WINW (*ab* = -0.012, 95% CI [-0.026, 0.001]).

The two potential mediation paths from transient challenge stressors to WINW are significant, that through transient calmness being negative (*ab* = -0.005, 95% CI [-0.013, -0.001]), and that through transient enthusiasm being positive (*ab* = 0.003, 95% CI [0.000, 0.011]).

**Table 3.** Step 2: Effects of transient and routine predictors on calmness and enthusiasm.

	Calmness			Enthusiasm				
	B	SE	95% CI		B	SE	95% CI	
<i>Fixed effects</i>								
Week	.01	.00	.00	.01	.00	.00	−.01	.01
Gender (male)	.06	.18	−.31	.43	−.08	.20	−.48	.32
Transient challenge stressors	.06*	.02	.02	.10	.07**	.02	.03	.11
Transient hindrance stressors	−.19***	.02	−.23	−.15	−.07**	.02	−.12	−.03
Transient control	.06**	.02	.02	.10	.00	.02	−.04	.04
Transient support	−.02	.02	−.06	.02	.08***	.02	.03	.12
Routine challenge stressors	.03	.09	−.14	.20	.02	.09	−.17	.20
Routine hindrance stressors	−.37***	.09	−.55	−.20	−.26**	.09	−.45	−.07
Routine control	.01	.09	−.17	.19	.06	.10	−.14	.26
Routine support	.02	.09	−.16	.19	.11	.09	−.09	.30
Intercept	3.45***	.11	3.24	3.66	3.75***	.11	3.53	3.97
		Estimate	95% CI			Estimate	95% CI	
<i>Random effects</i>								
Intercept (SD)		.56	.41	.74		.57	.45	.73
Week (SD)		.01	.00	.04		.01	.00	.11
Residual (SD)		.58	.55	.61		.61	.57	.64
<i>r</i> (intercept and B for week)		−.37	−.81	.34		−.07	−.54	.43
Phi AR(1) correlation		.29	.22	.37		.25	.17	.32
Log likelihood	−856.41			−914.05				

N Observations = 941, N Individuals = 47. SE = standard error, CI = confidence interval, SD = standard deviation.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

The results relating to H3 involving hindrance stressors and calmness are stronger for WINW than for NWIW. The indirect effect of transient demands through transient calmness is significant for WINW but not for NWIW. Similarly, the indirect effects of transient challenge stressors through calmness and enthusiasm are significant only for WINW but not for NWIW. Transient-demands-mediated-by-transient-enthusiasm on WINW is not significant, but the corresponding effect for NWIW is.

The above tests revealed that there are no significant mediation paths involving routine measures of well-being, and only transient well-being measures are mediators. Therefore, no further tests are needed to confirm H4: that the indirect effects of work demands on work–nonwork interference, mediated by transient well-being, are stronger than those for routine well-being.

**Table 4.** Step 3: Effects of transient and routine predictors and mediators on WINW and NWIW.

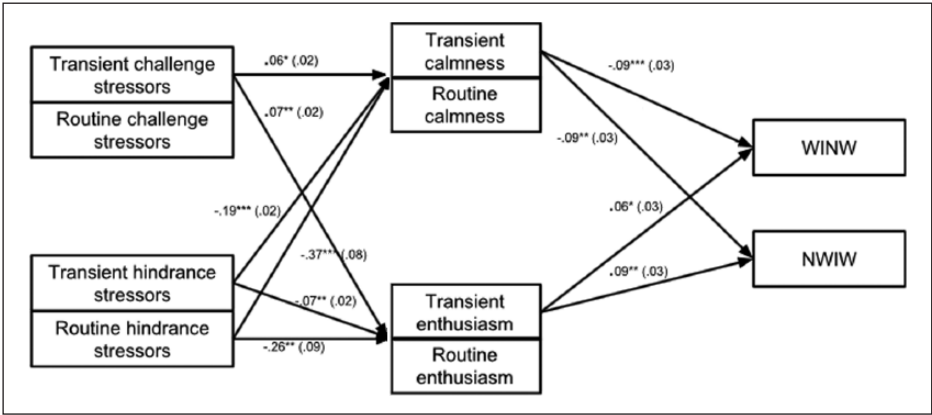
	WINW			NWIW				
	B	SE	95% CI	B	SE	95% CI		
<i>Fixed effects</i>								
Week	.00	.00	− .01	.00	−.01*	.00	−.02	.00
Gender (male)	−.12	.16	−.44	.20	−.29	.18	−.65	.07
Transient challenge stressors	.27***	.03	.22	.32	−.04	.03	−.10	.02
Transient hindrance stressors	.30***	.03	.25	.35	.39***	.03	.33	.45
Transient control	−.07**	.02	−.12	−.02	.08**	.03	.03	.14
Transient support	.01	.03	−.04	.06	.00	.03	−.05	.05
Routine challenge stressors	.13	.07	−.01	.28	−.04	.08	−.21	.12
Routine hindrance stressors	.34**	.09	.16	.52	.64***	.10	.42	.84
Routine control	−.09	.08	−.25	.06	−.01	.09	−.19	.17
Routine support	−.14	.08	−.30	.01	−.21*	.09	−.39	−.03
Transient calmness	−.09***	.03	−.15	−.04	−.09**	.03	−.15	−.02
Transient enthusiasm	.06*	.03	.01	.11	.09**	.03	.03	.15
Routine calmness	−.20	.15	−.51	.11	−.25	.17	−.59	.10
Routine enthusiasm	.04	.14	−.23	.32	.21	.15	−.10	.53
Intercept	2.30***	.10	2.10	2.50	2.47***	.12	2.24	2.70
		Estimate	95% CI			Estimate	95% CI	
<i>Random effects</i>								
Intercept (SD)		.51	.37	.72		.64	.48	.83
Week (SD)		.02	.01	.03		.02	.01	.03
Residual (SD)		.69	.66	.73		.77	.73	.80
r (intercept and B for week)		−.55	−.83	−.03		−.069	−.91	−.19
Phi AR(1) correlation		.13	.06	.21		−	−	−
Log likelihood	−1060.69				−1169.70			

N Observations = 941, N Individuals = 47. SE = standard error, CI = confidence interval, WINW = work-to-nonwork interference, NWIW = nonwork-to-work interference, SD = standard deviation. For the NWIW model at the 3rd step, the ARI correlation structure caused issues with convergence. These issues were also amplified for the Monte Carlo simulation of the mediation effects so it was decided to fit the model without ARI.

\**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001.

*Interpretation*

There are clear differences between the results for hindrance stressors and challenge stressors. On the one hand, hindrance stressors have a positive relationship with



**Figure 1.** Path model of results of well-being as a mediator of the workload–work–nonwork interference relationship. Values in parentheses are standard errors.  
\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . WINW = work-to-nonwork interference, NWIW = nonwork-to-work interference.

**Table 5.** Indirect effects and bootstrapped bias corrected confidence intervals for WINW and NWIW.

Predictor	Mediator	Outcome	Effect	95% CI
Transient challenge stressors (+)	Transient calmness (–)	WINW	–.005*	–.013, –.001
Transient challenge stressors (+)	Transient enthusiasm (+)	WINW	.003*	.000, .011
Transient hindrance stressors (–)	Transient calmness (–)	WINW	.018*	.006, .032
Transient hindrance stressors (–)	Transient enthusiasm (+)	WINW	–.012	–.026, .001
Transient hindrance stressors (–)	Transient calmness (–)	NWIW	.016	–.007, .025
Transient hindrance stressors (–)	Transient enthusiasm (+)	NWIW	–.016*	–.034, –.004

For the Predictors, the +/- signs in parentheses refer to the direction of the effect of the Predictor on the Mediator (step 2), and for the Mediators they refer to the direction of the effect of the Mediator on the outcomes (step 3).  
CI = confidence interval, WINW = work-to-nonwork interference, NWIW = nonwork-to-work interference.  
\* $p < 0.05$ .

work–nonwork interference both in terms of transient and routine demands and for both WINW and NWIW. On the other hand, challenge stressors relate to WINW but not NWIW and this is only significant for transient hours. Similarly, while hindrance stressors are negatively related to calmness and enthusiasm, transient challenge stressors are

**Table 6.** Summary of hypotheses and results.

Hypotheses	Results
H1a Challenge stressors → positive effect on Enthusiasm Enthusiasm → positive effect on Work–nonwork Interference Indirect effect is positive	Supported for transient level and WINW
H1b Hindrance stressors → negative effect on Enthusiasm Enthusiasm → positive effect on Work–nonwork Interference Indirect effect is negative	Supported for transient level and NWIW
H2a Challenge stressors → positive effect on Calmness Calmness → negative effect on Work–nonwork Interference Indirect effect is negative	Supported for transient level and WINW
H2b Hindrance stressors → negative effect on Calmness Calmness → negative effect on Work–nonwork Interference Indirect effect is positive	Supported for transient level and WINW
H3 Mediation is stronger for WINW than NWIW	Supported for challenge stressors
H4 Mediation is stronger for transient rather than routine effects	Fully supported

WINW = work-to-nonwork interference, NWIW = nonwork-to-work interference.

positively related to them. Routine challenge stressors have no relationship to calmness or enthusiasm.

A summary of the hypotheses and the results is provided in Table 6. The mediation hypothesis H1a, that challenge work stressors will lead to more enthusiasm that will increase work–nonwork interference, was supported for transient challenge stressors on WINW but not for routine challenge stressors or for NWIW. Similarly, H1b, which posited that hindrance stressors will reduce enthusiasm, in turn increasing work–nonwork interference, was supported for transient hindrance stressors and for NWIW but not for WINW. The positive effect of hindrance stressors on interference is thus less than it would be otherwise because of the reduced enthusiasm or increased depression. The second set of mediation hypotheses was also partially supported. H2a stated that challenge stressors will increase calmness, and in turn reduce interference. This was supported for the effect of transient challenge stressors on WINW but not for routine stressors or for NWIW. Similarly, H2b, which argued for a mediation effect of calmness so that hindrance stressors reduce calmness and this increases interference, was also partially supported. Through reducing the negative effects of calmness on WINW, transient hindrance stressors had a positive effect on WINW.

H3 is supported for the relationship between challenge stressors and both calmness and enthusiasm, as the indirect effects of WINW mediated by either of these factors is stronger than that of NWIW. However, the results for hindrance stressors are less decisive, with the mediation paths through calmness supporting the theory, while in the case of those through enthusiasm the cross-domain effects are stronger.

The tests for H4 revealed there were no significant mediation paths through routine well-being, providing support for the hypothesis that the mediation effects are stronger for transient rather than routine well-being.

## Discussion and conclusion

Our aim has been to develop theory about how work-related well-being may spill over to work–nonwork interference. Prior research has concentrated on how job demands, job stressors or workload increase interference and, while most empirical studies find this to be the case, they do not differentiate between types of stressors (Amstad et al., 2011; Frone et al., 1992; Geurts et al., 2003; Michel et al., 2011). Through distinguishing hindrance and challenge stressors we have hypothesized that even positive well-being may sometimes increase WINW. In our empirical study based on a repeated data survey of portfolio workers, the standard negative spillover model applied to hindrance stressors, as we found that hindrance stressors had a positive effect on work–nonwork interference that was explained by their negative effect on calmness.

However, the standard model did not apply to hindrance stressors mediated by enthusiasm, which had a negative effect on work–nonwork interference. It also did not apply to challenge stressors, which were associated with increased calmness and enthusiasm, and the former spilled over to decrease work–nonwork interference, while the latter spilled over to increase it. We have thus identified an unrecognized new phenomenon: enthusiasm-based work–nonwork interference.

A distinctive contribution of this research has been to show how positive emotions generated by challenge stressors may induce work–nonwork interference. This reflects our theoretical innovation of differentiating challenge and hindrance stressors but was also facilitated by the approach taken to modelling spillover by separating stressors, well-being and work–nonwork interference. This differs from the conventional approach to strain-based work–nonwork interference, which directly asks individuals the extent of their experience of this and builds antecedents into the identification of the interference (e.g. Buonocore and Russo, 2013; Carlson et al., 2006; Golden, 2012; Griggs et al., 2013; Lambert et al., 2013). This study is, to our knowledge, the first empirical follow-up of LePine et al.'s (2007) introduction of the two-dimensional work stressor concept to the work–nonwork area and our findings suggest this is a promising departure and add further support to the more general relevance of the dichotomy.

Although it was not hypothesized, the results indicate hindrance stressors have a stronger effect on WINW than challenge stressors. This could be owing to a negativity bias, whereby negative events have a stronger effect on psychological states or processes than do positive events of the same intensity (Rozin and Royzman, 2001). However, more research that controls for the equal intensity of hindrance and challenge stressors is required to establish if this is the case.



That our theory better predicts mediation in WINW than NWIW supports the argument that the effects of work demands are more likely to occur in the work rather than the non-work domain (Amstad et al., 2011; Bryon, 2005; Shockley and Singla, 2011). But the one result where the effect was stronger for NWIW (that is transient hindrance stressors mediated by transient enthusiasm) highlights again differences between dimensions of well-being. This may reflect the way the decreased enthusiasm generated by hindrance stressors leads to the person having more time or energy for effective recovery including better sleep or a reduced need for recovery. That this reduction does not depress the association between hindrance stressors and WINW reflects the dominant role that calmness plays in this relationship.

The variation in results between routine and transient levels of stressors and well-being confirms the value of temporal analysis in both the work–nonwork and stress areas and within-person comparisons (Butler et al., 2005; Ilies et al., 2007a, 2007b; Williams and Alliger, 1994). Had we not differentiated routine from transient processes then the mediation processes may have been masked by conflating transient and routine well-being (Zhang et al., 2009). This approach also enabled us to show for portfolio workers that spillover processes are more likely to apply to the transient (intra-individual differences) than the routine levels (inter-individual differences).

Routine hindrance stressors had an influence on work–nonwork interference but this was not mediated by well-being. This may be indicative of the way people's lives are organized around routine levels of hours, so that routine levels of calmness and enthusiasm are not so high as to generate such interference, or even work–nonwork conflict. That the transient demands–work–nonwork interference relationship is mediated by well-being suggests that negative well-being interference is associated with divergences from the norm.

Aside from the contribution to the field of work–nonwork interface, this article is an addition to the literature on non-standard work. Our sample is of freelance workers who see themselves as unlikely to return to standard work and who are not in a transient situation, as were, for example, Kirkpatrick and Hoque's (2006) agency workers. Like Purcell et al.'s nurses (2004: 718), they may have thought portfolio working 'could be relatively stress-free', as many were escaping from what they called the politics of the organization, or at least would reduce hindrance stressors; but our study has shown that they can be subject to comparable pressures to standard workers from work demands and fluctuations in their level. The results for hindrance stressors are indeed consistent with those from other studies on standard workers, while the results for challenge stressors may be more contingent. We have used hours worked as a measure of challenge stressors and thus our results may only be generalizable to populations where hours worked is seen as a challenge stressor. Where longer hours are interpreted as a hindrance stressor it is likely that the mediation paths would reflect those we have identified for hindrance stressors.

Our results may reflect the uncertainty surrounding the sufficiency of one's workload that portfolio workers in particular may face. Hours worked may be seen as a sign of work and income security and an opportunity to maintain and develop skills. This argument is reinforced by the finding that routine challenge stressors are not mediated by transient well-being. These results for challenge stressors therefore reflect the two sides

of portfolio working: it may offer greater freedom to create one's own demands and control how they are fulfilled, while creating uncertainty about the sufficiency of one's workload.

The strengths of the study are its longitudinal data, the multiple measures of key variables, and their measurement at the correct perceptual level for our theoretical arguments. The main weakness is its concentration on a sample for which we have no population statistics or comparisons with other workers. While the variety of methods used to acquire this sample reduces the confidence that we might have in their representativeness, the net we cast to gain a sample did not restrict the occupations. As it transpires, portfolio working is less common than imagined and restricted to a limited range of occupations, particularly those related to publishing.

The person who refused to join the study appeared to have a calculative approach to work. This may mean our sample is biased against such people or toward intrinsically motivated ones. The sample does not, however, seem to disproportionately represent people with more time, as the range of hours worked was quite high (between 0 and 103 hours per week, mean of 29). Nonetheless, it may still be that those who consistently or routinely have high work demands are less likely to participate in a longitudinal study that requires long-term participation, and our results may not necessarily apply to the extreme end, in terms of hours worked, of the portfolio population.

The use of a single-item measure to assess the two work–nonwork interference concepts could be seen as suboptimal, but such measures do capture each participant's umbrella assessment of their lives. Multi-item intensity measures have the advantage that measurement models can be used to assess construct validity. However, they have disadvantages. Individuals are asked to make the connections between their work and nonwork states (or vice versa) and may be inclined to use the intensity of the effects on their well-being from one domain as a means of assessing the interference on the other, or to attribute a lack of drive to fulfil demands in one domain to pressures in the other when this may not be the case. Single-item measures that capture respondents' summaries of their perceptions overcome such disadvantages and also have distinct advantages, and are thus preferred to multi-item intensity measures by many researchers in other areas (see, e.g. Hershcovis et al., 2010; Meier et al., 2009; Rossiter, 2002).

It is possible that the direction of the relationship between the predictors and mediators is not as we specify, and that well-being leads to work demands. In the case of hindrance stressors, it seems unlikely that anxious or depressed people take on heavier demands, although they may perceive the same level of demand as more onerous. That enthusiastic or anxious people will exaggerate the hours they work seems less credible. But in the case of the observed hours–well-being relationship, the idea that people who are calm or enthusiastic may work longer hours has some plausibility. However, interviews with portfolio workers revealed that they have little discretion over the amount of work taken on, instead accepting as much as possible to avoid uncertainty about future work (Clinton et al., 2006).

Also, the relationship between well-being and work–nonwork interference may be in the opposite direction to that specified, particularly if work demands generate time-based conflicts. Previous mediation studies of the work demands–well-being relationship have indeed treated well-being as an outcome of work–nonwork interference and hence

interference as a mediator of the work demands–well-being relationship, and empirical studies have found support for this (Bacharach et al., 1991; Frone et al., 1992; Geurts et al., 2003; Hall et al., 2010; Wood et al., 2013). The juxtaposition of our study with these suggests that well-being-based interference co-exists with other forms, be these time- or energy-depletion based. For technical reasons, the results of our earlier study of the work demands–work–nonwork interference–well-being pathway that used the same data (Wood et al., 2013) cannot be compared statistically.<sup>1</sup>

However, if we compare the findings from the two studies, the most striking difference is that in the model in this article there is no mediation through routine pathways, but in the earlier study (Wood et al., 2013) some mediation pathways through routine WINW were identified. This highlights that while individuals find ways to affectively cope with demands so that their routine well-being does not interfere with their personal lives, such demands also have a direct effect on routine WINW, which itself affects well-being. This suggests that routine factors do play a part in work–nonwork interference, but are less salient for wellbeing-based interference.

Future research is required on other samples or on representative samples of the whole economy, though the longitudinal design may limit large sample studies. It would be particularly interesting to compare groups with fluctuating incomes dependent on hours worked or workloads – the most prominent current example being zero-hour contract workers – with both portfolio and non-portfolio workers without such fluctuations. Since the majority of the work of our portfolio workers was done at home, comparisons with employed home workers would also be interesting. In the light of the potential bias in our sample toward people with a more expressive orientation to work, we might assess whether the relationships we found vary with the level of people’s intrinsic and extrinsic motivation to work. Equally, following the differentiation between people who segment their home/nonwork and work lives and those who make less of a differentiation (Olson-Buchanan and Boswell, 2006), we might test if any relationships are moderated by the extent of integration or segmentation.

Research using different measures, particularly of the challenge stressors, would be valuable. Work of a qualitative nature might be especially fruitful to explore the nature of the interference generated by the consequences of work demands for affect. It would also be interesting to see if positive affect from nonwork experiences has similar effects to those that challenge stressors had in our study. We might also examine whether the behavioural manifestations of work–nonwork interference – themselves under-researched (see Ilies et al. [2007b] for a limited exception) – vary depending on the routes through which they are produced and particularly whether negative or positive affect is at play.

The main policy implication of this research is to reinforce the importance of manageable work demands for both well-being and work–nonwork interference, while showing we must guard against assuming long working hours have nothing but bad consequences. For portfolio workers, the implication is that when appraising their work they should be more concerned with the nature of the demands, and how they might cope with them, than with their workload, though they should not let their ‘enthusiasm run away with them’ if they are concerned about work–nonwork interference. The significant effect of the two control variables, job control (on calmness) and support (on enthusiasm), also suggests that portfolio workers should appraise their capacity to control how and when they work

and to ensure they have available social support. Those contemplating moving into portfolio work would be well advised to think in terms of the difference between hindrance and challenge demands and the extent to which they will be able to minimize the former.

Potentially, these results extend beyond portfolio workers, and therefore this research adds an important element to the evidence base for designing interventions in the 'work-life balance' area. The implication is that when contemplating these initiatives and designing training courses managers should focus more on the various ways in which work demands can affect work-nonwork interference than they have perhaps in the past. More specifically, managers should firstly attend to hindrance stressors and secondly investigate in depth the impact of challenge stressors, and particularly the potentially diverse ways in which work demands are affecting the well-being and work-life balance of their staff. They should not rely on the positive effects of challenge stressors cancelling out the negative effects of hindrance stressors but instead managers should focus on ensuring the demands placed on employees are fully clarified or do not involve unavoidable conflicts.

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## Note

- 1 There are three reasons why the models cannot be statistically compared. First, the models require distinguishing between transient and routine variables, but the dependent variable is the raw measure that incorporates both between- and within-sources of variability. Second, the transient scores are person-centred, a non-linear transformation of the variable, which means that the model presented here, and that in the earlier (work-nonwork interference as a mediator) study, are effectively using different variables and therefore are not comparable. Third, to compare models, we need the models to be nested – that is, one should have more degrees of freedom than the other. In this case, they have the same degrees of freedom. One possible solution for this would be to define all the relationships from both models in one model, using structural equation modelling, and use that as a baseline for comparison, in order to see which one of the two diverges more from the saturated one. However, given the relationships specified in the models, the saturated model will involve a causal loop, and as a result it would not be possible to solve.

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**Stephen J Wood** is Professor of Management and Director of Grant Capture, College of Social Sciences at the University of Leicester, UK. His current interests include high-involvement management, work–life balance and family-friendly management, workplace aggression and discrimination, job quality, and health service management. Publications include: *Employment Relations in the Shadow of the Recession* (van Wanrooy et al.; Palgrave Macmillan, 2013); *Representing Workers: Trade Union Recognition and Membership in Britain* (with H Gospel; Routledge, 2003); *The Transformation of Work?* (Unwin Allen, 1989); and *Nanotechnology: From the Science to the Social* (with R Jones and A Geldart; Economic and Social Research Council, 2007). Stephen has provided policy advice to government departments, professional associations, and public and private sector organizations. [Email: s.j.wood@le.ac.uk]

**George Michaelides** is Lecturer in Organizational Psychology at the Department of Organizational Psychology, Birkbeck, University of London, UK. His research interests include motivation, well-being, work–life balance and leadership. He is also interested in longitudinal research methods and dynamic models. George’s research has been published in journals such as *Work and Stress*, *Journal of Occupational Health Psychology* and *Team Performance Management*. [Email: g.michaelides@bbk.ac.uk]