Mindfulness, Time Affluence, and Affective Appraisals of the Journey to Work: An Exploration of Relationships

by

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Abstract

To date, behavioral travel research has neglected to examine the role of mindfulness in the context of the work commute. Mindfulness is a psychological construct that involves a present-oriented, open, and nonjudgmental expression of conscious awareness. It has been associated with improvements to mental health, social engagement, and behavioral regulation. In this research, I examined ways in which users of different commuting modes (walkers, bicyclists, drivers, and bus users) perceive their journey to work from an affective stance. I then assessed commuter group differences with respect to dispositional mindfulness and time affluence (the perception that one has sufficient time to engage in pleasurable, meaningful activity). Finally, I explored direct and indirect relationships between mindfulness and commute-related attunement (the degree to which commuters find their work trip satisfying and peaceful), and how time affluence, commute-related stress, and competence partially mediate this relationship. I hypothesized that (a) non-motorized commuters would find their commute more affirming and less stressful than drivers or bus users; (b) that non-motorized commuters would report greater time affluence and mindfulness than drivers and bus users; and (c) that time affluence, competence, and stress would partially mediate a mindfulness-attunement relationship. I surveyed 786 university employees about their (a) relative degrees competence, stress, and attunement in the context of the work commute; (b) perceptions of time affluence over the previous month; and (c) levels of dispositional mindfulness. Our results revealed that bus users, walkers and bicyclists reported significantly less stress than drivers. Walkers and bicyclists reported greater positive journey-based affect than drivers and bus users. Additionally, walkers and bus users maintained relatively greater perceptions of time affluence than drivers. Structural equation models illustrated that mindfulness, operating through time affluence, competence, and stress both directly and indirectly enhances attunement to the commuting experience. Considered together, these findings suggest that in order to encourage individuals to engage in active transportation, it may prove profitable to enhance individual-level time affluence and sense of competence using non-motorized modes. This study also promotes the broadening of behavioral travel research to include investigations of ways in which mindfulness and elements of natural and built environments produce synergistic effects toward enhancing mental health.

1. Introduction

There is growing interest aimed at creating sustainable transportation systems that support physical activity, population health (Badland & Schofield, 2005), and environmental integrity (Abrahamse, Steg, Gifford, & Vlek, 2009). For these strategies to have greater impact, it is worth advancing our knowledge of how users of different travel modes perceive specific travel experiences. Examining commute-related perceptions and affective evaluations of commuting experience is relevant because it facilitates general understanding of the cognitive mechanisms underlying mode and route decision-making (Gardner & Abraham, 2008).

Studies investigating the role of self-reported affect in mode choice processes reveal that commuters value their perceived ability to maintain personal space and positive journey-based affect, and that these elements make driving comparably more attractive than using public transit (Mann & Abraham, 2006). Further, when people are asked why they use cars as opposed to alternative travel modes, they tend to reference the car's relative instrumental advantages such as its reliability, convenience, and speed (Gardner & Abraham, 2007). Similarly, work by Ellaway, Macintyre, Hiscock, & Kearns (2003) highlights that owning and operating a vehicle are positively associated with psychological needs of mastery and positive social identity. Intriguingly, although individuals tend to cite instrumental reasons for driving such as cost, convenience, and reliability when asked directly; they typically convey symbolic-affective motives for driving, such as the car's capacity to express one's social standing, and the pleasure of driving itself when research objectives of assessing underlying motives for car use are not evident (Steg, Vlek, & Slotegraaf, 2001). Thus, consistent with principles of the Theory of Planned Behavior (Ajzen, 1991), it appears that affective appraisals of commuting can inform mode choice intentions, which can then influence mode choice behaviors.

Despite the apparent affective-symbolic advantages of car use, research on journey-based affect has demonstrated that drivers frequently report feeling stressed on their way to work (e.g., Koslowsky, Kluger, & Reich, 1995; Hennessy & Wiesenthal, 1999; Evans & Wener, 2006). It is fairly well documented, for example, that as traffic congestion increases so do reports of stress and agitation among drivers and users of public transit (Evans, Wener, & Phillips, 2002; Evans & Wener, 2006; Hennessy & Wiesenthal, 1999). Commute-incited stress is a pertinent area of research focus, as it is associated with greater workplace hostility and obstructionism (Hennessy, 2008). Nonetheless, few studies have examined journey-based affective experiences of walkers and bicyclists. One notable exception is work by Gatersleben and Uzzell (2007) which indicates that users of non-motorized commuting modes perceive their commute as more enjoyable and less stressful than those who drive or use public transit.

1.1. Mindfulness, Time Affluence, and the Work Commute

Research on affective appraisals of commuting has facilitated comprehension of the cognitive processes associated with mode choice and correlates of journey-based affect. Even so, such research has been limited to an examination of proximal work commute attributes (those stimuli and elements that people encounter on their way to work). Such attributes typically include traffic congestion, journey time considerations, delay, and inter-commuter conflict (Evans, Wener, & Phillips, 2002; Gatersleben & Uzzell, 2007). However, emotional experiences are also impacted by broader life circumstances (Lively & Heise, 2004). In order to more fully conceptualize commute-affiliated cognitive dynamics, I investigate ways in which pre-

established means of engaging with environments (e.g., mindfulness) and perceptions about time-related circumstances (e.g., time affluence), influence individuals' journey-based affect.

Given mindfulness' capacity to enhance individuals' mental health, positive social engagement, and adaptive behavioral regulation (Brown, Ryan, & Creswell, 2007); I posit that mindfulness has the potential to influence individuals' commuting experience in an affirmative manner. Mindfulness is defined as a present-oriented, open, and nonjudgmental expression of conscious awareness (Kabat-Zinn 2003; Brown & Ryan, 2003). Unique among other theories of awareness such as self-concept (Buss, 1980; Carver & Scheier, 1998) and integrative awareness (Ryan, 1995), mindfulness is associated with monitoring and observing moment-by-moment sensory and psychic events (Brown, Ryan, & Creswell, 2007). Further, those who practice mindfulness remain detached from identity concerns, seeking instead to accept experiences as they arise (Brown, Ryan, Creswell, & Niemiec, 2007)**.**

Mindful cognitive states coordinate and interact with other perceptions and needs (Brown & Ryan, 2003). Relevant here is recent research by Kasser and Sheldon (2009) which suggests that thoughts relating to feeling one has sufficient time to engage in preferred activities and perform tasks in a leisurely manner, may enhance the salutary effects of mindfulness. Such time-related perceptions represent a construct known as time affluence. In addition to time affluence, mindful states have greater probability of expression when psychological needs such as competence, or feelings associated with performing activities with skill and aptitude, are satisfied (Sheldon, Elliot, Kim, & Kasser, 2001; Kasser & Sheldon, 2009; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). It therefore seems reasonable to argue that greater levels of time affluence and competence are apt to facilitate increasingly robust expressions of mindfulness.

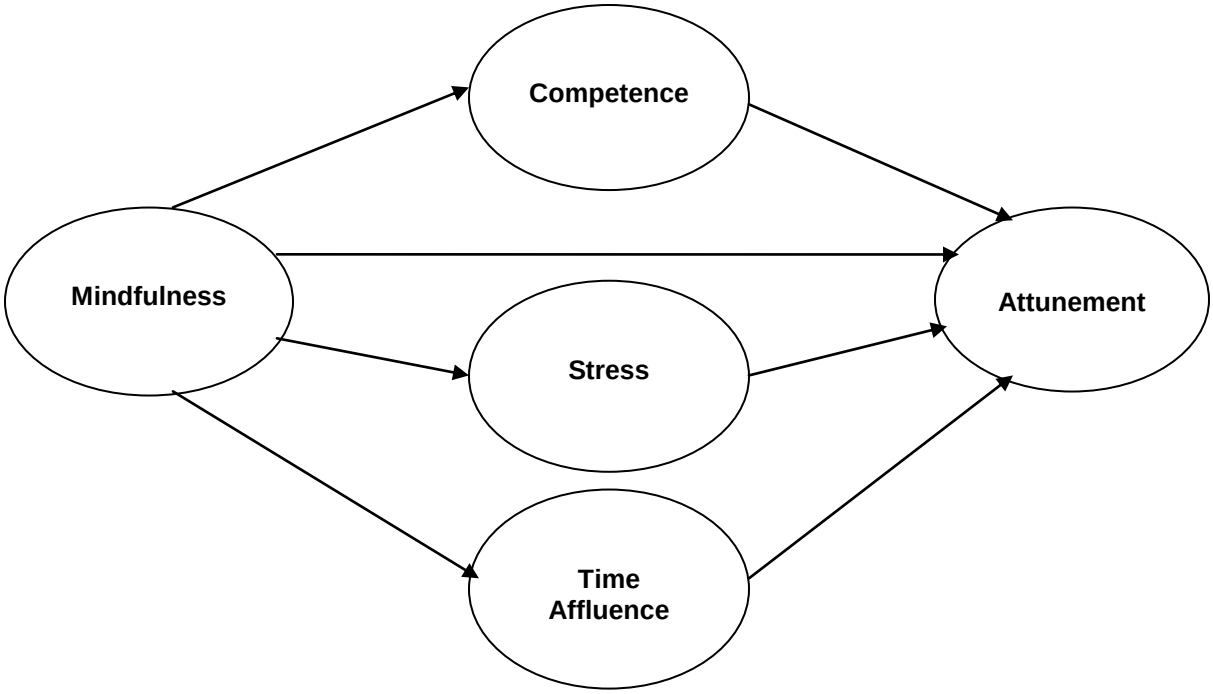
1.2. Integrating Journey-based Affect, Mindfulness, and Time Affluence

I begin this research by examining ways in which users of different commuting modes (walkers, bicyclists, drivers, and bus users) perceive their journey to work from an affective point of view. In keeping with previous work on the affective appraisals of commuting (Gatersleben & Uzzell, 2007), I hypothesize that users of non-motorized commuting modes such as walking and bicycling will report less commute time dissonance, and more positive journey-based affect (a composite construct consisting of competence, attunement, and stress) than individuals who typically drive or ride the bus to work (Hypothesis 1).

Next, I assess commuter group differences with respect to mindfulness and time affluence. I theorize that non-motorized commuters will report greater awareness of present-oriented experience (mindfulness) and having more time to engage in personally satisfying activities (time affluence), than drivers or bus users (Hypothesis 2).

Finally, I explore direct and indirect relationships between mindfulness and commute-related attunement (the degree to which individuals perceive their commute as affirming and restorative) and how time affluence, commute-related stress, and competence partially mediate this relationship. In accordance with prior research dealing with the mediating role of mindfulness and time affluence (Kasser & Sheldon, 2009) as well as research indicating negative associations between mindfulness and stress (Grossman, Niemann, Schmidt, & Walach, 2004); I hypothesize that mindfulness will both directly influence commute-related attunement, and indirectly impact attunement via interactions with commute-related competence, stress, and time affluence (Hypothesis 3). Figure 1 displays the proposed mediational model involving mindfulness, time affluence, commute-related competence, stress, and attunement.

Figure 1.
Proposed mediational model depicting the mediated relationship between mindfulness and attunement.



2. Methods

To investigate study hypotheses, a questionnaire instrument was designed to measure latent constructs of dispositional mindfulness, time affluence, and journey-based affect. This latter multidimensional construct is further divided into commute-related stress, competence, and attunement; all of which are described in greater detail in Section 2.1. Next, differences among commuter groups with regards to these latent constructs, estimated commute trip times ("actual" commute time), and commute trip times under ideal circumstances ("ideal" commute time) were examined. Finally, interactions among mindfulness, time affluence, and journey-based affect were explored.

2.1. Instrument Development

A 30-item questionnaire was developed to measure the following latent constructs: mindfulness; time affluence; commute-related attunement; competence; and stress[1]. Participants were also asked questions related to their typical mode choice over the past month; the period of time in which they had used their most frequent mode to commute to their current workplace; their estimated actual and ideal commuting times; car-ownership status; as well as demographic information such as age and household income (see Table in Appendix A).

Five of the questionnaire's 30 items derived from the Mindfulness Awareness Attention Scale (MAAS; Brown & Ryan, 2003). These items were used to measure participants' degree of dispositional mindfulness. This scale maintains high internal consistency (alphas of .82 or greater) and test-retest reliability ($t(59) = -.11$, *ns* between Time 1 and Time 2) (Brown & Ryan, 2003). Using a scale of 1 (*Almost Never*) to 6 (*Almost Always*), participants were asked to rate how frequently or infrequently they endured such experiences as: "*I rush through activities without being really attentive to them*".

Time affluence was examined using the Material Affluence Time Affluence Scale (MATAS) developed by Kasser & Sheldon (2009). Factor analysis in their four-study review indicated two distinct factors (one for material affluence, the other for time affluence) (with attendant factor loadings of .61 or greater). Significant correlations between MATAS scores and more objective indices of material and time affluence (e.g., yearly household income and the hours per week spent on "the work that you do for pay, for child care, and for other household necessities", p. 247) established construct validity. These items are designed to assess participants' perceptions of the amount and quality of free time they have to pursue purposeful activity and leisure. An example item from this scale was "*I have had enough time to do the things that are important to me*".

Six questionnaire items assessed competence and attunement in the context of the work commute. Three items measuring competence were drawn from research by Reis, Sheldon, Gable, Roscoe, & Ryan (2000), as their work demonstrated that daily needs satisfaction across various life domains predicts subjective well-being (Milyavskaya, et al., 2009). Three commute-related attunement items were developed using language that is semantically associated with positive affect and tranquility (e.g., "*I have felt content and in good spirits*"; "*I have felt carefree*").

Finally, three questionnaire items measured commute-related stress. These items were adapted from the Depression Anxiety Stress Scale (DASS-21; Antony, Bieling, Cox, Enns, & Swinson, 1998). The DASS-21 maintained high internal consistencies (respective Cronbach alphas of .87 and .91) and significant correlations with related measures of anxiety and stress (e.g., the Beck Depression Inventory [BDI], the State-Trait Anxiety Inventory [STAI]) in validation studies (Antony, et al., 1998). An example item from this scale included: "*I have felt that I was getting agitated*".

[1] For the sake of brevity, attunement, competence, and stress hereinafter refer specifically to these constructs as experienced within the context of the work commute.

2.2. Participants and Procedures

The study was approved by the University of North Carolina at Chapel Hill (UNC-CH) Institutional Review Board, and informed consent was obtained from each respondent prior to participation in the study.

Participants included UNC-CH staff members. In January of 2010, 11,050 prospective respondents were sent an email containing a link to the online questionnaire through the university's mass email system. After a one-week collection period, the survey session was closed and questionnaire responses were collected. A total of 832 staff members completed the questionnaire, representing a response rate of 7.5%. After examining the response set for inconsistencies, extreme outliers (responses > four standard deviations from the mean), and missing data, 786 response sets were included in the final analysis; see Table 1 for characteristics of the study's sample. Participants responded to all questions with regard to ''the last month.''

2.3. Statistical Approach

Hypothesis 1 and 2 were assessed using an analysis of variance (ANOVA), which examined whether sample walkers and bicyclists reported higher levels of mindfulness, time affluence, and positive journey-based affect, and lower levels of commute time discrepancy, than drivers and bus users.

Hypothesis 3 was assessed by employing structural equation models to determine direct and mediated relationships between mindfulness, time affluence, competence, stress, and attunement.

3. Results

3.1. Descriptive Analysis

Respondents worked a median of 40 to 50 hours per week (range: less than 10 hours to more than 50 hours) and earned a median after-tax household income of between $40,000 and $60,000. There were more women (68.2%) than men and the mean age of the respondents was 41 years of age (range: 19 to 72). Fifty respondents reported not having daily access to an automobile (6.4%). Regarding participants' predominant commuting modes, drivers represented the majority of the sample (59.3%), with bus users comprising the second-largest commuting group (26%). Following drivers and bus users were walkers (6.9%), bicyclists (6.4%), and users of 'other' modes (1.5%), such as scooters, and motorcycles. Respondents reported their average commute time to be about 29 minutes (*SD* = 16.5 minutes) and their 'ideal' commute time, assuming that participants were to use their presently dominant commuting mode, was roughly 19 minutes (*SD* = 12.2 minutes) (see Table 1).

On average, participants evaluated their journeys fairly positively. That is, they found their journey not very stressful (*M* = 7.50, *SD* = 2.96; *example item: "I have felt myself getting agitated"*), frequently relaxing (*M* = 11.72, *SD* = 2.93; *example item: "I have felt at ease and relaxed"*), and regularly confidence-inducing (*M* = 14.04, *SD* = 2.67; *example item: "I have felt sure of myself"*). All scales had a possible range of 3 to 18.

Table 1.
Sample characteristics (N=776).

		n	%
Female			68.2
Mean Age (SD)	40 (12.9)		
Commuting Mode			
	Drive	466	59.3
	Bus	204	26.0
	Walk	54	6.9
	Bicycle	50	6.4
	Other	12	1.5
Work Hours/Week			
	< 20	60	7.5
	≥ 20 < 40	159	20.3
	≥ 40 < 50	425	54.1
	≥ 50	107	13.6
	Student	34	4.3
Household Income (after taxes)			
	< $40,000	240	30.8
	≥ $40,000 to $60,000	154	19.7
	≥ $60,000 < $100,000	226	29.1
	≥ $100,000	160	20.6
Mean Est. Commute Time (SD)	29 (16.5)		
Mean Ideal Commute Time (SD)	19 (12.2)		

Table 2.
Mean scores of respondents' time affluence, mindfulness, journey-based affect, and commute time perceptions as a function of their commuting mode.

	Drivers	Bus users	Walkers	Cyclists	*F*	Sig. Group Differences
Time Affluence	22.63	24.80	27.36	25.78	8.61 (3, 770)**	(1,2) (1,3)
Mindfulness	21.55	21.98	22.93	22.68	2.68 (3, 770)*	(1,3)
Actual Commute	29.33	32.58	22.39	22.86	8.62 (3, 770)**	(1,3) (1,4) (2,3) (2,4)
Ideal Commute	18.38	19.86	17.22	18.59	1.32 (3, 770)[a]	
Stress	8.13	6.98	5.13	6.15	26.53 (3, 770)**	(1,2) (1,3) (1,4)
Attunement	11.11	11.84	13.80	14.46	34.31 (3, 770)**	(1,2) (1,3) (1,4) (2,3) (2,4)
Competence	14.04	13.47	14.83	15.44	9.48 (3, 770)**	(1,4) (2,3) (2,4)

Note: Sig. Group Differences indicates significant post hoc inter-group differences ($p < .05$).
[a]Not significant.
*$p < 0.05$ **$p < 0.001$.

3.2. Hypotheses 1 and 2: Commuter Group Differences

In the interest of ensuring reasonable group sizes, four commuter groups were identified; these included: drivers, bus users, walkers, and bicyclists. As a result, twelve respondents who had commuted using other modes were excluded from this analysis. To assess commuter group differences on measures of time affluence, mindfulness, commute time perceptions, and journey-based affect, a one-way ANOVA was performed. The ANOVA revealed that time affluence, mindfulness, actual commute times, and journey-based affect differed significantly among the four groups; whereas group members reported relatively similar ideal commute times (see Table 2).

As group sample sizes differed substantially, Hochberg's GT2 post hoc tests ($p < .05$) were used to compare the magnitude of inter-group differences. Results of these tests suggested that walkers and bus users conveyed greater time affluence than drivers. Further, walkers in this sample reported higher levels of mindfulness than drivers.

Concerning journey-based affect, bus users, walkers and bicyclists reported significantly less stress than drivers in this sample. All other mode users also reported higher degrees of attunement than drivers, with walkers and bicyclists conveying the greatest relative levels of attunement. Bicyclists reported greater competence than drivers and bus users, and walkers reported higher competence than bus users.

3.3. Hypothesis 3: Mediational Model Analysis

To examine theorized mediational relationships between mindfulness and attunement, a series of structural equation models (SEM) was performed. Given the fact that greater levels of mindfulness are associated with enhanced subjective well-being (Brown & Kasser, 2005), it was hypothesized that mindfulness would exert a direct positive influence on attunement. Further, past work indicates that satisfaction across life domains is frequently fortified by greater levels of time affluence (Kasser & Sheldon, 2009), competence, and mindfulness (Ryan, Huta, & Deci, 2008). Thus, it was hypothesized that time affluence, competence, and stress would partially mediate a mindfulness-attunement relationship.

Several proposed models exploring relationships between journey-based affect, mindfulness and time affluence were examined. Missing values were estimated using maximum likelihood estimation (Arbuckle, 2008) and diagnostic measures of collinearity (VIF scores < 4) addressed concerns related to multicollinearity among predictor variables.

All modeling analyses controlled for participants' age, sex, income, car ownership, and average weekly work hours. The SEMs were estimated using data from 786 respondents with the AMOS 17 statistical package (Arbuckle, 2008) on 22 questions from five Likert-scale instruments designed to measure dispositional mindfulness (Brown & Ryan, 2003), time affluence, (Kasser & Sheldon, 2009) as well as competence, stress, and attunement. A correlation matrix with indicator means and standard deviations is shown in Appendix B.

Regarding data integrity, a visual inspection of standardized residual histograms and scatter plots of independent-dependent relationships satisfied multivariate normality and linearity assumptions. Thus, given the data's normal distribution, maximum likelihood parameter estimation was selected. Concerning sample size, there is general agreement that 10 participants for every estimated parameter represent a sufficient sample size to ensure stability of the parameter estimates (Schreiber, Nora, Stage, Barlow, & King, 2006). Considering this study's sample size of 786, and that the number of study parameters is 29 (7 regressions, 22 variances), an acceptable ratio of 27.1 participants to 1 parameter was achieved.

In conducting the SEM analysis, three distinct models were assessed. The first, Alternative model 1, investigated the direct and mediated impact that attunement exerted on mindfulness when operating through experiences of time affluence, competence, and stress. The second, Alternative model 2, explored the direct and mediated effect of competence on attunement when functioning through experiences of stress, mindfulness, and time affluence. Relative to the Validation model, these two alternative models displayed poorer explanatory power and their respective fit indexes indicated the presence of model misspecification (see Table 5).

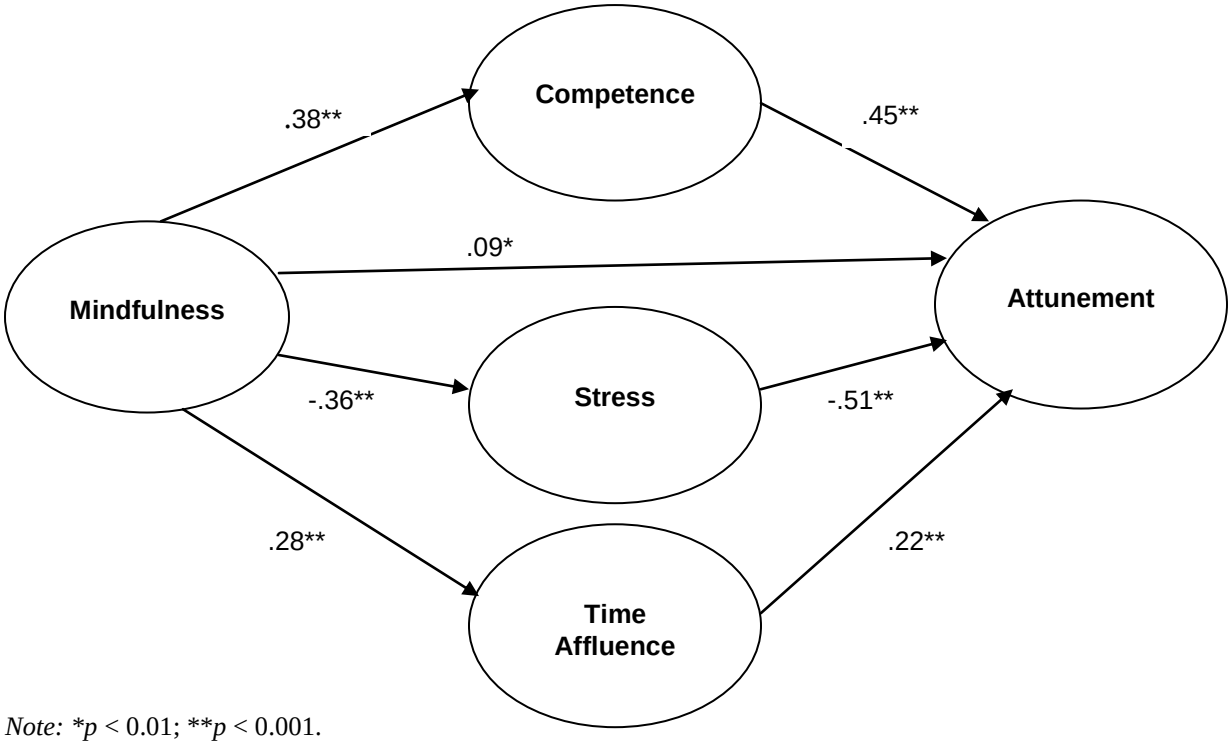
3.4. Model Results

The best-fitting SEM is depicted in Figure 2. The CFI is .973, the GFI is .954, the TLI is .965 the RMSEA is .041. These fit indexes indicate a good fit of the model to the data (see Table 5).

Table 3.
Standardized factor loadings in the validation model in Figure 2.

Latent Variable	Indicator Variable	Standardized Factor Loadings
Mindfulness		
	Mind_1	0.71
	Mind_2	0.83
	Mind_3	0.85
	Mind_4	0.74
	Mind_5	0.54
Time Affluence		
	TimeA_1	0.84
	TimeA_2	0.74
	TimeA_3	0.75
	TimeA_4	0.68
	TimeA_5	0.74
	TimeA_6	0.71
	TimeA_7	0.58
	TimeA_8	0.78
Competence		
	Comp_1	0.76
	Comp_2	0.71
	Comp_3	0.76
Stress		
	Stress_1	0.77
	Stress_2	0.70
	Stress_3	0.61
Attunement		
	Attun_1	0.77
	Attun_2	0.90
	Attun_3	0.63

Figure 2.
Validated mediational model depicting the mediated relationship between mindfulness and attunement.



Note: $*p < 0.01$; $**p < 0.001$.

3.5. Direct Effects

The validated model (Figure 2) confirmed the hypothesis that competence is related positively to dispositional mindfulness (standardized coefficient = .38), as well as attunement (standardized coefficient = .45). In addition, the model indicated that time affluence is associated positively to both dispositional mindfulness (standardized coefficient = .28) and attunement (standardized coefficient = .22). Conversely, stress is negatively associated with mindfulness (standardized coefficient = -.36) and attunement (standardized coefficient = -.51).

3.6. Indirect Effects

Indirect effects represent effects of independent variables on a dependent variable through mediating variables (Baron & Kenny, 1986). In the present study, it was hypothesized that time affluence, competence, and stress would partially mediate the relationship between mindfulness and attunement. Indeed, due to the indirect (or partially mediated) effect of dispositional mindfulness on attunement, the model indicates that when mindfulness increases by one standard deviation, attunement increases by 0.41 standard deviations. See Table 4 for a tabulation of the model's direct, indirect, and total effects.

Table 4.
Direct, indirect, and total effects of variables on attunement.

	Standardized coefficients				Unstandardized coefficients				
	A	C	S	T	A	C	S	T	*SE*
Direct									
Competence	0.453				0.610				0.062
Time Affluence	0.219				0.199				0.028
Stress	-0.510				-0.550				0.061
Mindfulness	0.089	0.375	-0.356	0.283	0.103	0.256	-0.438	0.489	0.037
Indirect									
Competence									
Time Affluence									
Stress									
Mindfulness	0.414				0.478				
Total									
Competence	0.453				0.610				
Time Affluence	0.219				0.199				
Stress	-0.510				-0.550				
Mindfulness	0.503	0.375	-0.356	0.283	0.581	0.256	-0.438	0.489	

Note: A = Attunement; C = Competence; S = Stress; T = Time Affluence.

Table 5.
Comparison of alternative models on the effects of mindfulness, time affluence, competence, and stress on attunement.

Model	χ^2	*df*	*p*	CFI	TLI	RMSEA	GFI
Validation Model (Figure 2)	406.877	176	.000	.973	.965	.036 - .046	.954
Alternative Model 1	801.454	186	.000	.930	.920	.057 - .066	.906
Alternative Model 2	859.687	202	.000	.923	.912	.060 - .069	.901

Note: CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root mean square error of approximation; GFI = Goodness of Fit Index.

4. Discussion

The current study proposed that journey-based affect may vary as a function of one's dominant commuting mode. Walkers and bicyclists in this study maintained significantly higher levels of attunement, and competence and relatively lower levels of stress than drivers and bus users. These findings support previous research by Gatersleben and Uzzell (2007) who found that car commuters perceived their work commute as more stressful than other mode users, that bus users frequently characterized their commute as boring, and that walkers and cyclists perceived their work commute as relatively relaxing and exciting. Therefore, from an affective standpoint, walking and bicycling should be promoted as comparably gratifying mode choices.

The present study also illustrated that the mindfulness-attunement relationship was mediated by three experiential pathways. The first pathway involved subjective evaluations of time affluence. Those participants who reported a capacity to pursue gratifying hobbies and

leisure were also not likely to feel distracted or forgetful. As such, these individuals were relatively attuned to and satisfied with their journey to work. This finding is consistent with previous work that has documented time affluence-stimulated benefits to subjective well-being (Kasser & Sheldon, 2009).

The second mindfulness-attunement mediational pathway involved self-appraisals of competence. Participants who reported higher degrees of confidence and self-assuredness in the context of the work commute concurrently reported greater awareness of present-oriented experience more generally. As a result, these individuals were also likely to find their commute peaceful and restorative.

The third pathway involved self reports of stress and displeasure. Participants who reported relatively high levels of agitation and nervous tension on their way to work also reported high degrees distraction and inattention. As a consequence, these individuals were also unlikely to report feeling relaxed and unflustered when traveling to work.

Though future research is needed to validate the journey-based affect scales employed in this study, these measures offer promising means of gauging affect associated with the journey to work. Planners, transportation modelers, policymakers, and employers could use these or similar scales to assess affective responses to commute-related policy changes (e.g., the introduction of worksite parking "cash-out" programs); built environment modifications (e.g., the implementation of large-scale traffic-separated multi-use paths); as well as mode and route choice decision-making.

The current findings are in keeping with a research tradition that highlights the mental health benefits of non-motorized travel more generally. Indeed, previous research indicates that consistent physical activity such as walking and bicycling is associated with self-esteem and positive mood enhancements (Pretty, et al., 2007). Relating this concept to the work commute specifically, it seems that certain people actually enjoy commuting, as it provides a welcome, comforting transition between home and work life domains (Gatersleben & Uzzell, 2007). Such "travel liking" represented the biggest predictor of relative desired mobility (or the degree to which one wants to travel more or less than one currently travels) in several studies (Ory & Mokhtarian, 2005). As was revealed in the present study, non-motorized commuters reported significantly less dissonance between their actual and ideal commute times than drivers or bus users (see Table 2). Thus, given the positive affective consequences of non-motorized commuting, it seems reasonable to contend that walking and bicycling to work have greater potential to engender an affirmative transition between home and work environments than driving or riding the bus.

Study findings also suggest that as people perceive having more free time (greater time affluence); they become increasingly more likely to choose non-motorized commuting modes. To illustrate, a pedestrian commuter is not likely to enhance her time affluence by commuting on foot, as walking is a relatively slow mode choice. Instead, her life's circumstances allowed her to feel less time constrained and thus more flexible in deliberating ways of traveling to work. Indeed, after controlling for commute trip time and weekly work hours, walkers continued to report significantly greater time affluence than drivers, $t(215) = 3.32$, $p = 0.039$. Further, as 13.6% (63 out of 466 total) of drivers in this sample reported low levels of time affluence together with high levels of stress[2], such over-stressed and time-impoverished drivers may respond favorably to travel demand management strategies which aim to reduce private vehicle

[2] As discerned by lowest and highest quartile ranges on measures of time affluence and stress, respectively.

use (e.g., workplace flextime provisions) (Lucas & Heady, 2002). Despite the intuitive appeal of this example, however, habitual car use can serve to undermine attempts at reconciling intentions to walk or bike to work with behavioral execution of such intentions (Gardner, 2009). As such, relationships between commuting mode choices, commuting habits, work-hour arrangements, and perceptions of time affluence await further empirical study.

In addition to mode choice-time affluence associations, the current study's results also have relevant methodological implications. Firstly, mindfulness is most often investigated in controlled contexts such as research laboratories and mental health clinics. The current research suggests that mindfulness may have greater potential for expression in some naturally occurring contexts over others; quite obviously, the journey to work provides merely one example. Future research may reveal that mindful states emerge most frequently in contexts of close social engagements, mundane solitary activities, or periods of purposeful activity (e.g., volunteering). Secondly, this study's finding that non-motorized means of commuting may enhance the psychological need of competence is promising. This result can inform prospective research efforts aimed at investigating the psychological needs satisfaction associated with non-motorized commuting in particular and travel more generally.

Concerning methods of promoting mindfulness, Langer and Moldoveanu (2000) argue that employees would enjoy their work more if they altered their perception of the work they performed by employing mindful cognitive states. Further, these authors suggest that employers and employees could collaboratively rearrange work tasks so as to make them more interesting and engaging for employees, which would thereby support mindful expressions of consciousness. The journey to work may be conceptualized in similar fashion. For example, to enhance the commuting experience in the short term, commuters can engage with the work trip by activating mindful states. This concept is in keeping with the present study's finding that mindful states, as mediated by time affluence and competence have the potential to enhance individual-level commuting experience; and by corollary, the transition from home to work. Further, the activation of mindful states can serve to stabilize and allocate attentional capacity, thereby enhancing reflexive awareness and emotional regulation (Philippot & Segal, 2009). Engaging the mind in such a manner holds promise for commuters to suppress hostile, reactive impulses, to effectively disengage from stress and anger-provoking situations, and to enhance attunement to their commuting experience. Perhaps over longer time horizons, planners, engineers, policymakers, employers, and employees could collaboratively shape and alter commuting environments so as to make commuting inherently more interesting, engaging, safe, and thereby facilitative of mindful cognitive expressions.

4.1. Limitations

Although the present study highlights novel relationships between time affluence, commuting modes, mindfulness, and positive journey-based affect, prospective studies could correct for several of this study's inherent limitations. To begin, results presented here derived from retrospective self-report measures. Yet, there exists well-established evidence that individuals tend to overestimate the intensity of both positive and negative emotions (Thomas & Diener, 1990). Further, mood states tend to fluctuate throughout the day and have potential to alter one's daily experience and expression of consciousness (Stone, et al., 2006). This study attempted to control for these dynamics in two ways: (1) first, by accounting for individual differences via robust sample size; and (2) second, by soliciting information about emotional frequency rather

than saliency, as individuals tend to display greater accuracy reporting the former emotional dimension (Thomas & Diener, 1990).

Additionally, participants also reported their mode choice and attendant affect with respect to the month of January; among the coldest months of the year in this study's geographic location. Thus, longitudinal designs, experience sampling measures, and measurement triangulation (e.g., pairing self-report measures with physiological indicators of stress) provide greater promise in establishing construct validity and discerning undulations in journey-based affect.

Another shortcoming of this study involved its solicitation of mode choice information from respondents. The questionnaire asked, "Over the past month, how had you gotten to work on most days?", then supplied participants with a list of mode categories (see questionnaire instrument in Appendix A). This question did not capture multi-modal trips and in so doing, participants were required to choose one dominant mode; a challenging request for those respondents who regularly alternate between commuting modes. Nonetheless, attempting to capture the subtleties of trip-chaining and multi-modal commute patterns was beyond the scope of this study. Instead, the questionnaire instrument was designed to relate a time-bound, dominant mode choice to measures of dispositional mindfulness, time affluence, and journey-based affect.

This study was also limited in terms of its measurement of commute-relevant experience. Other variables which mediate the mindfulness-attunement relationship should be introduced into prospective study designs. Candidate variables include alternative psychological needs such as autonomy and relatedness, as well as motivation orientation related to the work commute (e.g., external regulation, introjected regulation, etc.) (see Nix, Ryan, Manly, & Deci, 1999).

Along similar lines, respondents were not asked questions relating to activities they might engage in while commuting, such as listening to music, using a cell phone, or eating. Recent research indicates that regardless of travel mode, distractions such as talking on a cell phone can manifest in what is known as "inattentional blindness", an experiential phenomenon in which individuals neglect to notice new and distinctive stimuli (Hyman, Boss, Wise, McKenzie, & Caggiano, 2009). And as we have seen, inattention is antithetical to mindfulness.

This study also failed to prompt participants to provide information on the environmental elements they encounter on their way to work. Such a shortcoming is especially relevant considering that past work indicates that environments impact mood states in significant ways. Indeed, stimulating urban environments have been associated with agitated mood states; natural environments with positive, adaptive mood states (Berman, Jonides, & Kaplan, 2008).

Finally, the generalizability of the results reported here is undermined by the fact that the preponderance of this study's participants were female, more likely than the larger parent population to use non-motorized commuting modes (UNC Campus Commuter Study, 2010), and worked at a single location; one which sustains rather unique commute-influencing policies (i.e., limited parking supply and a fare-free bus service). Research involving samples from a variety of work-place locations and cultures, as well as across various seasons, would assess the external validity of this study's findings.

5. Conclusion

In keeping with the findings of Gatersleben and Uzzell (2007), the current study has demonstrated that from an affective perspective, non-motorized means of commuting are superior to car and bus commuting. Further, study results suggest that circumstantial factors such as sustaining a satisfactory level of time affluence and maintaining the capacity to activate mindful states of consciousness can enhance the work trip experience.

The construct of mindfulness has heretofore been neglected in the travel literature. This omission is surprising, as the engagement of mindfulness has the capacity to profit people in myriad ways. Substantial amounts of research have examined ways in which elements of the built environment support or impede physical activity and active transportation (Saelens & Handy, 2008; Rodríguez, Khattak, & Evenson, 2006). What has yet to be explored, however, are those elements of natural and built environments that facilitate the cultivation of adaptive mental health and the unfolding of mindfulness.

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Appendix

Appendix A. Questionnaire Items.

Measured Construct		Questionnaire Item	Response Options/Range
Work Hours		On average, how many hours a week do you work?	< 10 to > 50 hours
Commuting Mode		Over the past month, how have you gotten to work on most days?	Car or Truck; Bus; Walking; Bicycling; Motorcycle; Scooter; Taxi; Other
Mode Choice Duration		How long have you used this commuting mode to get to your current place of work?	< 2 months to > 20 years
Estimated Commute Time		How much time does it typically take to get from your home to your main place of work (in minutes)?	Open
Ideal Commute Time		How much time would it ideally take to get from your home to your main place of work (in minutes)?	Open
Automobile Access		Within the past month, have you had daily access to an automobile?	Yes; No
Sex		Sex	Male; Female
Age		Age in Years	Open
Household Income		Yearly Household Income After Taxes	< $20K to > $100K
Mindfulness			Six-point Likert Scale (Frequency)
	Mind_1	I find it difficult to stay focused on what's happening in the present.	
	Mind_2	I rush through activities without being really attentive to them.	
	Mind_3	I find myself doing things without paying attention.	
	Mind_4	I do tasks automatically, without being aware of what I'm doing.	
	Mind_5	I find myself preoccupied with the future or the past.	
Time Affluence			Six-point Likert Scale (Agreement)
	TimeA_1	My life has been too rushed.	
	TimeA_2	I have had plenty of spare time.	
	TimeA_3	I have been racing from here to there.	
	TimeA_4	I have had enough time to do what I need to do.	
	TimeA_5	I have been able to take life at a leisurely pace.	
	TimeA_6	There have not been enough minutes in the day.	
	TimeA_7	I have had enough time to do thing that are important to me.	
	TimeA_8	I have felt like things have been really hectic.	

Attunement		"When traveling to work I have felt…"	Six-point Likert Scale (Frequency)
	Attun_1	content and in good spirits.	
	Attun_2	at ease and relaxed.	
	Attun_3	carefree.	
Competence		"When traveling to work I have felt…"	Six-point Likert Scale (Frequency)
	Comp_1	sure of myself.	
	Comp_2	in complete control.	
	Comp_3	very capable.	
Stress		"When traveling to work I have felt…"	Six-point Likert Scale (Frequency)
	Stress_1	that I had difficulty relaxing.	
	Stress_2	that I had was using a lot of nervous energy.	
	Stress_3	that I was getting agitated.	

Appendix B

	Variables	Pearson Correlations																					
#		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Mind_1	1																					
2	Mind_2	0.621	1																				
3	Mind_3	0.585	0.719	1																			
4	Mind_4	0.474	0.599	0.692	1																		
5	Mind_5	0.502	0.448	0.419	0.401	1																	
6	TimeA_1	0.199	0.231	0.195	0.178	0.150	1																
7	TimeA_2	0.055	0.070	0.057	0.071	0.025	0.624	1															
8	TimeA_3	0.230	0.247	0.212	0.211	0.238	0.701	0.503	1														
9	TimeA_4	0.142	0.147	0.141	0.119	0.081	0.566	0.570	0.469	1													
10	TimeA_5	0.110	0.129	0.084	0.098	0.074	0.608	0.656	0.518	0.554	1												
11	TimeA_6	0.157	0.134	0.160	0.139	0.132	0.582	0.563	0.559	0.517	0.543	1											
12	TimeA_7	0.179	0.159	0.151	0.142	0.139	0.480	0.487	0.413	0.550	0.471	0.377	1										
13	TimeA_8	0.195	0.182	0.139	0.142	0.179	0.692	0.558	0.652	0.482	0.563	0.611	0.408	1									
14	Comp_1	0.246	0.263	0.201	0.211	0.273	0.085	0.019	0.085	0.132	0.051	0.097	0.171	0.088	1								
15	Stress_1	-0.244	-0.224	-0.193	-0.183	-0.290	-0.296	-0.177	-0.318	-0.243	-0.184	-0.279	-0.231	-0.325	-0.394	1							
16	Attun_1	0.253	0.254	0.192	0.187	0.297	0.260	0.177	0.230	0.204	0.210	0.214	0.305	0.263	0.513	-0.498	1						
17	Stress_2	-0.248	-0.209	-0.197	-0.194	-0.280	-0.162	-0.118	-0.199	-0.135	-0.140	-0.174	-0.206	-0.215	-0.387	0.561	-0.526	1					
18	Comp_2	0.213	0.200	0.176	0.202	0.249	0.125	0.082	0.131	0.141	0.063	0.128	0.179	0.124	0.548	-0.373	0.479	-0.397	1				
19	Attun_2	0.258	0.264	0.235	0.244	0.304	0.302	0.224	0.302	0.236	0.229	0.257	0.273	0.311	0.512	-0.646	0.703	-0.561	0.554	1			
20	Stress_3	-0.282	-0.250	-0.187	-0.177	-0.295	-0.213	-0.116	-0.265	-0.120	-0.141	-0.157	-0.164	-0.251	-0.347	0.488	-0.416	0.460	-0.273	-0.522	1		
21	Attun_3	0.166	0.172	0.131	0.127	0.205	0.332	0.311	0.299	0.271	0.349	0.294	0.272	0.350	0.309	-0.416	0.511	-0.348	0.365	0.602	-0.362	1	
22	Comp_3	0.289	0.263	0.240	0.219	0.262	0.126	0.069	0.103	0.147	0.073	0.095	0.220	0.121	0.619	-0.319	0.547	-0.332	0.540	0.497	-0.331	0.373	1
Mean		4.50	4.47	4.38	4.44	3.99	2.95	2.58	3.20	3.20	2.62	2.78	3.56	2.93	4.99	2.71	4.28	2.58	4.21	4.15	2.29	3.22	4.78
SD		1.11	1.00	1.01	1.08	1.22	1.33	1.31	1.34	1.40	1.33	1.38	1.43	1.35	0.98	1.29	1.05	1.25	1.25	1.17	1.21	1.31	1.03