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Horan, S., Flaxman, P.E. and Stride, C.B. orcid.org/0000-0001-9960-2869 (2021) The perfect recovery? Interactive influence of perfectionism and spillover work tasks on changes in exhaustion and mood around a vacation. Journal of Occupational Health Psychology, 26 (2). pp. 86-107. ISSN 1076-8998

https://doi.org/10.1037/ocp0000208

The perfect recovery? Interactive influence of perfectionism and spillover work tasks on changes in exhaustion and mood around a vacation

Shannon Horan and Paul E. Flaxman
City, University of London

Christopher B. Stride
University of Sheffield

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Author Note

Shannon Horan, Department of Psychology, City, University of London; Paul E. Flaxman, Department of Psychology, City, University of London. Christopher B. Stride, Management School, University of Sheffield.

This research was supported by funding from the British Academy (Ref: SG151032). Some of the data analyzed in this paper were previously presented at the European Academy of Occupational Health Psychology Conference, Lisbon, Portugal in September 2018.

We thank Ross McIntosh, Aneliese Rau, and Sanam Shahid for their help with data collection.

Correspondence concerning this article should be addressed to Shannon Horan, Department of Psychology, City, University of London, Northampton Square, London EC1V 0HB, United Kingdom. Shannon.Horan@city.ac.uk. Correspondence specifically concerning the data analytic procedures should be addressed to Christopher B. Stride, Management School, University of Sheffield, S10 1FL, United Kingdom. c.b.stride@sheffield.ac.uk.

Abstract

This study examined week-level changes in affective well-being among school teachers as they transitioned into and out of a one week vacation. In addition, we investigated the interactive influence of personality characteristics (specifically *perfectionism*) and spillover work activities during the vacation on changes in teachers' well-being. A sample of 224 teachers completed study measures across seven consecutive weeks, spanning the period before, during, and after a mid-term vacation (providing a total of 1525 responses across the study period). Results obtained from discontinuous multilevel growth models revealed evidence of a vacation effect, indicated by significant reductions in emotional exhaustion, anxiety, and depressed mood from before to during the vacation. Across four working weeks following the vacation, exhaustion and negative mood exhibited a nonlinear pattern of gradual convergence back to prevacation levels. Teachers with a higher level of perfectionistic concerns experienced elevated working week levels of exhaustion, anxious mood, and depressed mood, followed by pronounced reductions in anxious and depressed mood as they transitioned into the vacation. However, a strongly beneficial effect of the vacation was only obtained by perfectionistic teachers who refrained from spillover work tasks during the vacation. This pattern of findings is consistent with a diathesis-stress model, in that the perfectionists' vulnerability was relatively dormant (or deactivated) during a respite from job demands. Our results may provide an explanation for why engaging in work-related activities during vacations has previously exhibited weak relationships with employees' recovery and well-being.

The perfect recovery? Interactive influence of perfectionism and spillover work tasks on changes in exhaustion and mood around a vacation

It is now widely recognized that failing to recover from the demands and pressures of work during non-work time (e.g., evenings, weekends, or vacations) has an adverse impact on employees' health and well-being. When demanding periods of work are not punctuated with adequate recovery experiences, stress-related psychophysiological systems may remain activated for prolonged periods of time, or become activated too frequently, raising the risk of psychological (e.g., burnout, anxiety, depression) and somatic (e.g., cardiovascular) health problems (Bennett, Bakker, & Field, 2018; Geurts & Sonnentag, 2006; McEwen, 2005; Sonnentag & Fritz, 2015).

Vacations from work--broadly defined as periods of one or more scheduled weeks away from the workplace--provide employees with a potentially powerful recovery opportunity (Lounsbury & Hoopes, 1986). The importance of vacations has been supported by evidence indicating that taking fewer vacations during one's working life is associated over time with significantly elevated risk of serious illness and premature mortality (Gump & Matthews, 2000; Strandberg et al., 2017). Given the considerable potential of vacations for revealing recovery from work processes, there are relatively few vacation studies in the occupational health psychology literature. The dearth of research in this area has been attributed to the challenge of gathering data from employees on multiple occasions, including while they are on vacation from work (De Bloom et al., 2010; Eden, 2001). Collectively, the available research indicates that vacations tend to have an immediate positive influence on employees' affective well-being (particularly reductions in emotional exhaustion and negative affect during vacation), but these beneficial vacation effects often fade out rapidly once employees have returned to work (e.g., De Bloom et al., 2010; Kühnel & Sonnentag, 2011; Nawijn et al., 2010; Westman & Eden, 1997).

Notwithstanding consistent evidence that vacations offer temporary benefits to well-being, a number of pertinent empirical questions remain unanswered or underexplored. First, while there is evidence of benefits gained during long (e.g., summer) vacations (e.g., De Bloom et al., 2013; Westman & Eden, 1997), specific excursions (e.g., for winter sports or to holiday parks) (De Bloom et al., 2010, 2012), and religious holidays (e.g., Kühnel & Sonnentag, 2011; Syrek et al., 2018), there is less research examining the well-being benefits elicited by shorter (e.g., one week) vacation periods that are expected to be sandwiched between demanding periods of work (Blank et al., 2018). Studying such respites seems worthwhile, given that the findings may be applicable to employees in different parts of the world who are not afforded lengthy paid vacation opportunities. Second, there is uncertainty about the speed at which beneficial vacation effects fade out after vacation. Some studies report that positive effects of vacations on well-being are still evident three to four working weeks postvacation (e.g., Blank et al., 2018; De Bloom et al., 2009; Flaxman, Ménard, Bond, & Kinman, 2012; Fritz & Sonnentag, 2006; Kühnel & Sonnentag, 2011). However, other studies have found that vacation effects fade out completely within the first few days of work resumption (e.g., De Bloom et al., 2013). Third, there have been calls to identify individual (e.g., personality) characteristics that explain between-person variability in: (a) well-being levels experienced by employees during prevacation working weeks; (b) the influence of on-vacation activities and experiences on changes in well-being; and (c) postvacation fade out trajectories (De Bloom et al., 2013; Flaxman et al., 2012; Geurts & Sonnentag, 2006). Finally, an unexpected finding to emerge from the vacation literature is that--apparently contrary to recovery theory--time spent on spillover work activities while on vacation is often not associated with employee well-being either during or after the vacation (e.g., De Bloom et al., 2011, 2013; Flaxman et al., 2012).

With the aim of addressing these issues, the current study makes the following contributions to the vacation literature. First, we investigate the effects of one week mid-term vacations on UK and US school teachers' affective well-being. An advantage of studying these nationally standardized respites from work is that findings are less likely to be confounded by variation in vacation length. Second, by measuring affective well-being over seven consecutive weeks, we are able to model change in well-being more precisely than vacation studies which collected data at fewer, less frequent, or unevenly spaced measurement occasions. We compare the fit of various model types that have previously been used to estimate the speed and shape of the postvacation fade out trajectory, thereby assessing whether postvacation changes in teachers' affective well-being are most accurately modeled by a linear function of time, by polynomials, or by "true" nonlinear functions such as exponential or logistic curves. Third, we respond to calls to explore the influence of individual differences on vacations, by examining the relationship between a common personality vulnerability factor, *perfectionism*, and teachers' experiences of the mid-term break. Adopting a diathesis-stress theoretical perspective, we propose that perfectionistic teachers' vulnerability for heightened exhaustion and negative affect will be activated primarily during working weeks, and in response to work tasks that spill over into the mid-term vacation. By contrast, we expect perfectionistic teachers who take a break from work demands during the vacation to obtain significant respite from their otherwise high levels of exhaustion and negative affect. In this way, we seek to establish whether unexpectedly weak associations previously found between time spent on work activities during vacations and well-being might be explained when we account for the influence of employees' underlying personality characteristics.

Influence of Vacations on Employees' Affective Well-Being: Theory and Research

Vacation research has been theoretically underpinned by a set of recovery-oriented principles drawn from the effort-recovery model (ERM; Meijman & Mulder, 1998) and allostatic load theory (e.g., McEwen, 1998, 2005). The ERM draws a distinction between acute *load reactions* and more chronic *negative load effects*. Load reactions refer to the normal, and typically adaptive, responses that arise as employees invest effort to meet job demands. These responses include elevated fatigue, changes in mood, and physiological (e.g., heart rate and hormonal) fluctuations. Under normal circumstances, these acute reactions are expected to return to their baseline levels as soon as employees have time away (and hopefully recover) from job demands. Negative load effects are viewed as more persistent and chronic responses, and are expected to emerge when employees have been repeatedly exposed to work stressors in the absence of sufficient recovery (van Hooff, Geurts, Kompier, & Taris, 2007).

Broadly similar processes are described in allostatic load theory (McEwen, 1998), which focuses on the physiological systems that mediate responses to psychosocial stressors (e.g., the primary stress mediators of the HPA axis and autonomic nervous system). Similar to the ERM's assumptions, allostatic load theory explains how initially protective responses that enable us to adapt to environmental change and challenge (i.e., *allostasis*) can, over time, lead to allostatic load, which refers to the "wear and tear" on body and brain elicited by repeated or chronic exposure to stress-related responses (McEwen, 2005). This theory particularly emphasizes the detrimental consequences of sustained activation, whereby the organism faces repeated challenge without sufficient respite, and the initially protective stress-related processes are switched on too frequently or for prolonged periods of time (Geurts & Sonnentag, 2006).

These complementary theories highlight the *accumulative* nature of incomplete recovery. If an employee fails to recover sufficiently between demanding periods of work, he or she may repeatedly re-enter the workplace in a suboptimal state, and will then need to draw upon compensatory effort to ensure an adequate level of job performance (Fritz & Sonnentag, 2006). Under such conditions, recovery is likely to become progressively more elusive. Should intensive work effort coupled with a lack of recovery continue unabated over extended periods of time, negative load effects may accumulate into more harmful and chronic forms of psychophysiological impairment (or *allostatic load*), such as burnout, anxiety, depression, or cardiovascular disease.

When applied to vacations, these theoretical principles have been utilized to explain a "passive" mechanism of recovery (Geurts & Sonnentag, 2006). That is, during most people's vacations, the normal stresses and demands of work are naturally removed. Hence, acute load reactions (e.g., temporarily elevated fatigue and/ or anxiety) elicited in response to the preceding period of work have the potential to converge toward their idiosyncratic baseline (i.e., pre-stressor) levels.

Empirical support for this recovery mechanism is derived from the “vacation effect”, which is most clearly demonstrated by a significant improvement in employees’ well-being between a prevacation working week and a subsequent period of vacation (De Bloom et al., 2010). Although this might be viewed as one of the more reliable findings in vacation research, a significant proportion of earlier studies did not provide an explicit test of the vacation effect, because the outcome variable (e.g., emotional exhaustion) was not assessed during the vacation itself (see De Bloom et al., 2009 for a review). Nonetheless, among studies that included a during vacation measurement occasion, the vacation effect has been demonstrated for emotional exhaustion (e.g., Flaxman et al., 2012; Kühnel & Sonnentag, 2011; Westman & Eden, 1997), negative affect (Syrek et al., 2018), and composite measures of health and well-being (including mood, health, energy, tension, and satisfaction; De Bloom et al., 2012, 2013). Extant evidence further indicates that respite length (i.e., number of days off work) is rarely associated with the size of the vacation effect (De Bloom et al., 2013; Etzion, 2003; Flaxman et al., 2012).

In the present study, our first goal is to test for the vacation effect among school teachers as they transition into a mid-term period of vacation. As far as we are aware, this is the first study to examine well-being on multiple occasions around this type of vacation period, and responds to calls for research on well-being fluctuations around briefer respites that are naturally surrounded by demanding periods of work (Blank et al., 2018). Mid-term breaks in both the UK (half-term) and US (Spring break or President’s week) possess this feature: a relatively brief (i.e., one week) recovery from work opportunity that punctuates two busy teaching terms in the school calendar (Corby, 2019).

To extend previous research, we examine effects of the mid-term vacation on a set of three affective well-being outcomes: emotional exhaustion, anxious mood, and depressed mood. First, we assess change in teachers’ emotional exhaustion from before to during the vacation, seeking to replicate findings of earlier studies that investigated effects of vacations on job burnout (Flaxman et al., 2012; Kühnel & Sonnentag, 2011; Westman & Eden, 1997). Focusing on emotional exhaustion may also ensure our findings are relevant to wider theoretical and empirical interest in understanding how employees' work-related energy resources fluctuate in response to discrete events (e.g., Davidson et al., 2010; Halbesleben et al., 2013). Second, we extend recent vacation research investigating changes in negative affect, by including indicators of both high activation (i.e., anxious mood) and low activation (i.e., depressed mood) dimensions of unpleasant affect (Flaxman et al., 2012; Syrek et al., 2018). This measurement strategy reflects a trend in the literature toward "dismantling" broader well-being constructs to investigate effects of vacations on more specific aspects of employees' emotional health (e.g., De Bloom et al., 2010, 2014; Chen, Lehto, & Cai, 2013; also see Warr et al., 2013). On the basis of the recovery-oriented theoretical assumptions described above (also see Geurts & Sonnentag, 2006), and previous empirical demonstrations of the vacation effect (e.g., Flaxman et al. 2012; Westman & Eden, 1997), we anticipated that a one-week vacation from work would correspond with significant improvements on all three markers of teachers' affective well-being.

Hypothesis 1: Teachers will experience a positive "vacation effect" in response to a one-week period of vacation, indicated by the size and statistical significance of prevacation-to-vacation improvements in emotional exhaustion (*Hypothesis 1a*), anxious mood (*Hypothesis 1b*) and depressed mood (*Hypothesis 1c*).

As already noted, the precise speed and shape of the postvacation fade out trajectory has proved more elusive. Given that recovery theorists emphasize the accumulative nature of load effects (Meijman & Mulder, 1998), and the progressive nature of employees' energy resource depletion in response to job demands (Shirom, 2003; Westman et al., 2004), it seems reasonable to assume that the fade out of beneficial vacation effects on affective well-being is generally a gradual rather than an immediate process (see De Bloom et al., 2009). There is evidence to support this assumption, particularly from studies revealing a gradual pattern of reemergence of employee exhaustion across postvacation working weeks (De Bloom et al., 2009; Kühnel & Sonnentag, 2011; Sonnentag & Fritz, 2006; Westman & Eden, 1997). However, across a larger group of vacation studies, the speed of postvacation fade out has ranged from the first few days back at work (De Bloom et al., 2010, 2012) up to 45 days after the vacation (Blank et al., 2018). This disparity may be partly attributed to different measures used to assess vacation effects, and also to variability in study design (especially the spacing and timing of postvacation measurement occasions).

Most vacation studies test fade out patterns by comparing well-being scores at each postvacation measurement occasion with prevacation scores. When there is no longer a significant difference in well-being between the two focal time points, fade out is deemed to have occurred (De Bloom et al., 2009, 2010). Therefore, conceptually, employees can be viewed as exhibiting a typically stable level of well-being that they tend to experience during working weeks, and a typically stable (albeit hopefully improved) level of well-being they would tend to experience during a period of vacation. From this perspective, longitudinal vacation studies are essentially exploring "transitions" between these typically stable levels, which are more technically known as *asymptotes*. In the present study, we utilize this assumption to guide our approach to modeling the postvacation trajectory of change in affective well-being as teachers transition out of the mid-term vacation and back to work. We test the hypothesis that teachers' weekly exhaustion and negative mood states will follow a postvacation trajectory that is consistent with gradual convergence back to prevacation levels. Moreover, based on previous findings (e.g., De Bloom et al., 2009; Kühnel & Sonnentag, 2011), we expect that convergence to prevacation levels (i.e., back to the work asymptote) will have occurred within four weeks after the vacation.

Hypothesis 2: Across four working weeks following a mid-term vacation, teachers' levels of emotional exhaustion (*Hypothesis 2a*) anxious mood (*Hypothesis 2b*) and depressed mood (*Hypothesis 2c*) will exhibit a gradual pattern of convergence back to their prevacation levels.

Employee Perfectionism

Researchers have highlighted a need for exploration of individual characteristics (e.g., personality traits) that might help to explain between-person variability in employees' vacation experiences (e.g., De Bloom et al., 2014; Flaxman et al., 2012; Geurts & Sonnentag, 2006). To our knowledge, only two previous vacation studies investigated the substantive role of personality variables, both of which focused on "compulsive" characteristics (De Bloom et al., 2014; Flaxman et al., 2012). In the present study, we extend Flaxman et al.'s (2012) study, which found a different pattern of vacation recovery among perfectionistic employees when compared to their nonperfectionist coworkers. In the following sections we set out arguments explaining why perfectionism may be uniquely associated with employees' prevacation levels of well-being, vacation effects, and the postvacation fade out trajectory.

Perfectionism is conceptualized as a multidimensional personality disposition (e.g., Hill & Curran, 2016; Stoeber & Gaudreau, 2017), with various perfectionistic characteristics found to load on two relatively distinct dimensions: *perfectionistic strivings* and *perfectionistic concerns*. Although traditionally neglected by occupational health scholars (see Harari, Swider, Steed, & Breidenthal, 2018; Stoeber & Damian, 2016), employee perfectionism is attracting more sustained empirical attention, particularly among researchers interested in understanding between-person variability in stress reactivity and recovery (Dunkley, Mandel, & Ma, 2014; Flaxman et al., 2012, 2018).

Most research indicates that the perfectionistic concerns dimension represents perfectionism's core vulnerability factor. This dimension is characterized by a chronic fear of failing or making mistakes, self-criticism, a heightened reactivity to others' criticism or negative evaluation, doubts about the quality of one's own actions (resulting in a tendency to check and repeat tasks to avoid mistakes), and a sense of pressure from others to be perfect (Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991, 2002; Stoeber & Rennert, 2008). A large body of evidence involving clinical, student, and community samples has shown that this aspect of perfectionism is positively associated with depression, anxiety, perceived stress, hopelessness, avoidant coping, and burnout (e.g., Dunkley et al., 2000, 2003; Flett & Hewitt, 2006; Hill & Curran, 2016; Limburg et al., 2016; Smith et al., 2018; Stoeber & Rennert, 2008).

The second perfectionism dimension, perfectionistic strivings, reflects a self-oriented motivation to achieve perfection, and involves the adoption and pursuit of very high personal standards of behavior and performance (Frost et al., 1990). The findings and opinions surrounding the strivings dimension remain contentious (Stoeber & Gaudreau, 2017; Stoeber & Otto, 2006). Perfectionistic strivings have been linked to a range of adaptive outcomes, including positive affect, problem-focused coping, conscientiousness, achievement motivation, and work engagement (e.g., Enns, Cox, & Clara, 2005; Flaxman et al., 2018; Stoeber & Otto, 2006). However, other studies indicate that perfectionistic strivings can be maladaptive (e.g., Besser, Flett, & Hewitt, 2004; Sherry, Hewitt, Sherry, Flett, & Graham, 2010). Though conceptually distinct, the strivings and concerns dimensions tend to be moderately positively correlated with one another. As a result, it has become common methodological practice to account for this overlap when investigating the unique predictive influence of perfectionistic concerns on psychological health (Stoeber & Gaudreau, 2017). Thus, in the present study, we focus our hypotheses on the specific influence of the perfectionistic concerns vulnerability on teachers' affective states around a vacation, while treating perfectionistic strivings as a control variable.

Activation of the perfectionistic concerns vulnerability in response to job demands

The diathesis-stress model portrays perfectionistic concerns as an underlying personality vulnerability that is triggered (or activated) via exposure to certain types of stress (Blankstein, Lumley, & Crawford, 2007; Chang & Rand, 2000; Enns et al., 2005). Research suggests that individuals exhibiting this personality disposition are especially sensitive to achievement-related and interpersonal stressors. When encountering personality-congruent stressors, these individuals are likely to experience elevated negative affect and other forms of psychological strain. Although perfectionism is often discussed as a universal personality trait, perfectionistic behavior tends to be domain-specific. Importantly for our purposes, “work” is the life domain in which adults report being at their most perfectionistic (Haase, Prapavessis, & Owens, 2013; Stoeber & Stoeber, 2009). The following set of characteristics helps to explain why employees who are higher in perfectionistic concerns are likely to exhibit heightened stress-reactivity during demanding periods of work.

First, when faced with challenging work tasks, employees exhibiting perfectionistic concerns possess a tendency to utilize avoidant coping strategies, such as procrastination or distraction (e.g., Dunkley et al., 2003; Flett et al., 1992). This type of coping response is understandable, given that even everyday tasks can represent a source of significant social-evaluative threat to these individuals (especially in relation to the risk of failing, making mistakes, or being criticized by others). Unfortunately, a propensity for avoidant coping, coupled with a tendency to repeatedly check for mistakes, is likely to elevate time pressure and thus generate stress by having to perform at an extremely high standard close to deadlines (Hewitt & Flett, 2002).

Second, individuals high in perfectionistic concerns have a cognitive style characterized by worry and rumination, catastrophizing (whereby minor hassles are “magnified” into significant threats), and frequent automatic perfectionistic cognitions (e.g., “No matter how much I do, it’s never enough”; Flett, Hewitt, Blankstein, & Gray, 1998). Research evidence supports the view that these interrelated forms of cognitive processing function as important mechanisms in the relationship between perfectionistic concerns and mental health problems (e.g., Flett, Hewitt, Nepon, & Besser, 2018; Graham et al., 2010; Macedo, Marques, & Pereira, 2014; Santanello & Gardner, 2007; Xie et al., 2019).

Third, employees high in perfectionistic concerns may face difficulties seeking and securing work-related support from supervisors and coworkers, given that perfectionistic individuals are often motivated to present a “perfect” image to the outside world, and may feel reluctant to reveal their (self-perceived) failings or inadequacies (a form of perfectionistic self-presentation; Mackinnon &

Sherry, 2012). Moreover, perfectionistic concerns often involves a belief that significant others (e.g., one's boss) demand perfection, reducing the likelihood that a perfectionist would view those persons as a potential source of support (e.g., Dunkley, Solomon-Krakus, & Moroz, 2016; Mackinnon & Sherry, 2012; Sherry, Law, Hewitt, Flett, & Besser, 2008).

Finally, even when performing well, achieving work goals, and receiving favorable feedback, employees with a high level of perfectionistic concerns find it difficult to derive a sense of performance satisfaction; they rarely feel their efforts are "good enough". This discrepancy between actual and desired levels of performance is partly due to these individuals tendency to pursue unrealistically high standards, and also because of a propensity to focus on even minor mistakes (Frost et al., 1995). Even when performing at an excellent standard, individuals high in perfectionistic concerns can easily find other aspects of their behavior to be self-critical about, such as how much effort they had to apply in order to reach the desired level of performance (Hewitt & Flett, 2002).

Given these distinctive characteristics of perfectionism, we predict that teachers who are higher in perfectionistic concerns will be especially reactive to the demands of their jobs. As a result of this heightened reactivity, they are likely to experience higher levels of emotional exhaustion, anxious mood, and depressed mood during working weeks. Support for this prediction would provide an important first step when testing the diathesis-stress model, in that the perfectionists' vulnerability is expected to be strongly activated through exposure to the stress of work.

Hypothesis 3: Perfectionistic concerns will be positively associated with typical work levels of emotional exhaustion (*hypothesis 3a*), anxious mood (*hypothesis 3b*) and depressed mood (*hypothesis 3c*).

Deactivation of the perfectionistic concerns vulnerability during vacation

From a diathesis-stress perspective, individuals who are high in perfectionistic concerns should not *always* experience unusually high levels of exhaustion and negative affect. Rather, the deleterious influence of perfectionism on well-being is only activated when perfectionistic individuals are exposed to the specific types of social-evaluative or performance stressors that are congruent with their personality vulnerability. This assumption has received empirical support from various studies conducted among clinical or student populations, which have found that perfectionism and perceived stress often interact in the prediction of distress (e.g., Chang & Rand, 2000; Dunkley et al., 2000). Assuming that perfectionistic teachers are most likely to encounter personality-congruent (i.e., social-evaluative and performance-oriented) stress during working weeks, and less likely to experience this type of stress during nonwork time, then their enhanced vulnerability should (in theory) be relatively dormant (or deactivated) during a period of vacation (Flaxman et al., 2012). If this assumption is correct, we expect to observe elevated exhaustion and negative mood states among perfectionistic teachers only during working weeks, and not during a week of vacation.

Moreover, given our prediction that perfectionists will be most reactive to stress experienced during working weeks, the extent of recovery obtained during a vacation should be particularly pronounced among perfectionistic teachers. More precisely, we predict that perfectionistic concerns will be positively associated with the size of reduction in exhaustion and negative mood states between working weeks and the vacation. We believe this ability to recover from job stressors during nonwork time is likely to be essential for employees reporting a high level of perfectionistic concerns: in the absence of recovery, these individuals are at significant risk of becoming entrapped in prolonged cycles of energy and mood resource depletion that culminate in burnout and depression (see Hill & Curran, 2016; Limburg et al., 2017).

However, this assumption that perfectionism will be positively associated with improvements in affective well-being between working weeks and the vacation is likely to be contingent upon perfectionistic teachers taking full advantage of the vacation recovery opportunity. To put that another way, the perfectionist diathesis will only be deactivated during vacation in the absence of the type of performance pressure that is encountered primarily at work. Thus, for perfectionistic employees, engaging in spillover work tasks during the vacation may prove especially problematic, given the various characteristics (e.g., catastrophizing and fear of making mistakes) that are likely to be triggered by engaging in such tasks. Accordingly, we expect time spent on work activities during the mid-term vacation will moderate any improvements in affective well-being experienced by teachers high in perfectionistic concerns.

Hypothesis 4: Perfectionistic concerns will be positively associated with extent of decrease in exhaustion and negative mood states during the vacation, but this vulnerability "deactivation" effect will be moderated by time spent on work tasks during the vacation. Specifically, among teachers higher in perfectionistic concerns, it is predicted that only those who refrain from work-related activities during the vacation will experience vacation levels of emotional exhaustion (*hypothesis 4a*), anxious mood (*hypothesis 4b*) and depressed mood (*hypothesis 4c*) similar to those lower in perfectionistic concerns.

Reactivation of the perfectionistic concerns vulnerability after vacation

According to the diathesis-stress hypothesis, the perfectionistic concerns vulnerability will be "reactivated" as teachers are re-exposed to job demands and stressors during the working weeks immediately following the vacation. Hence, we expect the perfectionistic concerns dimension to be positively associated with the rate of reemergence of emotional exhaustion, anxious mood, and depressed mood across postvacation working weeks. Moreover, those perfectionistic teachers who engage in spillover work tasks during the vacation may have to resume work after the vacation in a less recovered state. As a result, they would need to invest compensatory effort when confronting job demands and stressors after the vacation (Geurts & Sonnentag, 2006; Meijman & Mulder, 1998). Under these conditions, we would expect reactivation of the perfectionism vulnerability to be more pronounced among perfectionistic teachers who invest their energy resources in work tasks during the vacation.

Hypothesis 5: Perfectionistic concerns will be positively associated with postvacation increases in exhaustion and negative mood, and this vulnerability "reactivation" effect will be moderated (i.e., exacerbated) by investment of energy in work tasks during the vacation. Specifically, we predict that the teachers higher in perfectionistic concerns who engaged in work tasks during the vacation will experience a more rapid reemergence of emotional exhaustion (*hypothesis 5a*), anxious mood (*hypothesis 5b*), and depressed mood (*hypothesis 5c*) across postvacation working weeks.

Method

Participant Recruitment and Study Design

Study participants were teachers, head teachers (principals), and teaching assistants working within United Kingdom (UK) or United States (US) schools. Participants were recruited via a research flyer placed on a University website, word-of-mouth, personal contacts, or via social media platforms. At the end of the recruitment process, 313 teachers had volunteered to participate in the study.

Participants were first asked to complete an initial survey, which included measures of perfectionism, other personality dimensions, and demographic variables. They then received seven consecutive weekly surveys corresponding to a respite study design, where the third week was their mid-term vacation period. The initial and weekly surveys were distributed via Qualtrics online survey software. The weekly surveys were sent out on the Friday of each week, with participants asked to complete the survey as soon as possible, and to respond based on their experiences over the past week. Data collection took place during the 2016 and 2017 school years. The vacation periods were either the February or May "half-term" breaks in the United Kingdom, and Presidents' Week or Spring Break in the United States.

A total of 277 participants returned the initial survey and subsequently responded to at least one of the weekly surveys, collectively providing 1718 observations across the seven weeks. For analysis purposes, we included only participants who had responded to at least one time point before the vacation, during the vacation, and at least three time points following the vacation. This inclusion/exclusion rule was an attempt to balance power considerations with minimizing the risk of bias caused by absence or attrition, and ensuring that postvacation trajectories reflected the experiences of participants who had been present at work. This resulted in an analysis sample of 224 teachers, who collectively contributed 1525 responses across the seven time points. Of these 224 teachers, 75.4% worked for schools in the UK; 50% of the sample taught at primary schools, 18% taught at middle school level, and 32% taught at secondary/ further education level. Most participants (85.4%) were female; average age was 40.5 years old (SD=10.35) and median tenure was 13 years (IQR = 13; mean = 13.74, SD = 9.03).

Measures

Initial survey

Perfectionism was measured using the short-form of Frost et al.'s Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990; also see Cox et al., 2002). The short-form FMPS includes five items measuring *concern over mistakes*: "If I fail at work, I am a failure as a person"; "If I fail partly, it is as bad as being a complete failure"; "If someone does a task at work better than me, then I feel like I failed the whole task"; "If I do not do as well as other people, it means I am an inferior human being"; "The fewer mistakes I make, the more people will like me". Three items measure *doubts about actions*: "I usually have doubts about the simple everyday things I do"; "I tend to get behind in my work because I repeat things over and over"; "Even when I do something very carefully, I often feel that it is not quite right". Five items measure *personal standards*, which is a widely used indicator of perfectionistic strivings: "I have extremely high goals"; "I expect higher performance in my daily tasks than most people"; "It is important to me that I be thoroughly competent in everything I do"; "I set higher goals for myself than most people"; "Other people seem to accept lower standards from themselves than I do". Responses were captured on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Given that perfectionistic concerns is considered to be a distinct lower-order trait of neuroticism, researchers emphasize the importance of controlling for neuroticism when investigating unique effects of the perfectionist vulnerability (e.g., Clark, Lelchook, & Taylor, 2010; Dunkley et al., 2014). Accordingly, we measured neuroticism in the initial survey with the following two items from the 10-item version of the Big Five Inventory (Rammstedt & John, 2007): "…gets nervous easily", and "…is relaxed, handles stress well". These two items were preceded with the statement "I see myself as someone who…", and scored on a 6-point response scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*).

To examine the validity of these initial survey measures, we performed a series of confirmatory factor analyses (CFA) using Mplus software v8.4. Code used for each of these analyses is given in Appendix A. Our hypothesized measurement model was based on the two main dimensions of perfectionism (Cox et al., 2002): a second order perfectionistic concerns factor was hypothesized to be measured by underlying first order factors of concern over mistakes and doubts about actions. Perfectionistic strivings (i.e., personal standards) and neuroticism were treated as distinct first order factors. This model offered an acceptable fit to the data (Chi-sq = 183.62 on 85 df, CFI = 0.93, RMSEA = 0.07, SRMR = 0.06), and outperformed competing models in which one or more factors were merged (see Appendix B, Table B1).

Given the multinational nature of the sample, and the potential that respondents from the UK and US might interpret items differently, we also performed a multigroup CFA to test for measurement invariance between the national groups, using the sequence of model comparisons for the second order measurement model scenario outlined by Rudnev et al. (2018). Results supported the consistent interpretation of both questions and response scales across nations, with the complete strong invariance model--where factor loadings and intercepts of both first and second order factors were fixed equal for US and UK groups--not giving a significantly weaker fit than alternatives in which intercepts, and then loadings, were allowed to differ between groups (see Appendix B, Table B2).

Reliabilities for the perfectionistic concerns scale (i.e., collectively for concern over mistakes and doubts about actions items) and the perfectionistic strivings scale were satisfactory: Cronbach's alpha = 0.88 and 0.82; McDonald's Omega = 0.90 and 0.83, respectively. The reliability for neuroticism was weaker, alpha = 0.51; McDonald's Omega = 0.51. However, with just two items within the neuroticism scale (one negatively worded), this is not surprising. We averaged across the respective sets of items to create mean scale (composite) scores for perfectionistic concerns, perfectionistic strivings, and neuroticism.

Weekly survey measures

Emotional exhaustion was measured with five items adapted to the week level from the Maslach Burnout Inventory (MBI-HSS; Schaufeli, Leiter, Maslach, & Jackson, 1996). A sample item was "I felt burned out from my work". Participants were asked to rate their agreement with each statement with respect to their experiences over the past week on a 6-point scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*).

We measured weekly levels of anxious and depressed mood using relevant items adapted from Warr's (1990) affective well-being scales (also see Daniels, Brough, Guppy, Peters-Bean, & Weatherstone, 1997; Mäkikangas et al., 2007). Participants were asked to rate their experience of a range of emotions over the past week on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). We utilized three items to assess anxious mood, "anxious", "worried", and "tense"; and a further three items to assess depressed mood, "depressed", "miserable", and "gloomy".

During the mid-term vacation week, participants were asked to report the number of hours they had spent on work-related tasks and activities. This variable was subsequently transformed using the natural logarithm function, given the high degree of positive skew in its distribution (before transformation, mean = 9.21, median = 7.00).

To examine the measurement properties of our three week-level outcomes (emotional exhaustion, anxious mood, and depressed mood), we ran a series of CFAs. First, we ran separate CFAs for each time point. The hypothesized three factor measurement model significantly outperformed two factor (with anxious mood and depressed mood merged) and one factor alternatives at each time point (see Appendix B, Table B3). Our results demonstrated both metric and strong measurement invariance between UK and US subgroups at five of the seven time points (i.e., these models were not significantly weaker than the configural invariance model), with fit indices for the strong invariance model achieving a satisfactory fit at every time point (see Appendix B, Table B4). Appendix B, Table B5 summarizes the results of temporal invariance testing. When considering the seven weeks of responses collectively, the three factor solution also demonstrated metric invariance across time; that is, if we fixed factor loadings equal across the seven weeks, the model fit was not significantly diminished, either in terms of the change in the model chi-square or the fit indices. This indicates that respondents' understanding of the items did not change over time, and hence any change found can be attributed to genuine movement in the constructs being measured. There was also some support for strong invariance across the seven weeks; although fixing item intercepts equal across time gave a weaker fitting model, there was very little decrease in the fit indices, which only changed in the third decimal place.

The reliabilities for each of our three outcome scales were satisfactory at each time point: emotional exhaustion, $0.87 < \text{alpha} < 0.91$; $0.89 < \text{Omega} < 0.91$; anxious mood, $0.81 < \text{alpha} < 0.89$; $0.83 < \text{Omega} < 0.89$; and depressed mood, $0.85 < \text{alpha} < 0.93$; $0.89 < \text{Omega} < 0.93$. For each week and each outcome, we averaged across the respective sets of items to create weekly mean scale (composite) scores for emotional exhaustion, anxious mood and depressed mood.

Statistical Analyses

We fitted a series of discontinuous multilevel growth models to first build a model for change in our three well-being outcomes across time; second, to test the anticipated decrease in emotional exhaustion, anxious mood, and depressed mood as teachers transitioned into the vacation, and the postvacation fade out to a work asymptote (hypotheses 1 and 2); and finally to examine whether, for each outcome, variation between participants before, into, and out of the vacation could be explained by covariates (hypotheses 3, 4, and 5).

Modeling change in exhaustion and negative mood states over time

We would expect that, in the absence of any intervention, the emotional exhaustion, anxious mood, and depressed mood outcomes would exhibit a relatively stable level during periods of work. We also believe that vacation periods allow employees to recover from these negative affective states, with longer vacations enabling recovery to a stable vacation level. On their return to work, we would expect employees' levels of each outcome to return to their typical work level following a curvilinear or S-shaped trajectory, with the initial rate of return subsiding to a more gradual convergence to an asymptote (e.g., Bliese, Adler, & Flynn, 2017).

Therefore, over a period of time involving both work and vacation periods, we expect the pattern of responses on our outcome variables to resemble Figure 1, with scores moving between their typical work and vacation asymptotes. Historically, the difficulties and costs inherent in collecting repeated measures data meant that longitudinal studies in the social sciences tended towards a limited number (e.g., 3 or 4) time points, with correspondingly simple models for linear change fitted via mixed ANOVA or ANCOVA frameworks. However, in the last two decades, digitally administered surveys have made it easier to collect data at more time points, enabling more complex mathematical functions and rigorous modeling methods to be used for modeling change over time, and increasingly sophisticated models to be tested.

Within studies of transitions and interventions, this advance has typically taken the form of discontinuous longitudinal multilevel models (also known as discontinuous multilevel growth curves or piecewise mixed models). As described by Halbesleben et al. (2014) in the context of resource trajectories, such models combine the partition of outcome variance implicit in multilevel modeling--

i.e., into separate components representing within-person change, and between-person variation in level and change--with approximating complex shapes of within-participant change by “sticking together” a series of simpler functions for change, to collectively cover the entire time period of a study. This latter piecewise (or discontinuous) element of the method is achieved by using time-varying dummy variables to activate or switch off the specific function required for a particular time period. Bliese et al. (2017) cite a variety of examples of this method for modeling transition processes, ranging from combining simple linear functions to the addition of polynomial “pieces” to model curvilinear change (also see Halbesleben et al., 2014; Syrek et al., 2018). However, functions used for change over time have rarely reflected the theoretical convergence of an outcome to an asymptote (i.e., a stable level). Although higher order polynomials, such as quadratic or cubic terms (time-squared, time-cubed), can be used to represent curvilinear change, they will eventually accelerate towards infinity as time increases. As Grimm et al. (2011; p.6) note, “quadratic growth models only provide reasonable representations of change within the range of the data and are not good at representing the final asymptotic level of a developmental process”.

An alternative method, which is often utilized in the pure sciences where multiple timepoint datasets have been more prevalent, is to use “true” nonlinear functions, in which f(x) converges to an asymptote as x increases. The most frequently used are the exponential decay function or the logistic function, which are depicted and compared with linear and polynomial functions in Figure 2. This true nonlinear function approach is recommended by Pinheiro and Bates (2001) and Singer and Willet (2003) when the underpinning theoretical model involves convergence to an asymptote, as is the case with recovery from, and reemergence back to, stable work levels of well-being that is implicit in vacation study data. As well as providing a better match with theory, nonlinear functions also estimate asymptotes, the difference between them, and/or the rate of change towards them as explicit, interpretable parameters.

Accordingly, to model change in teachers' well-being over seven consecutive weeks, we fitted a series of discontinuous multilevel growth models of increasing complexity, separately for each well-being outcome. For each outcome, we first fitted an unconditional multilevel model in which the outcome variance was simply partitioned into within- and between-participant components (model 1). This served as a baseline comparison for model fit, and gave baseline estimates of variance to be explained at within- and between-participant levels. We then added a dummy variable for work vs vacation weeks, therefore modeling a simple step change in our outcomes into and out of vacation (model 2). The four postvacation time points allow for more sophisticated modeling of the fade out from vacation levels back to the work asymptotes of exhaustion and negative mood. We modeled the postvacation period using functions of increasing complexity, enabling a comparison between the linear and higher order polynomial approaches more traditionally used by quantitative psychologists and the true nonlinear function approach: first, a linear function for change over time (model 3); then a quadratic polynomial (model 4); a cubic polynomial (model 5); and finally a true nonlinear function in the shape of an exponential decay curve (model 6a). Each of these discontinuous multilevel linear, polynomial or nonlinear growth models is illustrated and described in their mathematical form in Figure 3.

The fit of these potential competing models was compared via change in the -2*log-likelihood (where models were nested); the AIC and BIC fit statistics (where smaller values indicate a better fit); and by variance explained at within- and between-participant levels. Having identified the best-fitting discontinuous growth model for work–vacation–work change (i.e., the "fixed effect" of change over time) for each outcome, we fine-tuned this model by adding a within-participants autoregressive type-1 correlation structure (i.e., controlling for the lag effect of the outcome at previous weeks, hence removing this "nuisance" variation; Model 6b). The model parameters that represented the difference between the work and vacation asymptotes, and the direction and rate of change following the vacation provided a test of hypotheses 1 and 2 respectively.

Taking forward the best of models 1 to 6b, we added random effects for the coefficients representing degree and shape of change. In other words, the difference between work and vacation levels of an outcome, and the shape/rate parameter(s) for postvacation change, rather than just the intercept (the work asymptote), were now allowed to vary between participants (model 7). Given our use of likert scale measures, with upper and lower bounds, the initial level of each outcome (i.e., the work asymptote) is systematically related to the degree of change (i.e., difference between work and vacation asymptotes). Therefore, as well as the aforementioned variance parameters, we fitted an additional random effect to model this covariance.

Having controlled for the potentially confounding effects of country (UK or US), neuroticism, and perfectionistic strivings, as well as our hypothesized moderator, hours worked during the vacation[1] (model 8), we tested hypotheses 3, 4 and 5 by attempting to explain between-person variation in work asymptote, difference between work and vacation asymptotes, and postvacation rate of return to work asymptote with our hypothesized fixed effects of perfectionistic concerns, time spent on work-related activities during the vacation (model 9), and the interaction between them (model 10).

To probe any significant interaction effects with respect to hypotheses 4 and 5, we assessed and plotted the work-to-vacation difference, and postvacation reemergence rate, for high, medium and low levels of perfectionistic concerns and time spent on work activities during the vacation. For perfectionistic concerns, high, medium, and low values were defined by the 16th, 50th, and 84th percentiles. Given the true quantitative nature, and easy interpretability of hours worked during the vacation, we used values of 0 hours (i.e., not working during the week of vacation), 7 hours (approximately one day's work) and 14 hours (approximately two day's work).

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[1] Due to the temporal precedence of the initial work period, hours worked during vacation was not used as a predictor of the work asymptote

All analyses were performed on our sample of 1525 observations from 224 teachers. We fitted our discontinuous multilevel growth curves using statistical programming language R (version 3.5), specifically the lme function for models with only linear or polynomial pieces, and the nlme function for models with non-linear sections (Pinheiro & Bates, 2001). Maximum Likelihood Estimation was used for the fitting process. To aid researchers keen to implement this analytic method, the R code used for all analyses described above is available in Appendix C. We assessed competing nested models using chi-square difference tests between their model deviances. The $p < .05$ level of statistical significance was used throughout when performing chi-square difference tests and testing model coefficients. When comparing non-nested models, we used AIC and BIC statistics and variance explained at each level. As a robustness check, and given the low reliability of the two-item neuroticism scale, we repeated the latter stage of modeling (models 8-10) without this control variable.

Results

Table 1 provides means, standard deviations, and zero-order correlations for all study variables at each time point. Table 2 summarizes the fit of the alternative discontinuous multilevel growth models for change over time for each outcome (models 1 to 6b as described above, and as depicted in Figure 3), giving the model deviance, the AIC and BIC statistics, and within-participant residual and between-participant intercept/work asymptote variances. For all three outcomes, model 2, a step change into and out of vacation, was clearly superior to the baseline model 1, a null model of no difference between vacation and work asymptotes. This finding indicates a significant effect of the vacation on teachers' affective well-being. Specifically, model 1 vs model 2, for exhaustion: Δ Deviance = 207.87 on 1 df, $p < .001$; for anxious mood, Δ Deviance = 263.51 on 1 df, $p < .001$; for depressed mood, Δ Deviance = 121.95 on 1 df, $p < .001$.

Of the models that incorporated more sophisticated options for modeling the postvacation return to the work asymptote using polynomial functions of time, only the cubic model (model 5) was superior to the simple step change out of vacation. However, based on comparisons of the AIC and BIC, and the (unexplained) variance components at the within- and between-participant level, model 6a, a discontinuous multilevel growth model that utilized the true nonlinear exponential decay function for postvacation change, performed as well as the cubic polynomial (model 5) for each outcome, but used two fewer parameters to do so. Given this greater parsimony, and its fit to the theoretical assumption of convergence to a work asymptote rather than growth to infinity, model 6a was preferred. For each outcome, model fit was further enhanced by adding a within-participants autocorrelation parameter to acknowledge the lag effects common in longitudinal samples (model 6a vs model 6b, for exhaustion: Δ Deviance = 47.96 on 1 df, $p < .001$; for anxious mood, Δ Deviance = 11.68 on 1 df, $p < .001$; for depressed mood, Δ Deviance = 45.45 on 1 df, $p < .001$).

Figure 4 depicts these discontinuous multilevel growth models with a true nonlinear function for the postvacation period, for each outcome (model 6b, lines), illustrating their excellent fit to the sample means for each week of the study (bars). Figure 4 also details the estimated fixed coefficients for: the work asymptote (*work_asymptote*); the difference between work and vacation asymptotes (*difference*); and the exponential decay rate of change parameter (*rate*) for the vacation-to-work transition. For each outcome, the difference coefficient--work asymptote minus vacation asymptote--was positive and statistically significant, therefore supporting hypothesis 1: exhaustion *difference* = 0.893, $p < .005$; anxious mood *difference* = 0.976, $p < .005$; depressed mood *difference* = 0.579, $p < .005$. Likewise, for all three outcomes, the *rate* coefficient was positive and statistically significant: exhaustion *rate* = 1.173, $p < .005$; anxious mood *rate* = 2.324, $p < .005$; depressed mood *rate* = 1.486, $p < .005$, supporting hypothesis 2. As Figure 4 illustrates, for anxious mood, the strong positive rate parameter indicates an almost immediate postvacation rebound to the work asymptote. By comparison, the postvacation fade out to the work asymptote was slower for both exhaustion and depressed mood. However, by the final week of the study (four working weeks after the vacation), the estimated scores were very close to the work asymptote, offering further support for hypothesis 2.

Finally, for each outcome, we tested hypothesis 3 (influence of perfectionistic concerns on work asymptotes), hypothesis 4 (influence of perfectionistic concerns, moderated by time spent on work activities during vacation, on the difference between work and vacation asymptotes), and hypothesis 5 (influence of perfectionistic concerns, moderated by time spent on work activities during vacation, on the rate of postvacation return to the work asymptote). The comparisons of fit between models 6b to 10 are summarized in Table 3. We first extended model 6b by adding random effects for the difference between work and vacation asymptotes (i.e., for parameter *difference*), the rate of postvacation return to the work asymptote (parameter *rate*), and the covariance between them (model 7). This significantly improved model fit for each outcome (model 6b vs model 7, for exhaustion: Δ Deviance = 10.51 on 3 df, $p = .014$; for anxious mood, Δ Deviance = 62.16 on 3 df, $p < .001$; for depressed mood, Δ Deviance = 100.62 on 3 df, $p < .001$). Adding the control variables of country, neuroticism, and perfectionistic strivings, and time spent on work activities during the vacation (model 8), and then the main effect of perfectionistic concerns (model 9) as predictors of these random effects of *work_asymptote*, *difference,* and *rate*, also significantly improved model fit for each outcome. Adding the interaction between perfectionistic concerns and time spent on work activities during vacation as a predictor of the random effects of *difference* and *rate* significantly improved model fit for the anxious and depressed mood outcomes (model 9 vs model 10, for exhaustion: Δ Deviance = 3.01 on 2 df, $p = .222$; for anxious mood, Δ Deviance = 13.37 on 2 df, $p = .001$; for depressed mood, Δ Deviance = 23.65 on 2 df, $p < .001$).

The estimated coefficients from model 10 are reported in Table 4. Country and perfectionistic concerns exhibited significant associations with the work asymptotes of all three outcomes, with UK teachers and those higher in perfectionistic concerns more likely to report higher levels of each outcome. The latter result supports hypotheses 3a-c (effect of perfectionistic concerns: for exhaustion, B = 0.25, $p = .014$; for anxious mood, B = 0.27, $p < .001$; for depressed mood, B = 0.31, $p < .001$). The perfectionistic concerns dimension was also associated with the improvement in anxious and depressed mood during vacation (i.e., the *difference* parameter). However, in support of hypotheses 4b and 4c, there was a significant negative interaction between perfectionistic concerns and time spent on work activities during the vacation in relation to the work-to-vacation change in mood: anxious mood, B = -0.20, p = .001; depressed mood, B = -0.15, p = .005.

These moderated effects can be illustrated by calculating the simple slopes of the perfectionistic concerns effect on anxious and depressed mood at low (0 hours worked), medium (7 hours worked), and high (14 hours worked) levels of work during the mid-term vacation. If no time was spent on work-related activities during the vacation, perfectionistic concerns exhibited a strong positive relationship with the *difference* parameter (for anxious mood, conditional effect B = 0.51, p = .001; for depressed mood, conditional effect B = 0.48, p = .001). However, if those with higher levels of perfectionistic concerns engaged in work activities during the vacation, this vacation effect is lost. At medium and high levels of engagement in work activities during vacation, the influence of perfectionistic concerns on the improvement in anxious and depressed mood was non-significant (for anxious mood, conditional effect at 7 hours worked: B = 0.09, p = .599; for depressed mood, conditional effect at 7 hours worked: B = 0.17, p = .317; for anxious mood, conditional effect at 14 hours worked: B = -0.03, p = .870; for depressed mood, conditional effect at 14 hours worked: B = 0.07, p = .721).

Figure 5 depicts the predicted patterns of change in anxious and depressed mood over the study period conditional on perfectionistic concerns and time spent on work activities during the vacation; specifically at the 16^{th} and 84^{th} percentiles of perfectionistic concerns, and for 0 hours and 14 hours of time spent on work activities during vacation. Figure 5 illustrates how those with higher levels of perfectionistic concerns were more vulnerable to anxious and depressed mood during work periods. They could reduce these negative affective states to the levels experienced by those lower in perfectionism when on vacation, but only when they abstained from spillover work activities during the vacation.

Hypothesis 4a was not supported, as we found no evidence that perfectionistic concerns, or its interaction with time spent on work activities during vacation, were significantly related to a decrease in emotional exhaustion from before to during vacation. Neither perfectionistic concerns, nor its interaction with spillover work tasks, had a significant influence on the rate of postvacation change for any outcome (hypotheses 5a-c). Finally, our robustness check confirmed that the conclusions drawn from models 8 to 10 were unaffected by removing the neuroticism control variable.

Discussion

This study had two primary goals. First, we examined week-level change in affective well-being among school teachers as they transitioned into and out of a one week period of vacation. Second, we explored the interactive influence of perfectionistic personality characteristics and spillover work tasks during the vacation on change in teachers' well-being. Consistent with previous research, our overall sample of teachers experienced the "vacation effect", which was evident in a significant improvement in affective well-being from before to during the mid-term vacation. When directly comparing different options for modeling the postvacation fade out trajectory, we found the most favorable model was one that utilized a nonlinear exponential decay function with convergence back toward work asymptotes (i.e., typical working week levels) of emotional exhaustion and negative mood states over four consecutive postvacation working weeks. In line with expectation, perfectionism was positively associated with the size of the vacation effect. Specifically, teachers higher in perfectionistic concerns experienced elevated prevacation levels of exhaustion, anxiety, and depressed mood, followed by an especially pronounced decrease in anxious and depressed mood during the vacation. However, this particularly beneficial vacation effect experienced by perfectionistic teachers was found to be contingent upon refraining from work-related activities during the vacation. Contrary to predictions, neither perfectionism, nor its interaction with spillover work tasks, was uniquely associated with rates of convergence back to prevacation levels of emotional exhaustion or negative mood.

Theoretical Implications

In support of hypothesis 1, a single week respite from work coincided with a significant improvement in teachers' affective well-being. Our study therefore replicates the salutary vacation effect observed in earlier studies of longer vacations (e.g., De Bloom et al., 2013; Fritz & Sonnentag, 2006; Westman & Eden, 1997) and more specific types of leisure excursion (e.g., winter skiing trips; De Bloom et al., 2010). This initial result lends support to the "passive" recovery mechanism described by Geurts and Sonnentag (2006), in that the removal of job stress during the mid-term respite appeared to elicit an immediate reduction in teachers' exhaustion and an improvement in mood. Our study extends earlier vacation research by examining change around nationally standardized mid-term breaks in the US and UK school calendars, and also by simultaneously testing vacation effects across three distinct indicators of well-being, which have previously been assessed in separate studies (e.g., Kühnel & Sonnentag, 2011; Syrek et al., 2018). It is noteworthy that a vacation effect was found across all three of our study outcomes, thereby supporting theoretical propositions that a respite from normal job demands functions to: (a) temporarily halt the accumulation of work-related energy resource depletion, as was evident in the improvement in teachers' emotional exhaustion during the vacation (Shirom, 2003; Westman et al., 2004); and (b) initiate the process of "mood repair" (Sonnentag & Fritz, 2007), as indicated by vacation-week reductions in both high activation and low activation negative mood states.

The extent of change from before to during the mid-term vacation is congruent with growing evidence suggesting that lengthy vacations may not be essential to obtain these well-being benefits (e.g., Blank et al., 2018; Etzion, 2003). A well-timed week away from the workplace may in many cases be sufficient to activate the recovery process. Taking brief and sufficiently regular vacations therefore shows good potential for ensuring that employees' short-term fatigue and negative affective states do not accumulate over time into more chronic forms of impairment, such as burnout or depression (Strandberg et al., 2017; Westman et al., 2004). Recovery during mid-term vacations may be particularly critical for maintaining the health and well-being of the teaching profession, which continues to report above average levels of psychological strain (Heath & Safety Executive, 2019; Kühnel & Sonnentag, 2011). It seems paradoxical that teachers are sometimes viewed as having a generous leave entitlement, while still experiencing high rates of burnout and other stress-related problems. Presumably, this paradox can be explained in part by the well-documented workload and interpersonal demands of teaching (e.g., Higton et al., 2017); yet it also suggests that there is further scope to help schools and teachers optimize their prescheduled (e.g., mid-term) breaks in the service of recovery.

Although not a primary focus of our study, the stable pattern of affective well-being observed across two working weeks preceding the vacation may interest scholars who have discussed the well-being dynamics of the prevacation period (Nawijn et al., 2013; Syrek et al., 2018; Westman & Eden, 1997). Few studies have focused on modeling or predicting change in well-being that might unfold during this period (for exceptions see Nawijn et al., 2013; Syrek et al., 2018). It has been suggested that the week immediately prior to vacation is unlikely to be a normal working week, given the influence of (a) positive anticipation of time away from work, and/ or (b) increased time pressure associated with an “inner tension” to complete unfinished work and home tasks before going on leave (Nawijn et al., 2013).

There is conflicting evidence surrounding these prevacation dynamics. Westman and Eden (1997) found no difference in job burnout between 6 weeks and 3 days prior to a summer vacation, while Nawijn et al. (2013) found that employees’ affective well-being decreased significantly between the penultimate and final working week before a winter sports vacation. In contrast, Syrek et al. detected trends of increasing positive affect and declining negative affect across several weeks leading up to a Christmas holiday (also see Gilbert & Abdullah, 2004). The current study’s results concur with Westman and Eden's (1997) findings, in that our sample of teachers reported virtually flat levels of exhaustion and negative mood across two working weeks leading up to the vacation. It is possible that this pattern of prevacation well-being was influenced by our participants' high degree of familiarity with mid-term breaks. For example, teachers in the UK have similar mid-term respites in October, February, and May of every school year. Such familiarity may serve to dampen positive anticipation effects, and may enable teachers to learn how to manage the time pressure that potentially builds up just before less frequent respite periods. Nonetheless, the stability in teachers' exhaustion and mood scores across the prevacation working weeks is congruent with the assumption that employees will tend to exhibit typically stable levels of affective well-being during working periods (i.e., a work asymptote).

Because participants provided data over consecutive weeks following the vacation, we were able to apply more sophisticated discontinuous growth modeling procedures to estimate the rate and shape of the postvacation fade out trajectory. In this regard, we respond to calls to utilize this type of modeling when investigating fluctuations in employees' well-being over time, particularly in response to discrete events (e.g., Bliese et al., 2017; Halbesleben et al., 2013, 2014). We applied this analytic method to contribute to debate about whether positive vacation effects disappear abruptly (i.e., well-being returns to its prevacation level) as soon as employees have returned to work (e.g., De Bloom et al., 2010), or whether well-being benefits obtained from vacations decay more gradually with time (e.g., Fritz & Sonnentag, 2006; Westman & Etzion, 2001). The postvacation findings provided support for our second hypothesis, in that teachers' weekly levels of exhaustion and negative mood exhibited the predicted pattern of nonlinear convergence back toward prevacation levels across four weeks after the mid-term break. The exponential decay function for change over time outperformed the immediate single-step (i.e., linear) return to the work asymptote for all three outcomes, and offered a more satisfactory fit to our data than quadratic and cubic polynomial options. These findings are broadly congruent with Syrek et al.'s (2018) recent study of the

Christmas holiday, which demonstrated that employees' affective state tends to follow a curvilinear trajectory of change around a period of vacation.

Interestingly, we found that the postvacation change trajectory was not identical across our three study outcomes. Specifically, a high activation dimension of negative affect (i.e., week-level anxious mood) showed the highest rate of convergence back to the work asymptote, whereas the low activation measures (i.e., emotional exhaustion and depressed mood) exhibited similar, and rather more gradual, rates of re-emergence after the vacation. Moreover, some beneficial vacation aftereffects for exhaustion and depressed mood seemed to extend into the second working week following the vacation. Hence, for exhaustion and depressed mood, our study's findings support the notion that favorable vacation effects tend to fade out completely somewhere between 2 and 4 working weeks after a vacation (De Bloom al., 2009; Westman & Eden, 1997).

The subtle difference in weekly change trajectories across our outcomes supports vacation scholars who advocate dismantling broader well-being constructs into more specific subfacets (e.g., Chen et al., 2013; Nawijn et al., 2013). For example, when examining individual items within a broad measure of health and well-being, De Bloom at al. (2010) found that employees' mood valence returned quickly to its prevacation level after a vacation, whereas fatigue exhibited a slower postvacation fade out. We believe such differences in change sensitivity between well-being constructs warrant further research attention, particularly given calls for investigations of the temporal "volatility" inherent in different types of personal (e.g., energy or mood) resources (ten Brummelhuis & Bakker, 2012).

Turning now to the influence of perfectionism on the observed changes in teachers' well-being around the vacation. The perfectionism hypotheses were underpinned by a diathesis-stress theoretical perspective (e.g., Chang & Rand, 2000; Flaxman et al., 2012). Specifically, we predicted that the perfectionistic concerns vulnerability factor would be most strongly activated during working weeks, deactivated during the vacation period, and rapidly reactivated again when teachers returned to school. We found support for key aspects of this diathesis-stress model. First, consistent with hypotheses 3a, 3b and 3c, perfectionistic concerns were positively associated with prevacation levels (i.e., work asymptotes) of exhaustion, anxiety, and depressed mood, indicating that the more perfectionistic teachers experienced heightened stress-reactivity in response to job demands. These elevated working week asymptotes of exhaustion and negative mood are in line with research involving working populations that has documented relationships between perfectionistic concerns, job burnout, and other forms of psychological strain (Childs & Stoeber, 2010; Flaxman et al., 2018; Harari et al., 2018; Stoeber & Damian, 2016; Stoeber & Rennert, 2008).

Second, we obtained support for the notion that the perfectionism diathesis would be relatively dormant (or deactivated) outside of work, in that perfectionistic teachers generally experienced a pronounced reduction in anxious and depressed mood states (but less so emotional exhaustion) as they transitioned from working weeks into the mid-term vacation (i.e., the perfectionistic concerns dimension was positively and uniquely associated with the work-to-vacation difference parameters). This pattern of findings is consistent with research reporting work as the life domain in which adults tend to be at their most perfectionistic (Haase et al., 2013; Stoeber & Stoeber, 2009), and with the notion that individuals exhibiting perfectionistic concerns will be especially reactive to the social-evaluative pressures of work.

The diathesis-stress interpretation received additional validation from the significant interaction between perfectionistic concerns and spillover work tasks in the prediction of change in teachers' negative mood states. Consistent with hypotheses 4b and 4c, perfectionistic teachers' ability to improve their mood during the vacation seemed to be impaired by investing time in spillover work-related activities. Specifically, although the perfectionistic concerns dimension was associated with declines in both anxious and depressed mood during the vacation, these effects were found to be conditional upon refraining from job tasks during the vacation. It is striking to observe that, among the perfectionistic teachers who took a complete break from work-related activities during their mid-term vacation, levels of anxious and depressed mood decreased to a level that was equivalent to teachers who reported a low level of perfectionistic concerns (see Figure 5). However, perfectionistic teachers who worked for seven or more hours across the mid-term vacation week did not experience a significant improvement in anxious or depressed mood. Thus, it appears that engaging in work tasks while on vacation elicits (or perhaps maintains) perfectionism's distinctive characteristics (e.g., catastrophizing, procrastinating), thereby reducing the extent to which perfectionistic teachers could obtain respite from the heightened negative affect they tend to experience during working weeks.

We failed to find support for hypothesis 5, in that that neither perfectionism, nor its interaction with spillover work activities, was significantly associated with the reemergence rate of exhaustion or negative mood after the vacation. In this regard, our findings diverge from Flaxman et al.'s (2012) study, which found that a subgroup of perfectionistic academics experienced a more rapid fade out of well-being benefits obtained during an Easter vacation. One possible explanation for the discrepancy is that the current study applied an arguably more stringent test of the unique influence of perfectionistic concerns on the postvacation fade out trajectory. Specifically, unlike Flaxman et al.'s (2012) vacation study, we controlled for neuroticism and the perfectionistic strivings dimension. An alternative explanation is that the demands of returning to school after a mid-term break posed a salient challenge to most teachers, rendering personality differences somewhat less influential. A related possibility is that the postvacation trajectory would be more strongly influenced by an interaction between perfectionistic concerns and job demands experienced when first resuming work (see Kühnel & Sonnentag, 2011).

Practical Implications

Various cognitive-behavioral therapy (CBT) interventions have been developed to address problematic characteristics of the perfectionist personality vulnerability (e.g., Egan et al., 2014; Lloyd et al., 2015; Pleva & Wade, 2007; Rozental et al., 2017). Such interventions can be brief and skills-based, making them suitable for workplace settings. A fruitful avenue for future research and practice would be to implement and evaluate workplace training programs that have been specifically designed to help employees who experience difficulties due to perfectionism. Perfectionistic employees may also benefit from more general recovery-enhancing programs that are aimed at helping employees detach from work during leisure time (e.g., Hahn, Binnewies, Sonnentag, & Mojza, 2011).

Another option is to increase awareness among managers and staff about the common characteristics of perfectionism, including how perfectionistic employees might respond to feedback, and their unusually strong aversion to failing or making mistakes. Also, teachers and their representatives in various countries are raising concerns about excessive workloads (e.g., American Federation of Teachers, 2017; ETUCE, 2011; Worth & Van den Brande, 2019), and some teachers in the current study may have felt they had little choice but to complete or prepare work during the mid-term vacation. Thus, organization-focused initiatives may be required to ensure a healthy balance between job demands and resources, so that the regular breaks in the school calendar can be viewed as valuable opportunities for replenishing depleted energy and mood resources.

Limitations and Directions for Future Research

Our study has various limitations that highlight avenues for further vacation research. First, we utilized three personality facets--concern over mistakes, doubts about actions, and personal standards--drawn from the same measure of perfectionism (i.e., MPS; Frost et al., 1990). Although Frost's MPS has been one of the most widely used measures over the past three decades, perfectionism researchers often create more comprehensive perfectionistic strivings and perfectionistic concerns dimensions by combining Frost's subscales with Hewitt and Flett's (1991) self-oriented perfectionism (SOP) and socially prescribed perfectionism (SPP) subscales (Cox et al., 2002). We included the SOP and SPP subscales in the background survey, but our initial analyses revealed that combining facets from the different measures provided a relatively poor measurement model. Future studies would benefit from examining the influence of individual perfectionism facets (e.g., SPP alone) on employees' recovery experiences. Second, we employed a brief (i.e., 2 item) measure of neuroticism as a control variable. Although neuroticism displayed an expected pattern of relationships with perfectionistic concerns and our well-being outcomes, future vacation researchers may wish to employ more comprehensive personality scales.

Third, we investigated relationships between a set of negative experiences (i.e., exhaustion and negative mood states), and did not examine changes in positive mood, work engagement, or beneficial recovery experiences during the vacation. It would be useful to see future vacation research exploring the influence of potentially adaptive lower-order personality traits (e.g., optimism, trait mindfulness), change in positive affect around vacations (see Syrek et al., 2018), along with beneficial vacation experiences, such as degree of relaxation or psychological detachment from work (Sonnentag & Fritz, 2007).

Fourth, we focused on a sample of teachers working in schools in the UK and US. School teachers may face job-specific demands (e.g., marking, pupil misbehavior, pressure from parents) that could restrict the generalizability of our findings to other professional groups. Nonetheless, we suggest our findings should at least be relevant to the larger population of teachers working in countries that have mid-term vacations within the national school calendar.

Fifth, we collected data across just two working weeks before the vacation, and once during the vacation, so were unable to model nonlinear change in our outcomes over the work-to-vacation transition. As noted earlier, there is a need for further research that explicitly focuses on understanding how the approach to vacations influences subsequent vacation experiences and postvacation trajectories. In addition, with more measurement occasions during the vacation, it may be possible to explore when well-being variables become stabilized at their vacation asymptotes (i.e., the typical levels of exhaustion and mood that are experienced when employees are not exposed to significant job pressures). Lastly, all study variables were collected via self-report. To further advance the field, it would be useful to see future vacation research supplementing self-reports with biomarkers of stress-reactivity and recovery, such as heart rate variability or the cortisol response (e.g., Cropley et al., 2017; Vahle-Hinz et al., 2014).

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Table 1

Means, Standard Deviations, and Zero-Order Correlations For All Study Variables at Each Time Point

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	Country	0.75	0.43																									
2	Neuroticism	3.00	0.88	0.13																								
3	Perf Striving	3.57	0.70	-0.07	0.05																							
4	Ln Vac' hrs wkd	1.91	1.00	0.25	0.16	0.20																						
5	Perf' Concern	2.54	0.82	0.25	0.53	0.32	0.30																					
6	Exh - week 1	3.90	1.19	0.30	0.23	0.05	0.26	0.32																				
7	Exh - week 2	3.93	1.21	0.26	0.14	0.14	0.22	0.23	0.72																			
8	Exh - week 3	3.00	1.25	0.26	0.16	0.11	0.43	0.31	0.57	0.59																		
9	Exh - week 4	3.62	1.23	0.27	0.12	0.17	0.28	0.31	0.62	0.64	0.65																	
10	Exh - week 5	3.78	1.27	0.33	0.21	0.12	0.26	0.31	0.65	0.62	0.63	0.73																
11	Exh - week 6	3.75	1.26	0.36	0.23	0.12	0.24	0.32	0.67	0.70	0.64	0.67	0.80															
12	Exh - week 7	3.84	1.33	0.35	0.28	0.16	0.25	0.36	0.58	0.58	0.61	0.66	0.67	0.76														
13	Anx - week 1	2.84	1.03	0.15	0.25	0.12	0.22	0.31	0.58	0.48	0.34	0.34	0.35	0.36	0.33													
14	Anx - week 2	2.80	1.02	0.15	0.20	0.15	0.24	0.26	0.47	0.64	0.40	0.44	0.43	0.50	0.43	0.54												
15	Anx - week 3	1.78	0.81	0.08	0.21	0.15	0.38	0.28	0.14	0.15	0.37	0.21	0.16	0.23	0.20	0.16	0.30											
16	Anx - week 4	2.66	1.02	0.27	0.23	0.14	0.21	0.33	0.45	0.50	0.45	0.70	0.56	0.53	0.50	0.45	0.52	0.29										
17	Anx - week 5	2.73	1.08	0.21	0.32	0.17	0.23	0.41	0.43	0.43	0.40	0.50	0.68	0.57	0.46	0.40	0.49	0.25	0.59									
18	Anx - week 6	2.64	1.05	0.34	0.29	0.17	0.21	0.36	0.46	0.51	0.49	0.43	0.56	0.66	0.54	0.44	0.54	0.26	0.55	0.57								
19	Anx - week 7	2.69	1.11	0.24	0.32	0.19	0.23	0.45	0.42	0.34	0.43	0.42	0.48	0.52	0.70	0.40	0.50	0.26	0.50	0.59	0.58							
20	Dep - week 1	1.99	1.04	0.21	0.24	0.11	0.30	0.36	0.57	0.48	0.41	0.34	0.37	0.48	0.35	0.53	0.44	0.25	0.34	0.36	0.39	0.39						
21	Dep - week 2	1.95	1.08	0.18	0.15	0.16	0.18	0.25	0.41	0.60	0.44	0.39	0.40	0.48	0.42	0.40	0.66	0.30	0.35	0.40	0.50	0.43	0.63					
22	Dep - week 3	1.39	0.66	0.03	0.12	0.15	0.25	0.21	0.19	0.16	0.33	0.23	0.18	0.23	0.18	0.17	0.31	0.67	0.27	0.24	0.24	0.23	0.42	0.48				
23	Dep - week 4	1.85	0.97	0.25	0.15	0.11	0.22	0.35	0.41	0.45	0.50	0.62	0.51	0.52	0.42	0.35	0.48	0.30	0.67	0.49	0.48	0.45	0.53	0.59	0.42			
24	Dep - week 5	1.95	1.07	0.23	0.30	0.12	0.24	0.39	0.44	0.46	0.48	0.52	0.68	0.60	0.45	0.38	0.49	0.30	0.56	0.70	0.55	0.51	0.47	0.59	0.44	0.70		
25	Dep - week 6	1.94	1.08	0.25	0.19	0.05	0.16	0.29	0.44	0.45	0.47	0.44	0.55	0.65	0.48	0.30	0.44	0.19	0.44	0.48	0.67	0.47	0.54	0.60	0.37	0.65	0.70	
26	Dep - week 7	1.98	1.16	0.24	0.27	0.19	0.24	0.38	0.42	0.42	0.50	0.45	0.48	0.58	0.65	0.32	0.46	0.24	0.44	0.48	0.55	0.71	0.56	0.62	0.37	0.61	0.66	0.72

Note. N = 224. Country = UK or US. Exh = emotional exhaustion; Anx = anxious mood; Dep = depressed mood. Vac' hrs worked = number of hours worked during vacation.

Table 2

Comparative Fit For Competing Growth Curve Models For Shape of Change Over Time in Exhaustion, Anxious Mood, and Depressed Mood

Outcome	Model	Deviance, Model Parameters	AIC	BIC	Within-par'pnts variance	Between-par'pnts intercept variance†
Emotional Exhaustion	1: No difference in work and vacation asymptotes	4199.12, 3	4205.12	4221.11	0.65	0.99
	2: Step change from work into vacation, and from vacation to work asymptote	3991.25, 4	3999.25	4020.56	0.55	1.00
	3: Step change from work into vacation, linear change from vacation to work	4021.68, 5	4031.68	4058.32	0.56	1.00
	4: Step change from work into vacation, polynomial (quadratic) change vacation to work	3979.71, 6	3991.71	4023.68	0.55	1.00
	5: Step change from work into vacation, polynomial (cubic) change from vacation to work	3965.55, 7	3979.55	4016.85	0.54	1.00
	6a: Step change from work into vacation, exponential decay change vacation to work	3970.31, 5	3980.31	4006.94	0.54	1.00
	6b: As 6a, with AR1 within-participants autoregressive correlation	3922.35, 6	3934.35	3966.32	0.59	0.95
Anxious Mood	1: No difference in work and vacation asymptotes	4174.84, 3	4180.84	4196.82	0.72	0.43
	2: Step change from work into vacation, and from vacation to work asymptote	3911.33, 4	3919.33	3940.64	0.58	0.46
	3: Step change from work into vacation, linear change vacation to work	4018.17, 5	4028.17	4054.81	0.63	0.45
	4: Step change from work into vacation, polynomial (quadratic) change vacation to work	3932.00, 6	3944.00	3975.97	0.59	0.46
	5: Step change from work into vacation, polynomial (cubic) change vacation to work	3900.52, 7	3914.52	3951.82	0.58	0.46
	6a: Step change from work into vacation, exponential decay change vacation to work	3908.75, 5	3918.75	3945.39	0.58	0.46
	6b: As 6a, with AR1 within-participants autoregressive correlation	3894.07, 6	3906.07	3938.04	0.61	0.43
Depressed Mood	1: No difference in work and vacation asymptotes	3760.92, 3	3766.92	3782.91	0.51	0.56
	2: Step change from work into vacation, and from vacation to work asymptote	3638.97, 4	3646.97	3668.28	0.46	0.57
	3: Step change from work into vacation, linear change vacation to work	3669.18, 5	3679.18	3705.82	0.47	0.57
	4: Step change from work into vacation, polynomial (quadratic) change vacation to work	3638.99, 6	3650.99	3682.96	0.46	0.57
	5: Step change from work into vacation, polynomial (cubic) change vacation to work	3632.65, 7	3646.65	3683.94	0.46	0.57
	6a: Step change from work into vacation, exponential decay change vacation to work	3632.67, 5	3642.67	3669.31	0.46	0.57
	6b: As 6a, with AR1 within-participants autoregressive correlation	3587.22, 6	3599.22	3631.18	0.50	0.54

Note. N = 1525 observations from 224 participants. † i.e., variance in work asymptote between participants.

Table 3

Model Fit and Comparisons of Discontinuous Multilevel Growth Models for Exhaustion, Anxious Mood, and Depressed Mood, with Step Change From Work to Vacation Asymptotes, Exponential Decay Change From Vacation Back to Work Asymptotes, Random Effects For Work Asymptote, Difference and Rate Parameters, and Participant-Level Covariates Added to Explain Random Effects as Hypothesised

Outcome	**Model**	**Deviance, No. of model parameters**	**Δ Deviance, Δ No. of model parameters**	***p***	**AIC**	**BIC**
Work Exhaustion	6b: Discontinuous multilevel growth model, step change for work-to-vacation transition, exponential decay for vacation-to-work (from Table 7)	3922.35, 6	---	---	3934.35	3966.32
	7: Add between-participants variance for *difference* and *rate* parameters and between-participants covariance between *work_asymptote* and *difference* parameters	3911.84, 9	10.51, 3*	0.015	3929.84	3977.79
	8: Add country, neuroticism, perfectionistic striving as predictors of *work_asymptote*, *difference* and *rate,* and vacation hours worked as predictor of *difference* and *rate*	3829.39, 20	82.45, 11*	<0.001	3869.39	3975.95
	9: Add perfectionistic concerns as predictor of *work_asymptote*, *difference* and *rate*	3818.24, 23	11.15, 3*	0.011	3864.24	3986.78
	10: Add perfectionistic concerns*vacation work interaction as predictor of *difference* and *rate*	3815.23, 25	3.01, 2	0.222	3865.23	3998.43
Anxious Mood	6b: Discontinuous multilevel growth model, step change for work-to-vacation transition, exponential decay for vacation-to-work (from Table 7)	3894.07, 6	---	---	3906.07	3938.04
	7: Add between-participants variance for *difference* and *rate* parameters and between-participants covariance between *work_asymptote* and *difference* parameters	3831.91, 9	62.16, 3*	<0.001	3849.91	3897.86
	8: Add country, neuroticism, perfectionistic striving as predictors of *work_asymptote*, *difference* and *rate,* and vacation hours worked as predictor of *difference* and *rate*	3736.42, 20	95.49, 11*	<0.001	3776.42	3882.98
	9: Add perfectionistic concerns as predictor of *work_asymptote*, *difference* and *rate*	3720.05, 23	16.37, 3*	0.001	3766.05	3888.59
	10: Add perfectionistic concerns*vacation work interaction as predictor of *difference* and *rate*	3706.68, 25	13.37, 2*	0.001	3756.68	3889.88
Depressed Mood	6b: Discontinuous multilevel growth model, step change for work-to-vacation transition, exponential decay for vacation-to-work (from Table 7)	3587.22, 6	---	---	3599.22	3631.18
	7: Add between-participants variance for *difference* and *rate* parameters and between-participants covariance between *work_asymptote* and *difference* parameters	3486.60, 9	100.62, 3*	<0.001	3504.60	3552.55
	8: Add country, neuroticism, perfectionistic striving as predictors of *work_asymptote*, *difference* and *rate,* and vacation hours worked as predictor of *difference* and *rate*	3446.95, 20	39.65, 11*	<0.001	3486.95	3593.50
	9: Add perfectionistic concerns as predictor of *work_asymptote*, *difference* and *rate*	3430.56, 23	16.39, 3*	0.001	3476.56	3599.10
	10: Add perfectionistic concerns*vacation work interaction as predictor of *difference* and *rate*	3406.90, 25	23.65, 2*	<0.001	3456.91	3590.10

Note. N = 1525 observations from 224 participants. *statistically significant at $p < .05$ level, having Bonferroni corrected for repeated tests of same model on related outcomes (i.e., significance level adjusted to .05/3 = .017). *work_asymptote* = level of outcome in work periods; *difference* = difference between outcome's work period and vacation asymptotes; *rate* = rate of outcome's return to work period asymptote, postvacation.

Table 4

Fixed Effects of Model Parameters From Discontinuous Multilevel Growth Models For Exhaustion, Anxious Mood, and Depressed Mood, with Random Effects Explained by Country, Neuroticism, Perfectionism, and Time Spent on Work Activities During Vacation

		Work Exhaustion ‡			Anxious Mood ‡‡			Depressed Mood ‡‡‡		
Model Parameter	**Covariate**	**B**	**SE**	***p***	**B**	**SE**	***p***	**B**	**SE**	***p***
work_asymptote	(Intercept)	1.73*	0.41	<0.001	0.70	0.30	0.018	0.23	0.34	0.509
work_asymptote	Country	0.71*	0.16	<0.001	0.37*	0.11	0.001	0.38*	0.13	0.004
work_asymptote	Neuroticism	0.15	0.09	0.097	0.18*	0.06	0.006	0.10	0.07	0.165
work_asymptote	Perfectionistic Striving	0.15	0.10	0.133	0.15	0.07	0.031	0.10	0.08	0.223
work_asymptote	Perfectionistic Concern	0.25*	0.10	0.014	0.27*	0.07	<0.001	0.31*	0.09	<0.001
Difference	(Intercept)	0.15	0.49	0.763	-0.70	0.47	0.143	-1.09*	0.42	0.010
Difference	Country	0.20	0.15	0.187	0.41*	0.15	0.009	0.40*	0.14	0.004
Difference	Neuroticism	0.12	0.08	0.140	0.08	0.09	0.352	0.08	0.07	0.280
Difference	Perfectionistic Striving	0.14	0.09	0.131	0.10	0.10	0.321	0.05	0.08	0.578
Difference	Perfectionistic Concern	0.14	0.17	0.394	0.51*	0.15	0.001	0.48*	0.14	0.001
Difference	Work during vacation§	-0.06	0.19	0.759	0.26	0.16	0.103	0.27	0.14	0.065
Difference	PC * Work during vac	-0.10	0.07	0.142	-0.20*	0.06	0.001	-0.15*	0.05	0.005
Rate	(Intercept)	3.21	1.37	0.019	8.50	4.88	0.082	3.18	2.65	0.230
Rate	Country	0.40	0.37	0.282	2.58	1.38	0.061	0.55	0.55	0.322
Rate	Neuroticism	-0.64	0.28	0.024	-1.03	0.74	0.160	-0.77	0.43	0.077
Rate	Perfectionistic Striving	-0.03	0.23	0.912	-1.27	0.69	0.066	-0.64	0.55	0.249
Rate	Perfectionistic Concern	0.03	0.39	0.936	0.31	0.45	0.492	0.99	0.66	0.136
Rate	Work during vacation§	-0.80	0.64	0.211	3.03	2.69	0.262	0.72	0.99	0.464
Rate	PC * Work during vac	0.34	0.24	0.158	-0.72	0.61	0.231	-0.14	0.35	0.701

Note. N = 1525 observations from 224 participants. § logarithmic transformation of hours worked during vacation. *statistically significant at $p < .05$ level, having Bonferroni corrected for repeated tests of same model on related outcomes (i.e., significance level adjusted to .05/3 = .017).

work_asymptote = level of outcome in work periods;
difference = difference between work and vacation asymptotes of outcome;
rate = rate of change in outcome postvacation

Example model equation (model 10, for anxious mood of j^th participant at t^th time point)

Predicted $ANXIOUS\_MOOD_{tj} = work\_asymptote_j + difference_j*PRE\_HOL\_DUM_{tj} - difference_j*(\exp(-1*rate_j*WEEKS\_AFTER\_HOL_{tj}))$

where:

$work\_asymptote_j = 0.70 + 0.37*COUNTRY_j + 0.18*NEUROT_j + 0.15*PS_j + 0.27*PC_j$

$difference_j = -0.70 + 0.41*COUNTRY_j + 0.08*NEUROT_j + 0.10*PS_j + 0.51*PC_j + 0.26*VWK_j - 0.20*PC_j*VWK_j$

$rate_j = 8.50 + 2.58*COUNTRY_j - 1.03*NEUROT_j - 1.27*PS_j + 0.31*PC_j + 3.03*VWK_j - 0.72*PC_j*VWK_j$

$PRE\_HOL\_DUM_j$: Dummy identifying pre-vacation weeks, coded = 1 for weeks 1,2; = 0 otherwise
$WEEKS\_AFTER\_HOL_j$ = number of weeks since end of vacation (coded = 0 for prevacation weeks and vacation week)
$COUNTRY_j$: Country, UK = 1, US = 0
$NEUROT_j$: Mean score, trait neuroticism
PS_j: Mean score, perfectionistic striving
PC_j: Mean score, perfectionistic concern
VWK_j: Natural logarithm of hours worked during vacation

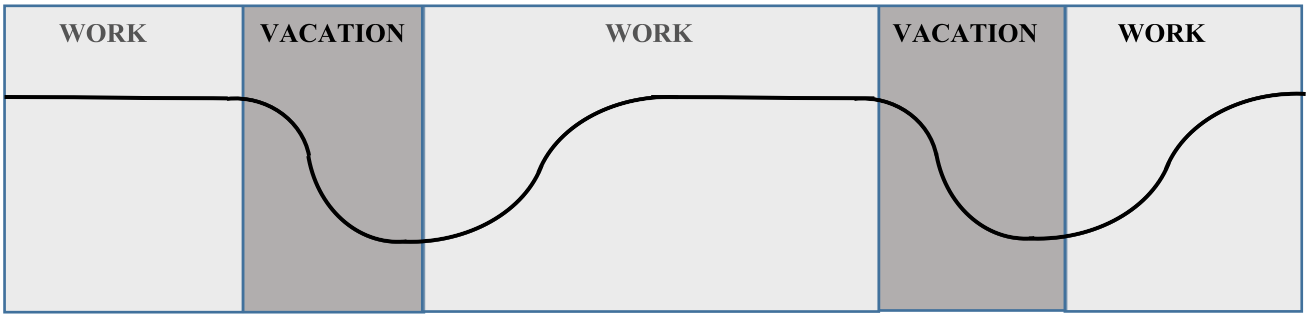


Figure 1. Theoretical model for a negative affective well-being outcome over a period of work punctuated by vacations.

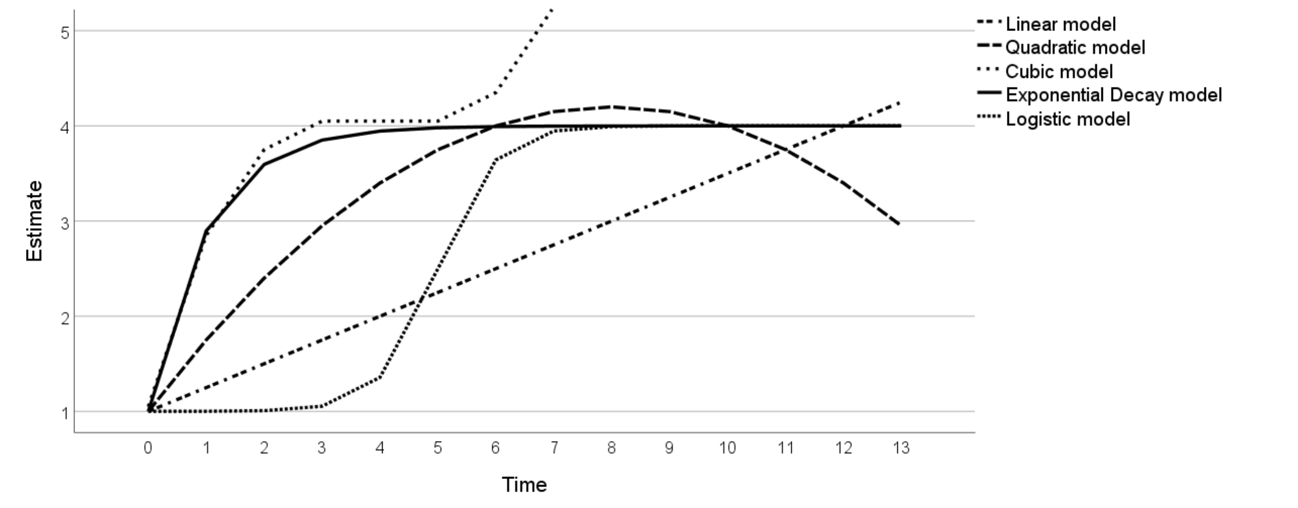
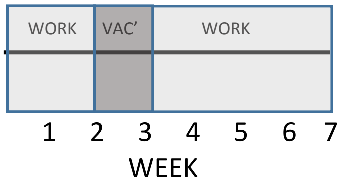


Figure 2. A selection of linear, polynomial and true non-linear model types, fitted to a change process with a lower asymptote of 1 and an upper asymptote of 4.

Model 1: No difference in work and vacation asymptotes (therefore no rate of change between them either)

Predicted $\text{OUTCOME}_{tj} = \textit{work\_asymptote}_j$

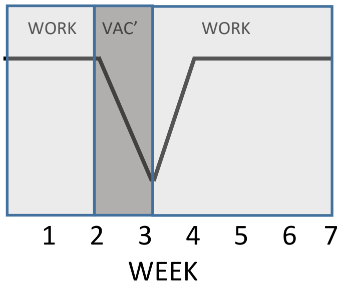
- $\textit{work\_asymptote}_j$ is the participant intercept in a standard linear multilevel model



Model 2: Difference between work and vacation asymptotes, step change between them

Predicted $\text{OUTCOME}_{tj} = \textit{work\_asymptote}_j - \textit{difference}*\text{HOL\_DUM}_{tj}$

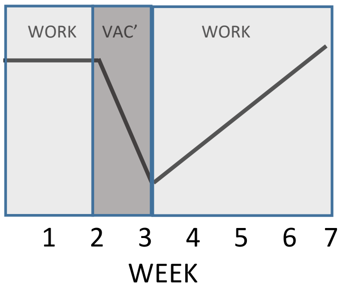
- HOL_DUM_{tj} coded = 0 for working weeks (1, 2, 4-7); = 1 for vac' weeks (3)
- $\textit{work\_asymptote}_j$ is the participant intercept and represents the work asymptote
- *difference* is the fixed regression coefficient for HOL_DUM_{tj} and represents the estimated difference between work and vacation asymptotes (work – vacation)



Model 3: Difference between work and vacation asymptotes, step change work to vacation, linear change vacation to work

Predicted $\text{OUTCOME}_{tj} = \textit{work\_asymptote}_j - \textit{difference}*\text{PRE\_HOL\_DUM}_{tj} + \textit{ratelin}*\text{WEEKS\_AFTER\_HOL}_{tj}$

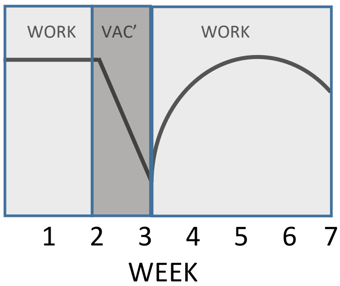
- $\textit{work\_asymptote}_j$ and *difference* as for model 2
- PRE_HOL_DUM_{tj} = 0 for pre-vacation weeks (weeks 1, 2); = 1 otherwise
- $\text{WEEKS\_AFTER\_HOL}_{tj}$ coded = 0 weeks 1-3, = 1 week 4, = 2 week 5 etc.
- *ratelin* is fixed regression coefficient for $\text{WEEKS\_AFTER\_HOL}_{tj}$ and represents the estimated rate of change per week postvacation



Model 4: Difference between work and vacation asymptotes, step change work to vacation, quadratic change vacation to work

Predicted $\text{OUTCOME}_{tj} = \textit{work\_asymptote}_j - \textit{difference}*\text{PRE\_HOL\_DUM}_{tj} + \textit{ratelin}*\text{WEEKS\_AFTER\_HOL}_{tj} + \textit{ratequad}*\text{WEEKS\_AFTER\_HOL}^2_{tj}$

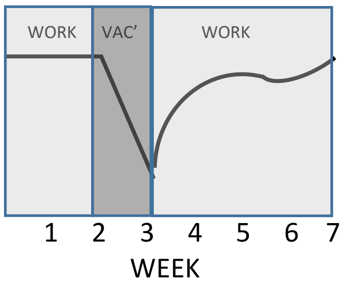
- PRE_HOL_DUM_{tj}, $\text{WEEKS\_AFTER\_HOL}_{tj}$, $\textit{work\_asymptote}_j$, *difference* as M3
- *ratelin and ratequad* are fixed regression coefficients for $\text{WEEKS\_AFTER\_HOL}_{tj}$ and $\text{WEEKS\_AFTER\_HOL}^2_{tj}$ and together represent the quadratic function for change per week postvacation



Model 5: Difference between work and vacation asymptotes, step change work to vacation, cubic change vacation to work

Predicted $\text{OUTCOME}_{tj} = \textit{work\_asymptote}_j - \textit{difference}*\text{PRE\_HOL\_DUM}_{tj} + \textit{ratelin}*\text{WEEKS\_AFTER\_HOL}_{tj} + \textit{ratequad}*\text{WEEKS\_AFTER\_HOL}^2_{tj} + \textit{ratecube}*\text{WEEKS\_AFTER\_HOL}^3_{tj}$

- PRE_HOL_DUM_{tj}, $\text{WEEKS\_AFTER\_HOL}_{tj}$, $\textit{work\_asymptote}_j$, *difference* as M3
- *ratelin, ratequad, ratecube* are fixed regression coefficients for $\text{WEEKS\_AFTER\_HOL}_{tj}$,$\text{WEEKS\_AFTER\_HOL}^2_{tj}$,$\text{WEEKS\_AFTER\_HOL}^3_{tj}$ and together represent the cubic function for change per week postvacation



Model 6: Difference between work and vacation asymptotes, step change between work and vacation, exponential decay change from vacation to work, converging back to work asymptote

Predicted $\text{OUTCOME}_{tj} = \textit{work\_asymptote}_j + \textit{difference}*\text{PRE\_HOL\_DUM}_{tj} - \textit{difference}*(\exp(-1*\textit{rate}*\text{WEEKS\_AFTER\_HOL}_{tj}))$

- $\text{WEEKS\_AFTER\_HOL}_{tj}$, $\textit{work\_asymptote}_j$, *difference* as for model 4
- PRE_HOL_DUM_{tj} = 1 for pre-vacation working weeks 1, 2; = 0 otherwise
- *rate* is the fixed regression coefficient for rate of change in the non-linear (exponential decay) function for change between weeks 3 and 7.

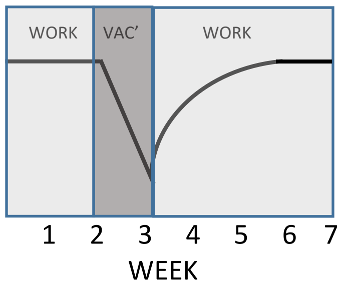
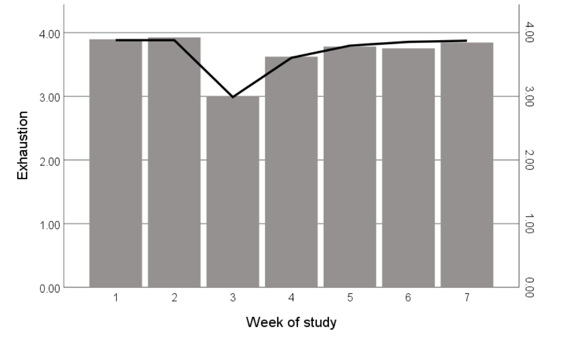


Figure 3. Competing discontinuous multilevel growth models for change over time in well-being outcomes, from pre to postvacation.

Outcome: Emotional Exhaustion
Predicted EXHAUSTION =
work_asymptote + *difference**PRE_HOL_DUM - *difference**(exp(-1**rate**WEEKS_AFTER_HOL))

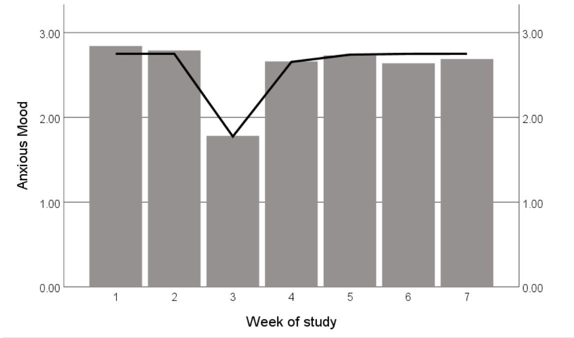
Variable coding:
PRE_HOL_DUM = 1 for weeks 1,2; =0 otherwise
WEEKS_AFTER_HOL = number of weeks since end of vacation (= 0 for pre-vacation, vacation)

Parameter estimates (standard errors):
work_asymptote = 3.882 (0.072) $p < 0.005$
difference = 0.893 (0.055) $p < 0.005$
rate = 1.173 (0.202) $p < 0.005$



Outcome: Anxious Mood
Predicted ANXIOUS MOOD =
work_asymptote + *difference**PRE_HOL_DUM - *difference**(exp(-1**rate**WEEKS_AFTER_HOL))

Variable coding:
PRE_HOL_DUM = 1 for weeks 1,2; =0 otherwise
WEEKS_AFTER_HOL = number of weeks since end of vacation (= 0 for pre-vacation, vacation)
Parameter estimates (standard errors):
work_asymptote = 2.750 (0.051) $p < 0.005$
difference = 0.976 (0.057) $p < 0.005$
rate = 2.324 (0.606) $p < 0.005$



Outcome: Depressed Mood
Predicted DEPRESSED MOOD =
work_asymptote + *difference**PRE_HOL_DUM - *difference**(exp(-1**rate**WEEKS_AFTER_HOL))

Variable coding:
PRE_HOL_DUM = 1 for weeks 1,2; =0 otherwise
WEEKS_AFTER_HOL = number of weeks since end of vacation (= 0 for pre-vacation, vacation)

Parameter estimates (standard errors):
work_asymptote = 1.977 (0.056) $p < 0.005$
difference = 0.579 (0.050) $p < 0.005$
rate = 1.486 (0.395) $p < 0.005$

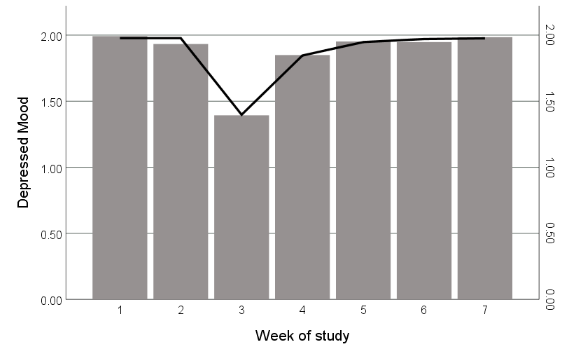


Figure 4. Discontinuous multilevel growth models for change over time in emotional exhaustion, anxious mood, and depressed mood (lines) with sample means (bars). *Note.* N = 1525 observations from 224 participants. Model parameters to be estimated: *work_asymptote* = level of outcome in work periods; *difference* = difference between work and vacation asymptotes of outcome; *rate* = rate of change in outcome postvacation

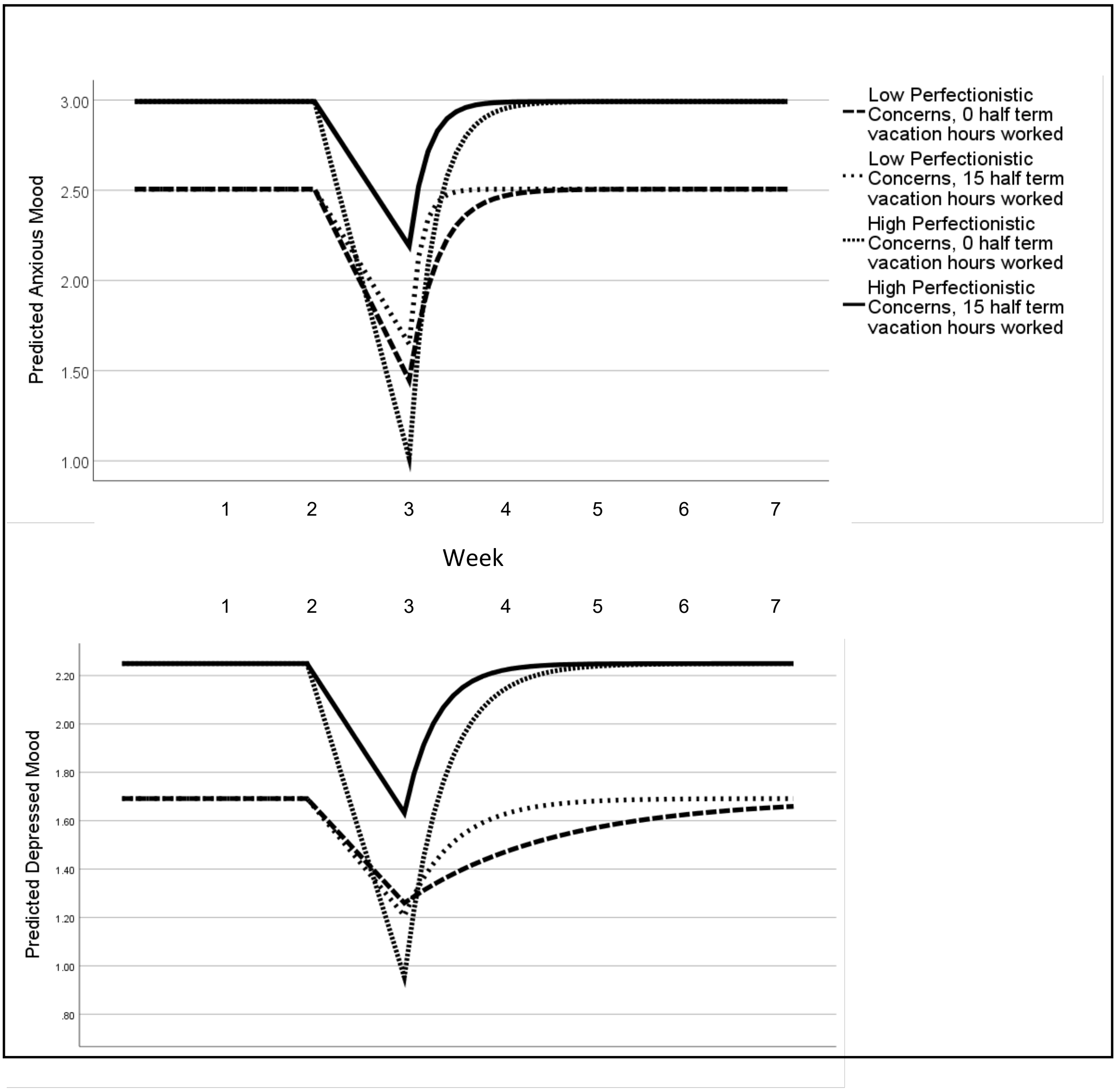


Figure 5. Discontinuous multilevel growth models for change over time in anxious mood and depressed mood: predicted values by working during vacation and perfectionistic concerns (estimated at mean levels of neuroticism and perfectionistic strivings, and averaged across country).