

RECOVERY DURING THE DAILY COMMUTE AND ITS IMPACT ON THE
RELATIONSHIP BETWEEN JOB DEMANDS AND WORK-LIFE CONFLICT

A Thesis

Presented to

The Faculty of the Department

of Psychology

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In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

By

Daniel J. Ingels

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ABSTRACT

By extending research on the concept of borderlands in work-life boundary theory, as well as the strain-inducing effects of commute impedance, I argue that an individual's daily commute from work to home constitutes a prime example of a boundary activity that bridges work life and personal life and affects one's well-being. To test this theory, I hypothesize that individual variation in commute characteristics, including length, environment, and social experiences, affect one's ability to experience recovery from work strain during the commute from work to home. Additionally, I attempt to replicate the well-supported finding that recovery attenuates the effects of job demands on work-life conflict and well-being within the commute setting. Two studies of self-report data from 478 adults in the Lagos, Nigeria, metropolitan area are used to evaluate the hypotheses proposed in this study. Overall, results from both studies provided some support of the proposed model, with commute environment positively predicting recovery in one study of higher SES adults. The same study demonstrated that recovery also attenuated the effects of work-life conflict and emotional exhaustion. The results of the additional study of lower SES adults provided contradictory results, suggesting that recovery may function differently in low SES populations.

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Recovery During the Daily Commute and its Impact on the Relationship Between Job Demands and Work-Life Conflict

One's ability to psychologically recover from work-related strain can have a profound impact on employee health and well-being (Fritz & Sonnentag, 2006; Sonnentag, 2001; Sonnentag & Zijlstra, 2006). Although our understanding of work stressors, recovery, and their effects has increased substantially over the past decades, research on commutes, which constitute the boundaries of employees' work and non-work times, have yet to be comprehensively integrated in job strain models. Globally, the commute to and from work is a major part of the daily routine for most workers (Schaeffer, Street, Singer, and Baum, 1988), and as cities grow and incomes increase, individuals are more likely to choose to commute via private vehicles (Kutzbach, 2009). Many mega-cities (cities with populations greater than 10 million) in developing countries have little capital and technically-expertised labor to dedicate to public transportation infrastructure investment (O'Neill, 2010). Therefore, existing public transportation infrastructure may deteriorate, and new projects may not ever be implemented. As private vehicle commutes become the dominant transportation choice for workers in large cities, the evaluation of consequences and effects of workers' daily commutes remains particularly necessary.

Research on the daily commute has primarily focused on direct relationships with strain outcomes and has developed from the commute impedance model (Stokols, Novaco, Stokols, & Campbell, 1978), which provides the theoretical foundation for the role of the commute in recovery from job strain. Stokols et. al define commute impedance as the amalgam of environmental stressors that constrain one's ability to move between two points, and they identify two parameters of commute impedance: (1) the distance that must be travelled between

home and work, and (2) the time spent in transit between home and work. In other words, a commute with the lowest levels of impedance would be short in distance and short in time spent, whereas a commute with the highest levels of impedance would be lengthy in both distance and time spent. Additionally, the commute impedance model posits that traffic congestion is a contributing factor to impedance. Levels of congestion interact with commute distance to increase time spent during the commute, which means that over a longer-distance commute, congestion will have a stronger effect on the time spent during the commute, when compared to a shorter-distance commute (Hennessy & Wiesenthal, 1997; Stokols et al., 1978).

Commute impedance results in numerous negative outcomes, which may impede an individual's ability to recover from other stressful experiences, including job-related strain. Research on the commute impedance model shows that commute impedance led to greater physiological arousal, deficits in commute performance, more negative perceptions of traffic congestion, and increased feelings of annoyance (Hennessy & Wiesenthal, 1997; Schaeffer, Street, Singer, & Baum, 1988; Stokols et. al, 1978; Westerman & Haigney, 2000). Additionally, commute difficulty can lead to increased cardiovascular stress (Lambiase, Barry, & Roemmich, 2010), feelings of time urgency (Lucas & Heady, 2002), and satisfaction with commute (Lucas & Heady, 2002). However, although much research on commute impedance has focused on the direct psychological and physiological effects of poor commute conditions, little research has been conducted to evaluate how commute conditions attenuate or augment the psychological effects of work situations. Additionally, little research has addressed events or conditions that may augment or attenuate the transmission of stress over the work-life boundary, which is the functional separation between one's work life and personal life (Clark, 2000). Because the daily commute is the unique situation that bridges the gap between work life and personal life, it may

be expected that the daily commute could play a role in an individual's work-life conflict. This study examines the role of the commute as a boundary experience between the work domain and personal life domain. We investigate whether and how experiences during one's commute play a role in increasing or reducing the effects of job demands on personal life through recovery processes (Sonnentag, 2001). In other words, the commute to and from work may offer individuals an opportunity to disconnect from job demands and strain and recover from their effects before returning to personal life. Therefore, by reducing the effects of job demands, the commute offers an opportunity for workers to reduce spillover and crossover of job-related strain, reducing work-life conflict.

Building upon prior research on work-life conflict, psychological recovery, and commute experiences, the present study aims to expand upon the commute impedance model by considering circumstantial factors, such as commute length, the environment and social dynamics, as well as determine the role of the commute in recovery from job-related strain. The introduction to this study will be structured to provide answers to three questions. First, under what circumstances can commutes facilitate recovery experiences for workers? Second, what characteristics of one's commute are conducive to recovery, and what commute characteristics exacerbate the relationships between work demands strain? Third, do recovery experiences during one's commute diminish the negative consequences of job strain?

Commutes and the Work-Life Boundary Interface

Commutes function as a unique intersection between one's work life and personal life by providing a boundary between those two life domains. The predominant theoretical explanation of the navigation between work life and personal life is boundary management, which suggests that workers create balance between both domains in different ways, with some workers

allowing work and personal life domains to integrate and others attempting to segment each domain (Hall & Richter, 1988). Nippert-Eng (1996) detailed this concept of active organization of roles by suggesting that individuals deliberately generate boundaries around their work and personal lives and that these boundaries can vary in strength among individuals to allow for segmentation or integrations of domains. Additionally, these boundaries can depend upon certain work and life factors, such as occupation, family conditions, or even personal preference. Clark (2000) describes the boundary theory concept of *blending* as a phenomenon where an area's boundary is not exclusive to either the work or personal life domain, and the commute is a daily phenomenon where both domains commonly blend. A *borderland*, as Clark describes it, involves experiences that comprise both domains. Psychological blending occurs when a person engages in non-work experiences while at work or uses work experiences to enrich or affect personal life. Blending experiences can be particularly harmful to individuals if there are strong differences in each of the domains, as individuals may have to continuously pivot between their work identities and non-work identities (Anzaldua, 1987).

The commute to work can be considered a type of blended area, as it generally serves as a bridge between the work and personal life domains, and *permeations* from the work or personal life domains into the blended space can occur, potentially impacting one's recovery experiences. When experiences used in one domain can be transferred to another, they can have positive outcomes, such as increased creativity (Whetten & Cameron, 1998). However, negative emotions and strain can spillover from one domain to another when permeations are present (Evans & Bartolome, 1980). Thus, through one's daily commute, work and non-work elements can permeate the commute boundary-space, potentially increasing the effects of strain and negative emotion from those domains.

Recovery During the Commute

Using the existing theoretical framework for psychological recovery, the commute can be considered an opportunity for individuals to recover from or exacerbate strain. An individual can expend effort in a variety of forms, and this effort draws upon that individual's psychological resources, leading to strain (Repetti, 1993; Totterdell, Spelten, Smith, Barton, & Folkard, 1995; Zohar, 1999). Psychological recovery is necessary to restore those resources. The theoretical foundation for the concept of psychological recovery is based on the Effort-Recovery Model (ERM) (Meijman & Mulder, 1998), which predicts that effort at work causes fatigue until the individual is no longer exposed to work demands. From an ERM perspective, recovery experiences, such as relaxation, control of leisure time, mastery of non-work-related activities, and psychological detachment from work (Sonnentag & Fritz, 2007), allow individuals to build resources to enable them to successfully complete their work requirements.

Time is perhaps the most prominent antecedent of improved or reduced recovery, and time spent commuting may be among the most important predictors of recovery during one's commute. Totterdell, Spelten, Smith, Barton, and Folkard (1995) found that well-being improves as the number of days since one's last day of work increases. Most early research on recovery shows the longer-term function of recovery, over the course of weekends and vacations, where such breaks serve as opportunities to stop building strain and gain personal resources (Etzion, Eden, & Lapidot, 1998; Westman & Eden, 1997). However, such early studies only demonstrate that breaks from the demands of work affect one's recovery and do not address the activities that can take place within one's non-work experiences that contribute to variation in levels of recovery. Research on activities that occur outside of the work context show that individuals' health and well-being are affected by the types and qualities of activities in which individuals

engage. Sonnentag (2001) details how activities after work affect one's ability to recover from strain and improve one's well-being, from the perspective of two types of after-work activities: high-duty activities and potential recovery activities. High-duty activities typically rely on the same resources as those used during working time. For recovery from work-related strain to occur, demands must not be placed on any systems that are used to complete job tasks, and having to utilize those resources for any job-related activities, such as answering work emails or continuing work-related conversations while at home. However, high-duty activities can also consist of activities that heavily draw from other stores of resources, and these primarily consist of non-work responsibilities, such as child-care, household maintenance, and other activities that are non-work-related but can lead to compounded strain. As with these kinds of activities, the daily commute may be considered a high-duty activity, whose impact on recovery from job strain may be augmented or attenuated based on individual differences in one's commute. Considering that time is the primary antecedent of recovery and that the daily commute can draw large amounts of personal resources, it is proposed that longer commutes lead to poorer recovery.

Hypothesis 1: Commute length will be negatively associated with recovery experienced during one's commute.

Commute Environment

The environment in which one commutes can greatly influence one's ability to recover from work-related strain. The commute impedance model considers three broad factors that lead to stressful commute conditions: distance travelled, time spent traveling, and congestion. However, one may argue that those three conditions, although certainly most important, are not the only conditions that can positively or negatively impact one's commute experience. Additional factors, including air quality (Chan & Chung, 2003), perceptions of danger

(Gatersleben & Uzzell, 2007), and scenery (Redmond & Mokhtarian, 2001) also have the potential to shape one's commute experience.

One way in which the commute environment may affect recovery experiences is through strain induced by poor air quality. Transportation through petroleum-powered vehicles negatively affects human health by increasing air pollution (Grabow, Spak, Holloway, Stone, Mednick, & Patz, 2012), which can potentially affect comfort and recovery opportunities. Automobile exhaust typically contains both ozone and fine particulate matter into ambient air and exacerbate health conditions, such as bronchitis and asthma, and may contribute to cardiovascular mortality (Brunekreef and Holgate, 2002). Exposure to airborne toxins can vary based on driving conditions, with exposure increasing as traffic density increases (Chan & Chung, 2003). Additionally, exposure is greater on urban routes and expressways, as compared to rural highways, and air quality within the vehicle tends to fluctuate with the air quality outside the vehicle, regardless of the vehicle's ventilation capabilities (Chan & Chung, 2003). Thus, commuters may experience negative health effects in dense traffic situations.

The perceived commute environment is also highly impacted by drivers' perceptions of danger during travel, distracting drivers from safe travel and increasing strain. Dangerous traveling conditions can include other aggressive or distracted drivers, surface erosion (e.g. "pot holes"), poor traction due to weather, poor visibility due to weather or smog, and traffic density. Gatersleben and Uzzell (2007) found that commute strain was primarily driven by other drivers, such as aggressive or reckless driving behavior, and density-related issues, such as close proximity to other drivers. Additionally, weather conditions are a major factor in workers' decisions to change travel routes or modes, and about one quarter of commuters reported that

adverse weather is the primary factor when making commute changes (Khattak & De Palma, 1997).

The visual appeal of the roadside can also play an important role in commute satisfaction and strain, affecting how one recovers from a stressful workday. Although road conditions account for a large percentage of what commuters focus on (Carr & Schissler, 1969; Hughes & Cole, 1988), commuters do also pay some attention to scenery that is not directly related to travel. Carr and Schissler (1969) first addressed this in a study asking individuals to recall a short, but unfamiliar, trip. The participants were significantly more apt to recall non-driving-related scenery, such as buildings or historical sites, with little mention of driving-related conditions. Pleasant scenery may allow for a more enjoyable commute and can contribute to strain reduction and recovery. Commutes that have predominantly natural scenery are more likely to lead to quicker recovery from strain induced before the commute and buffers the effects of strain experienced after the commute, as compared to commutes that have well-developed (i.e. non-natural) scenery (Parsons, Tassinary, Ulrich, Hebl, & Grossman-Alexander, 1998).

An individual's commute environment has the potential to be less resource-intensive than other people's commutes, and a less resource-draining commute allows for these individuals to engage in recovery activities, which consist of opportunities that stop drawing high levels of personal resources and allow restoration of those resources (Sonnetag, 2001). Recovery encompasses four types of experiences: relaxation, control over non-work activities, psychological detachment, and mastery of non-work experiences. Relaxation during the commute is more likely when the air quality is clean, noise is low, traffic appears to be safe and uncongested. Control of one's commute may be more likely when one feels safe and encouraged by the state of traffic. Psychological detachment from work can occur when the individual finds

the external environment pleasing and comfortable, allowing one to focus on the positive state of the commute rather than strain from work experiences. Mastery may be less important in the context of commuting, but feelings of confidence during one's commute may limit increases in strain. Thus, when an individual experiences a positive commute environment, he or she will engage in lower-effort commutes and will be more likely to achieve better recovery during his or her daily commute.

Hypothesis 2: Commute environment will moderate the negative relationship between commute length and recovery experienced during one's commute, such that the relationship will be weaker for those who have a more positive commute environment.

Social Experiences While Commuting

As the structural and environmental circumstances of one's commute can have a substantial impact on well-being, social opportunities during one's commute can also have a unique influence on one's well-being. Social activities allow individuals to be distracted from work-related stressors and other resource-draining situations and opens access to supportive interactions from others (Sonnentag, 2001). Social support involves any social interactions or relationships that provide functional assistance or feelings of attachment that are perceived as caring (Hobfoll & Stokes, 1988). However, social support can potentially intensify negative affect from stressful experiences as such support can emphasize that the individual is dealing with difficult work-related stressors, leading to lower self-esteem (e.g. threat to self-esteem model; Fisher, Nadler, Whitcher-Alagna, 1982). Carpooling provides a unique opportunity to engage in social interaction while operating within a boundary-area activity.

Typically, individuals will commute with family members or coworkers, and carpooling with individuals from these domains introduces permeability into this boundary area. Instead of

being able to take time to experience recovery during one's commute, an individual who carools with coworkers or family must actively deal with responsibilities or experience strain due to permeations from either the work domain or personal life domain. In accordance with Sonnentag's (2001) definition of high-duty non-work activities, commuting with family members may be a resource-intensive activity as it requires dealing with household and child-care responsibilities. Therefore, it is expected that commuting with family members will not facilitate recovery. On the other hand, commuting with coworkers risks drawing out perceived work-related demands and stressors that drain personal resource reserves by forcing a worker to continue to deal with work-related elements that may remind him or her of those demands or stressors. Thus, the social implications of carpooling will not encourage better recovery during one's commute.

Hypothesis 3: Carpooling, as opposed to driving alone, with either coworkers or family will moderate the negative relationship between commute length and recovery experienced during one's commute, such that the relationship will be stronger for those who carpool.

Role of Recovery During Commute Within the Job Demands and Work-Life Conflict Relationship

The job demands – work-life conflict – emotional exhaustion relationship is well supported by the existing body of occupational health psychology research, and recovery during one's commute may moderate this relationship. The Job Demands-Resources model of burnout (Bakker & Demerouti, 2007) posits that every occupation has its own set of factors associated with strain, categorized into job demands and resources. Job demands are any physical, psychological, social, or organizational aspects of a job that require effort or skill and are

associated with physical or psychological costs. Though not necessarily negative, job demands can be stressful when high effort is required to meet the demands. Job resources are any physical, psychological, social, or organizational aspects of a job that are functional in achieving work goals, reduce job demands, or stimulate personal growth. Hockey (1993) suggests that individuals protect themselves when they experience demands from their environment, through increased activation and effort. By engaging in resource-draining activities, fatigue will likely take effect, leading to emotional degradation. If a worker does not have or cannot utilize enough resources to mitigate the strain experienced at work, the worker may have to return to his or her personal life domain with elevated levels of strain. Spillover and crossover effects from this strain are possible (Bolger, DeLongis, Kessler, & Wethington, 1989), leading to emotional exhaustion and other negative outcomes.

High levels of job demands lead to high levels of work-life conflict due to one's inability to maintain his or her own psychological resources by time the individual returns to his or her personal life, and the commute may have a strong potential to correct for (or harm) one's ability to regain psychological resources through recovery experiences. Van der Hulst, Van Veldhoven, and Beckers (2006) demonstrated that high levels of job demands lead to a greater need for recovery. Additionally, successful recovery has been shown to decrease the negative effects of high job demands (Kinnunen, Feldt, Siltaloppi, & Sonnentag, 2011). Because the daily commute is a unique period of time between work life and personal life, this period may give individuals an opportunity to regain resources that were lost during work, allowing them to be better suited to address personal needs. Therefore, those who have better recovery experiences during their commutes will not see the negative repercussions of high job demands on work-life conflict.

Hypothesis 4: Recovery during commute will moderate the relationship between job demands and work-life conflict, such that the relationship will be weaker when one experiences better recovery during commute.

Methods

Participants

Participants consisted of adult individuals that were surveyed through a previous data collection of students from three public schools and two private schools in Lagos, Nigeria. Nigeria is unique in that it is the most populous country and largest economy in Africa. Lagos is one of Nigeria's largest cities and a commercial hub, with a population of greater than 15 million people. In the first study of adults surveyed through the public schools, 71.3 percent of parents had only a primary or secondary school education, and the incomes of individual parents were \$58 per month (25th percentile) and \$294 per month (37.8), with 37.8% of families having more than 3 children under age 18 in their household. In terms of gender distribution, 66.8% of the sample identified as female while 33.2% of the sample identified as male. In the second study of adults surveyed through private schools, adults made, on average, \$13,137 per year (25th percentile) and \$62,784 (75th percentile), with 54.6% of families having more than 3 children under age 18 living in their household. In terms of gender distribution, 39.2% identified as female while 60.8% of the sample identified as male. Altogether, there were 226 adults in the public school collection and 154 adults in the private school collection that completed all items for the constructs in this analysis.

Procedures

Data from participants through the public school collection were collected via structured interviews. Because adult literacy rates in Nigeria are below 60% (UNESCO, 2013), the survey

tools were pilot tested with participants who matched the demographic characteristics of the target population. Because many of these participants were unable to complete the surveys on their own due to literacy levels, trained research assistants administered structured interviews with an interview guide based on the survey questions. Participants were invited to participate in the study at a town hall-style meeting at their children's schools, and those interested in the study returned to complete the structured interview during scheduled open sessions. Participants who completed the structured interviews received an umbrella in exchange for participation. Data from participants through the private school collection were collected via online surveys, as adult literacy rates were not expected to be of concern.

Measures

Commute environment. Participants' commute environment was assessed using the nine-item Active Commuting Route Environment Scale developed by Wahlgren, Stigell, & Schantz (2010). Sample items included: "I feel unsafe in traffic along my commuting route" and "There is a high availability of greenery (natural areas, parks, planted items, trees) along my commuting route." Participants rated these items using a five-point Likert-type rating scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Recovery experience during commute. Participants' degree of recovery experience during the commute was assessed using a six-item scale adapted from the Recovery Experience Questionnaire (Sonnentag & Fritz, 2007). Sample items included: "During my commute home from work, I distance myself from the demands of work" and "During my commute home from work, I use the time to relax." Participants rated these items using a five-point Likert-type rating scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Commute Length. The lengths of participants' commutes were assessed with one item asking participants to indicate the perceived average time of their daily commutes in one direction. Participants indicated commute length in minutes.

Carpooling. Participants' carpooling to and from work was assessed with one item asking participants to indicate if they commuted with coworkers, partners, children, and others. For this analysis, responses for carpooling with coworkers represent one construct while responses for carpooling with family members (e.g. partners, children) represent a separate construct. Both represent social factors of the commute experience.

Job demands. Participants perceived job demands were assessed using a seven-item scale developed by Karasek (1979). Sample items included: "To what extent does your job require your working fast?" and "To what extent do you feel there is not enough time for you to finish your work?" Participants rated these items using a five-point rating scale ranging from 1 (*never*) to 5 (*very often*).

Work-life conflict. Participants degree of work-life conflict was assessed using a four-item scale developed by Wayne, Musisca, and Fleeson (2004). Sample items included: "Your job reduces the effort you can give to activities at home" and "Job worries or problems distract you when you are at home." Participants rated these items using a five-point Likert-type rating scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Emotional exhaustion. Participants' degree of emotional exhaustion was assessed using a five-item scale adapted from the Oldenburg Burnout Inventory (Halbesleben & Demerouti, 2005). Sample items included: "There are days that I already feel mentally tired before I go to work" and "After my work, I usually feel mentally worn out and weary." Participants rated these items using a five-point rating scale ranging from 1 (*never*) to 5 (*very often*).

Results

All analyses were conducted through IBM SPSS 24.0 and were conducted separately for the public schools sample and the private schools sample. First, stepwise multiple regression analysis was used to evaluate the effects of commute features on recovery during commute, including the direct effect of commute length and then the moderating effects of carpooling and commute environment. Second, the effect of recovery during commute on the job demands–work-life conflict–emotional exhaustion relationship was evaluated using a moderated-mediation analysis through the PROCESS macro. PROCESS follows the recommendations of Preacher, Rucker, and Hayes (2007) and Edwards and Lambert (2007) by using bootstrapped regression to establish mediation and assess effects that are conditional on the moderator.

Study 1

Variable means, standard deviations, scale reliabilities, and inter-item correlations for the public schools sample are presented in Table 1.

Insert Table 1 about here

The results of the multiple regression analysis with recovery during commute as the outcome is presented in Table 2. Hypothesis 1 predicted that commute length would be negatively related to recovery during one's commute. The relationship was nonsignificant and effectively equal to zero, failing to support Hypothesis 1. Hypotheses 2 and 3 predicted that commute environment and carpooling with family/coworkers, respectively, would moderate a proposed relationship between commute length and recovery during one's commute. Each of the interactions were found to be nonsignificant and effectively equal to zero. Thus, Hypotheses 2

and 3 were not supported. Interestingly, the main effect of commute environment was found to be significantly and *negatively* related to recovery during one's commute ($\beta = -.37, p < .001$), suggesting that commute environment directly harms recovery during one's commute, as opposed to playing a moderating, beneficial role.

Insert Table 2 about here

The results of the moderated mediation analysis are presented in Table 4. In conflict with prior research on the job demands–work-life conflict–emotional exhaustion relationship, job demands was found to not have a significant positive relationship with work-life conflict nor with emotional exhaustion. Work-life conflict was found to have a significant positive relationship with emotional exhaustion ($\beta = .29, p < .001$). Hypothesis 4 predicted that recovery during one's commute would moderate the proposed relationship between job demands and work-life conflict. The interaction between job demands and recovery during commute was found to be nonsignificant, failing to support Hypothesis 4. Interestingly, recovery during one's commute was found to be significantly and positively related to work-life conflict ($\beta = .24, p < .001$), suggesting that experiencing recovery during one's commute may actually increase one's work-life conflict.

Insert Table 3 about here

Study 2

Variable means, standard deviations, scale reliabilities, and inter-item correlations for the private schools sample are presented in Table 4.

Insert Table 4 about here

The results of the multiple regression analysis with recovery during commute as the outcome is presented in Table 5. Hypothesis 1 predicted that commute length would be negatively related to recovery during one's commute. As with Study 1, the relationship was nonsignificant and effectively equal to zero, failing to support Hypothesis 1. Hypotheses 2 and 3 predicted that commute environment and carpooling with family/coworkers, respectively, would moderate a proposed relationship between commute length and recovery during one's commute. Again, each of the interactions were found to be nonsignificant and effectively equal to zero. Thus, Hypotheses 2 and 3 were again not supported. As with Study 1, the main effect of commute environment was found to be significantly and positively related to recovery during one's commute ($\beta = .37, p < .001$), suggesting that commute environment directly effects recovery during one's commute, as opposed to playing a moderating role. As well, carpooling with family was found to have a *positive* effect on recovery during one's commute ($\beta = .34, p < .05$), suggesting that being with family during one's commute may provide a source of recovery for commuters.

Insert Table 5 about here

The results of the moderated mediation analysis are presented in Table 6. In line with prior research, job demands was found to have a significant positive relationship with work-life conflict ($\beta = .41, p < .001$) and with emotional exhaustion ($\beta = .235, p < .05$). Work-life conflict was found to have a significant positive relationship with emotional exhaustion ($\beta = .51, p < .001$). Hypothesis 4 predicted that recovery during one's commute would moderate the proposed relationship between job demands and work-life conflict. The interaction between job demands and recovery during commute was found to be significant and positive ($\beta = .31, p < .05$), suggesting that the positive relationship between job demands and work-life conflict is stronger for people with poorer recovery during commute than for people with stronger recovery during commute. Thus, Hypothesis 4 was supported in this sample. In contrast to the public schools sample, recovery during one's commute was found to be significantly and negatively related to work-life conflict ($\beta = -.29, p < .001$) in the private schools sample, suggesting that experiencing recovery during one's commute directly decreases work-life conflict.

Insert Table 6 about here

Discussion

Opportunities for recovery from strain related to job demands are highly necessary, as they may potentially decrease the negative effects of excessive job demands on burnout. Previous studies have tested recovery in a variety of contexts, such as vacations (e.g. Fritz & Sonnentag, 2006), weekend activities (e.g. Fritz & Sonnentag, 2005; Sonnentag & Fritz, 2007), and during sleep (e.g. Sonnentag, Binnewies, & Mojza, 2008). However, the literature has yet to

provide an analysis of how recovery occurs during boundary experiences that are not clearly in either the work life domain or personal life domain. In this study, I considered one's daily commute as one type of boundary experience in order to test the extent to which an individual's commute characteristics can facilitate recovery and if recovery experienced during one's commute can be effective in reducing the negative effects of job-induced strain. In the remaining discussion sections, I will detail the theoretical and practical implications of this study while also explaining its methodological limitations.

Hypothesis 1 of this study proposed that commute length is negatively related to recovery experiences during one's commute. This hypothesis was primarily driven by theories regarding the role of high-duty activities in recovery from work (e.g. Sonnentag, 2001) and time as a form of impedance for a commute (e.g. Stokols et al., 1978). The point of this hypothesis was to demonstrate that commutes constitute high-duty activities, and longer commutes would result in longer experiences of high-duty activity that would impede recovery. The results of this study could not demonstrate that longer commutes led to longer experiences of high-duty activity, as indicated by non-significant results for the relationship between commute length and recovery. Notably, the regression coefficients for this relationship were about zero in magnitude, and while I caution against interpreting nonsignificant results (see Kluger & Tikochinsky, 2001), it is peculiar that the resulting statistics for this relationship were quite close to zero. This could suggest that commute time, as a form of commute impedance, is not a special factor in the role of commuting as a high-duty activity. Rather, other commute characteristics may play stronger roles in impeding (or helping) recovery during one's commute.

Hypothesis 2 proposed that the relationship between commute length and recovery would be moderated by one's commute environment, such that commute length would have less of a

negative impact on recovery in more positive commute environments. Because Hypothesis 1 was nonsignificant (with zero magnitude), it is difficult to test whether such a relationship is different for different commuting contexts, but this test did offer an opportunity to see if different commute characteristics might have led to differing magnitudes of effects for commute length. However, the results demonstrated that commute environment did not significantly moderate the commute length and recovery relationship. While the hypothesized results were not found in this data, these moderating constructs did have notable main effects on recovery during one's commute. The results showed differential main effects for commute environment on recovery between the private school sample and the public school sample. The private school sample showed a positive main effect for commute environment on recovery. As with the finding for the main effect of carpooling with family in the same sample, this finding suggests that a positive commute environment allows individuals to attain better recovery experiences while commuting. Fitting with Sonnentag's (2001) conception of recovery as opportunities for relaxation and control over non-work experiences, a positive commute environment appears to allow individuals to avoid increased levels of strain due to other drivers and surroundings, leading to proper recovery. The public school sample shows that commute environment has an *opposite* effect on recovery. More specifically, for this sample of lower socioeconomic status, commuters actually experienced less recovery in positive commute environments than they did in more negative commute environments. This phenomenon could be explained by how such individuals psychologically detach from their work during their commutes. One explanation could involve such individuals having no opportunity to think about their work demands when they are commuting in poor environments, allowing them to feel recovered from their work, while those in easy and positive commute environments have the ability to think about work demands,

leading to poor recovery. This peculiar result merits further research to determine how recovery occurs differentially between different cultures and socioeconomic statuses.

Hypothesis 3 proposed that carpooling with coworkers or family would moderate the relationship between commute length and recovery, such that commute length would have a stronger negative effect on recovery when carpooling. Again, carpooling was found to not have an interaction effect on the relationship between commute length and recovery, but the analyses showed some support for a main effect of carpooling with family on recovery. In the private school sample, commuting with family was found to be positively related to recovery. In the introduction to this study, it was proposed that commuting with family constituted a high-duty activity (e.g. Sonnentag, 2001) that would impede recovery, but this result counters that explanation. These results suggest that family could be a resource that allows individuals to psychologically detach (e.g. Sonnentag & Fritz, 2007) from their work demands and experience other activities (even home-life demands) that allow such individuals to stop experiencing work demands. In the public school sample, similar results were not found. Considering only 10% of the participants reported carpooling with family and 6% reported carpooling with coworkers, there may have been too little power to detect any significant and substantial effects for carpooling on recovery, meriting further testing of this hypothesis in communities of lower socioeconomic status.

Hypothesis 4 proposed that recovery experienced during one's commute would moderate the effects of job demands on work-life conflict and, subsequently, emotional exhaustion. In the private school sample, this hypothesis was supported. This provides empirical support for extending the findings of Kinnunen et al. (2011) that recovery can decrease the negative outcomes associated with high job demands, to the commuting context. In other words, people

who are able to experience recovery from work during their commute do actually see positive outcomes once they return to their home-lives. However, this result was only found for the higher socioeconomic status private school sample. In the public school sample, again, the opposite moderating effect was found, that recovery during one's commute exacerbated the effects of job demands on work-life conflict and emotional exhaustion. While it is difficult to explain this finding from a theoretical standpoint, it is possible that experiences of recovery may allow these individuals to experience detachment from work that may be *too* excessive, resulting in poor balance between work-life and home-life. In other words, this finding could suggest that, in a similar population of workers, recovery may keep people from understanding how job demands can affect home-life and not engage in appropriate strategies to limit work-life conflict.

Theoretical Implications

For the first goal of this study, regarding the effects of commute characteristics on recovery, the data largely showed that many commute characteristics do not play a strong role in encouraging or discouraging recovery. Most notably, commute length had a zero-magnitude relationship with recovery in both samples. It is conceivable that the relationship may be weak, but it is a remarkable finding that the relationship appears to be nonexistent. This finding seems to either negate or diminish the time function of commute impedance in recovery processes by suggesting that recovery either does or does not occur regardless of the amount of time spent commuting. However, based on recommendations by Kluger and Tikochinsky (2001) on nonsignificant results for hypothesis testing, one should not assume that these results demonstrate that one's commute length plays no role in experiences of recovery. Rather, this study implies that other impedance characteristics, such as distance or traffic, may be more problematic for recovery at any temporal length. Commute environment is the closest of such

commute characteristics to me measured, providing some indication of this. However, these results show that lengthy commutes appear to neither provide opportunities for recovery nor add further demands upon the commuter.

Additionally, although not hypothesized, there were significant relationships between commute environment and commute recovery. In the private schools sample, there was a positive relationship between commute environment and commute recovery. Thus, instead of moderating the apparently nonexistent relationship between commute length and recovery, commute environment may actually directly impact recovery, such that a more positive commute environment helps commuters recover. In terms of the commute impedance model, navigating through poor quality commute environments (e.g. high noise, strong smog, or unattractive scenery) serves as a direct impedance to commute recovery, rather than modulating the impedance effects of other commute characteristics. However, in the public schools sample, commute environment was negatively related to recovery during commute, which is opposite what was hypothesized. One substantive explanation for this finding is that these adults may be commuting in environments that are quite negative or harmful, and commuters may have to force themselves to engage in some sorts of recovery activities in order to cope with poor commutes.

For the second portion of the study, regarding the moderating effects of recovery during commute on the job demands–work-life conflict–emotional exhaustion relationship, each sample provided unique results. For the private schools sample (Sample 2), the moderated mediation hypothesis was supported. Thus, this study demonstrates that the previously well-supported effect of job demands on work-life conflict and emotional exhaustion can be attenuated by other experiences, such as recovery. These findings suggest that commute characteristics and their subsequent outcomes may lead to reduced negative effects from job demands and lead to

improved well-being. Additionally, recovery during one's commute was negatively directly related to work-life conflict, suggesting that recovery experiences may provide resources for dealing with strain between work-life and personal-life domains. For the public schools sample, there were, again, unexpected findings regarding the role of recovery during one's commute on attenuating the effects of job demands on well-being outcomes. While there was no interaction effect between job demands and recovery during one's commute on work-life conflict, there was a direct *positive* effect of recovery on work-life conflict, suggesting that engaging in recovery experiences may be associated with increased work-life conflict. While I suggest in the limitations section that these spurious relationships with recovery during commute may just be due to measurement problems in the public school sample, there may be substantive explanations for this finding as well. Specifically, because these parents may be dealing with high strain due to high job and home demands, they may feel encouraged to try to engage in recovery-inducing activities. These conflicting findings suggest that further research should be conducted on recovery experiences in varying types of populations, especially in low SES communities in non-Western countries. Additionally, differentiation should be made in further studies and substantive explanations regarding the measurement of recovery in terms of recovery "experiences" versus recovery "outcomes." If the odd effects for recovery during one's commute in the public sample are actually due to substantive reasons, as opposed to measurement reasons, then the hypothesized results may have been found if feelings of recovery were measured instead of recovery experiences.

Practical Implications

Organizations ought to be concerned with reducing burnout among employees because burnout has been shown to affect organizations in numerous ways, including poor task

performance (Bakker, Demerouti, & Verbeke, 2004), more frequent absences (Bakker, Demerouti, de Boer, & Schaufeli, 2003), and declines in employee well-being (Schaufeli, Taris, & van Rhenen, 2008). Organizations may be able to help employees reduce burnout by assisting them in experiencing recovery, even potentially during their daily commutes. Obviously, organizations cannot simply relocate just to improve their employees' commutes, but they can provide options like flexible work schedules to help them avoid commutes in poor environments (e.g. lots of traffic, depressing surroundings, high smoke and noise). By allowing employees to commute during off-peak commuting times, employees can experience relatively enjoyable commutes and may be able to avoid more difficult driving situations that are present during peak commuting times.

Individual commuters should also be encouraged to tailor their commute routes in ways that can reduce commute-induced strain and allow them to experience more positive environmental features along the route. As demonstrated in this study, commute length does not necessarily play much of a role, if any, in a person's recovery experiences. Thus, taking a slightly longer alternative route in a more positive environment may be helpful in reducing work-life conflict and burnout, at least as long as it does not impact sleep quality, time for engagement with one's family, etc.

Lastly, this study provides broad implications in terms of community interest and infrastructure policy. The results from Study 2 demonstrate that the environment in which one commutes is highly related to commuters' recovery experiences and well-being. Thus, officials responsible for infrastructure investments are encouraged to not only invest in rebuilding of roads, but they are also encouraged to develop other policies or investments to promote a more

positive commute environment, such as roadside greenery installation and stricter emissions standards.

Limitations and Future Directions

The primary limitation of this study was the nature of the samples collected and how capable they are of answering the substantive questions of this study. Data was collected from parents of public school children and private school children in the metropolitan city of Lagos, Nigeria, which hosts commutes that are very different from those in more Western metropolitan areas, where commutes in slow-paced, dense traffic can last well over an hour for most commuters. However, as much of the prior literature on commuting experiences has focused on commutes in Western communities, this study does provide a unique perspective on commutes in non-Western communities and between subpopulations with drastic differences in socioeconomic status.

An additional limitation relating to the settings of this study involve the nature of the public school sample. As described in the methods section above, there was an assumption that many participants would not have the literacy skills to complete the survey on their own, so trained interviewers dictated the survey to participants. However, no assumption was made regarding their interpretation of the survey questions, so their responses may have caused issues with the analysis of the public school sample. Indeed, this appears to have potentially affected the results regarding the recovery during commute variable. The variable had several spurious relationships that were opposite of what was expected. Specifically, recovery during commute was found to be negatively related to commute environment and positively related to work-life conflict and emotional exhaustion. Therefore, while such findings could demonstrate commute effects for people with very low levels of socioeconomic status, these findings could also be

statistical artifacts that, nonetheless, require further research to validate the nature of recovery during one's commute to determine if there are substantive explanations for these unexpected findings.

Lastly, this study considered a handful of commute characteristics that could potentially encourage or discourage recovery while commuting. Specifically, these include commute length, commute environment, and carpooling. However, one construct that may explain more variance in commute recovery than the tested constructs is *commute variability* (Kluger, 1998). Commute variability can be considered the extent to which one's commute characteristics vary day-to-day. A commute with low variability across commuting sessions will be very predictable because the commuter can be certain that the commute will nearly always occur the same way. In this case, the commuter maintains a sense of control over the commute and may feel little strain. A commute with high variability across commuting sessions will be very unpredictable because the commuter cannot be certain that the commute will be easy or difficult any given day. The commuter may feel little sense of control over the commute and will experience strain as he or she commences each commute session. Thus, in terms of recovery, a commute with high variability can be considered a high-duty activity while a commute with low variability can be considered a low-duty activity, establishing a direct negative relationship between commute variability and recovery during one's commute.

Conclusion

Although an imperfect study of commute recovery, this study suggests that recovery experiences during one's commute may play a meaningful role in the manifestation of work-life conflict and burnout. Additionally, although the analysis of commute characteristics only demonstrated mixed results, the importance of the role of commute environment in recovery

demonstrates that perceptions of one's commute may play an important role in how commutes affect our daily lives. Thus, we encourage further research on commute perceptions to determine how they help or harm individuals' abilities to reduce the effects of job strain and improve well-being.

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TABLES

Table 1

Descriptive Statistics and Correlations of Variables of Study 1

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Commute Length	62.05	108.08	--							
2. Commute Environment	2.49	0.61	-.19**	(.50)						
3. Carpooling - Family	.10	.30	.06	.03	--					
4. Carpooling - Coworkers	.06	.24	-.01	-.01	.16*	--				
5. Recovery During Commute	2.73	.77	.00	-.28***	.11	.10	(.71)			
6. Job Demands	3.09	.68	.02	-.14*	.08	-.04	-.02	(.71)		
7. Work-Life Conflict	2.58	.92	.07	-.37***	.03	-.09	.20**	.12	(.76)	
8. Emotional Exhaustion	3.04	.83	.01	-.22**	.02	.06	.27***	.16*	.33***	(.65)

Note. N=226. * $p < .05$ ** $p < .01$ *** $p < .001$. Cronbach's alpha values presented on diagonal.

Table 2

Results of Regression Analysis of Recovery During Commute (Study 1)

Variables	Step 1		Step 2	
	β	<i>SD</i>	β	<i>SD</i>
<i>Main Effects</i>				
Commute Length	.00	.00	-.00	.00
Commute Environment	-.38***	.08	-.37***	.08
Carpooling - Family	.28	.16	.27	.17
Carpooling - Coworkers	.25	.21	.23	.21
<i>Interaction Effects</i>				
Commute Length x Commute Environment			-.00	.00
Commute Length x Carpooling - Family			.00	.00
Commute Length x Carpooling - Coworkers			-.00	.00
R^2	.11***		.12***	
ΔR^2			.01	
Adjusted R^2	.09		.09	

Note. Two-tailed tests. N=226. *** $p < .001$.

Table 3

Results of Regression Analyses of Work-Life Conflict and Emotional Exhaustion (Study 1)

Variables	Work-Life Conflict		Emotional Exhaustion	
	β	<i>SD</i>	β	<i>SD</i>
<i>Main Effects</i>				
Job Demands	.17	.09	.15	.08
Recovery During Commute	.24**	.08		
Work-Life Conflict			.29***	.06
<i>Interaction Effects</i>				
Job Demands x Recovery During Commute	-.02	.10		
R^2	.06**		.12***	
Index of Moderated Mediation	-.00	.04		

Note. Two-tailed tests. N=226. ** $p < .01$ *** $p < .001$.

Table 4

Descriptive Statistics and Correlations of Variables of Study 2

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Commute Length	46.90	36.99	--							
2. Commute Environment	2.41	.63	-.34***	(.76)						
3. Carpooling - Family	.50	.50	.21*	-.19*	--					
4. Carpooling - Coworkers	.25	.43	-.02	-.09	-.30***	--				
5. Recovery During Commute	2.84	.84	-.00	.20*	.16	-.06	(.89)			
6. Job Demands	3.63	.56	.01	-.30***	-.03	-.04	-.22**	(.85)		
7. Work-Life Conflict	2.91	.83	.01	-.34***	-.09	.07	-.37***	.38***	(.84)	
8. Emotional Exhaustion	2.89	.77	-.12	-.23**	-.11	.02	-.36***	.38***	.61***	(.84)

Note. N=154. * $p < .05$ ** $p < .01$ *** $p < .001$. Cronbach's alpha values presented on diagonal.

Table 5

Results of Regression Analysis of Recovery During Commute (Study 2)

Variables	Step 1		Step 2	
	β	<i>SD</i>	β	<i>SD</i>
<i>Main Effects</i>				
Commute Length	.00	.00	.00	.00
Commute Environment	.34**	.11	.37**	.12
Carpooling - Family	.35*	.14	.34*	.14
Carpooling - Coworkers	.06	.16	.06	.16
<i>Interaction Effects</i>				
Commute Length x Commute Environment			.00	.00
Commute Length x Carpooling - Family			-.00	.00
Commute Length x Carpooling - Coworkers			.00	.01
R^2	.08**		.10**	
ΔR^2			.02	
Adjusted R^2	.06		.05	

Note. Two-tailed tests. N=154. * $p < .05$ ** $p < .01$.

Table 6

Results of Regression Analyses of Work-Life Conflict and Emotional Exhaustion (Study 2)

Variables	Work-Life Conflict		Emotional Exhaustion	
	β	<i>SD</i>	β	<i>SD</i>
<i>Main Effects</i>				
Job Demands	.41***	.11	.23*	.09
Recovery During Commute	-.29***	.07		
Work-Life Conflict			.51***	.06
<i>Interaction Effects</i>				
Job Demands x Recovery During Commute	.31*	.13		
R^2	.26***		.39***	
Index of Moderated Mediation	.16*	.09		

Note. Two-tailed tests. N=154. * $p < .05$ ** $p < .01$ *** $p < .001$.

FIGURE

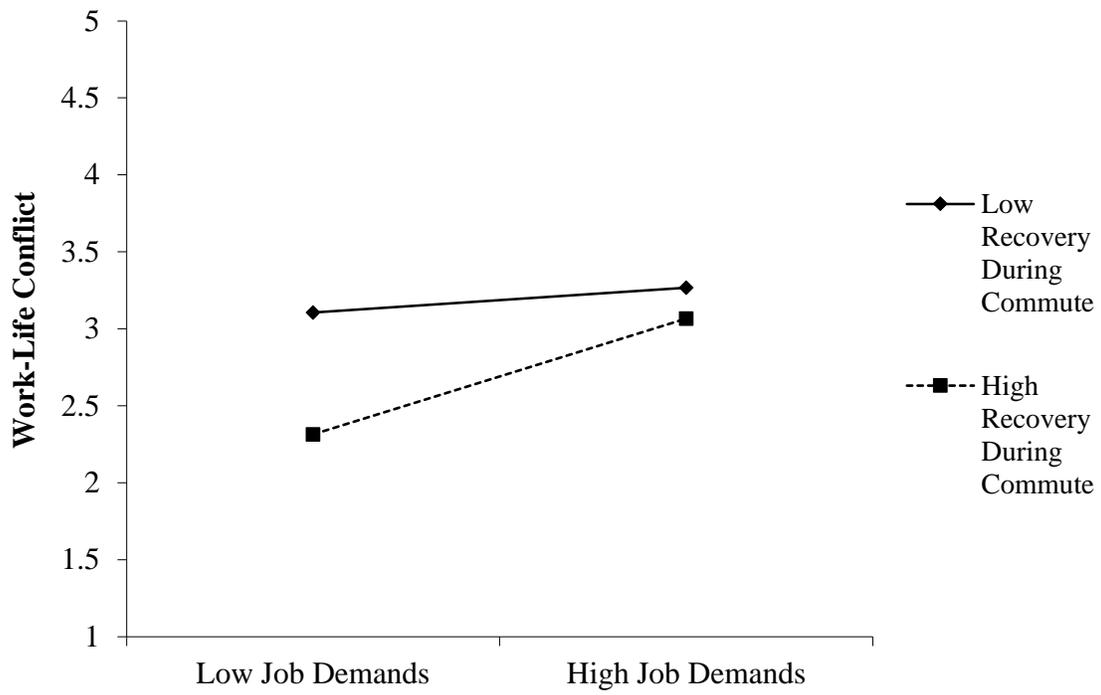


Figure 1. Interaction of Job Demands and Recovery During Commute in predicting Work-Life Conflict.