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Traffic Congestion Exposure, Perceived Commuting Stress and Psychological Distress among Urban Residents in Lagos State, Nigeria: A Cross-Sectional Study

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Abstract

Background

Traffic congestion is an under-recognised threat to mental health in rapidly urbanising cities, and evidence linking commuting conditions to psychological distress in sub-Saharan Africa is scarce. We examined whether traffic congestion exposure and perceived commuting stress are associated with psychological distress among adult commuters in Lagos State, Nigeria.

Methods

In this STROBE-guided community-based cross-sectional study, 624 adults were recruited through multistage sampling. Congestion exposure was measured as self-reported daily congestion delay (< 30, 30–59, 60–89, ≥ 90 min), commute duration and frequency of severe congestion. Commuting stress was measured with a score informed by the Multimodal Commuting Stress Scale. Psychological distress was measured with the six-item Kessler scale (K6; range 0–24; ≥13 defined high distress). Logistic regression yielded adjusted odds ratios (aORs) with 95% confidence intervals (CIs).

Results

Mean age was 36.8 years (SD 10.9) and 55.6% were women. Median daily commuting time was 108 minutes (IQR 75–150), and 46.6% reported severe congestion on ≥ 4 days per week. High commuting stress affected 44.4% and high psychological distress 25.5%. The prevalence of high distress rose from 13.8% among those with < 30 minutes of daily delay to 41.5% among those with ≥ 90 minutes (p for trend < 0.001). In the fully adjusted model, which also included commuting stress, ≥ 90 versus < 30 minutes of delay was associated with higher odds of high distress (aOR 2.31, 95% CI 1.37–3.91), as was high commuting stress (aOR 3.18, 95% CI 2.08–4.86). Discrimination was acceptable (AUC 0.78).

Conclusions

Long congestion delay, frequent severe congestion and high commuting stress were each independently associated with psychological distress among Lagos commuters. The design is cross-sectional and exposures were self-reported, so causality cannot be inferred. Journey reliability and commuter experience merit consideration in urban transport and mental-health planning, and prospective studies with objective mobility measures are warranted.

1. Introduction

Traffic congestion is an urgent but under-examined threat to mental health in rapidly urbanising African cities such as Lagos. Mental disorders already account for 4.9% of global disability-adjusted life-years

[1], and the World Health Organization describes mental-health needs as high and responses as insufficient worldwide [2]. Urbanisation sharpens this challenge: population density, the spatial separation of homes and workplaces, limited transport infrastructure and heavy reliance on road transport produce prolonged and unpredictable journeys, through which transport affects health by physical, environmental, social and psychological pathways [3, 4]. Lagos State, one of Nigeria's most densely populated and economically important urban areas, exemplifies these conditions. Residents travel by private vehicles, buses, motorcycles and tricycles, taxis, rail and water transport, and because employment, education and commerce are concentrated in particular parts of the metropolis, many travel long distances routinely. Psychological distress is already common in Nigerian samples assessed with Kessler-type scales, including health workers in southwestern Nigeria [5] and university students [6]. Daily exposure to congestion could therefore add to an existing burden, yet its contribution to distress in Lagos has not been quantified, which leaves transport and health planners without local evidence on which to act.

Researchers have made real progress in linking the urban and travel environment to mental health, but important gaps remain. Systematic reviews report associations between objective urban-environment characteristics and psychological distress [7]; between transport infrastructure, congestion and delay and negative affective states and psychophysiological distress across 69 studies [8]; and between commute duration and mode and emotional wellbeing and mental health across 45 studies, with negative effects spilling over into home and work life [9]. Broader overviews and longitudinal analyses of commuting point in the same direction [10, 11], public-transport commuters report higher perceived and physiological stress [12], long commutes are associated with sleep problems among workers [13], and co-exposures such as traffic noise are associated with poorer mental health [14, 15]. Measurement has advanced too: the Multimodal Commuting Stress Scale (MCSS) captures commuting stress across transport modes [16], and the six-item Kessler scale (K6) [17] and related Kessler scales have shown acceptable reliability in African samples [18]. Four gaps remain. First, like the wider neighbourhood-environment literature, this evidence comes mainly from high-income settings [19]. Second, reviews describe the evidence on journey reliability as thin and the causal pathways as unclear, with heavy reliance on self-report [8, 9, 12]. Third, studies of congestion exposure rarely capture how commuters perceive their journeys, so it is unclear whether perceived commuting stress is associated with distress independently of exposure and socioeconomic characteristics. Fourth, Nigerian studies of distress have not examined commuting [5, 6], and the few Lagos studies of congestion and stress are small; one reported a modest positive correlation between perceived stress and congestion among university staff [20]. Consequently, the question of whether congestion and commuting stress relate to distress among Lagos commuters remains unanswered.

To address these gaps, we used a community-based cross-sectional survey with multivariable logistic regression (Method) to quantify the unmeasured contribution of congestion to psychological distress in Lagos (Problem) by estimating how congestion delay, the frequency of severe congestion and perceived commuting stress relate to K6-defined distress among adult commuters (Solution), so that transport and public-health planners have baseline local evidence for prioritising journey reliability and commuter

wellbeing (Application). Our thesis is that commuting conditions, and the stress they generate, are measurable correlates of psychological distress that deserve a place in urban mental-health policy. The primary objective was to examine the association of traffic congestion exposure and perceived commuting stress with psychological distress among adult urban residents of Lagos State. Specifically, we (i) described sociodemographic and commuting characteristics; (ii) quantified congestion exposure; (iii) estimated the prevalence of high commuting stress and high distress; (iv) examined the association between congestion exposure and distress; and (v) determined whether commuting stress is associated with distress after adjustment for confounders. We hypothesised that (H1) greater congestion exposure would be associated with higher odds of psychological distress; (H2) higher commuting stress would be associated with higher odds of distress; and (H3) the association in H1 would persist after adjustment for sociodemographic, socioeconomic and commuting characteristics, including commuting stress.

2. Methods

2.1 Study design and reporting

A community-based cross-sectional design was chosen because it allows exposure, mediating experience and outcome to be measured together in a large sample at one point in time. The study was conducted in Lagos State, Nigeria, from August 2026 to October 2026, and is reported according to the STROBE statement for cross-sectional studies [21].

2.2 Setting

Lagos State, in southwestern Nigeria, is a highly urbanised metropolitan area with extensive daily movement between residential, commercial, educational and employment zones. Participants were drawn from geographically distinct urban communities in Lagos Mainland, Ikeja, Surulere, Mushin, Kosofe, Eti-Osa and Alimosho, chosen to represent different traffic intensities and socioeconomic profiles and so to capture variation in congestion exposure.

2.3 Participants

Eligible participants were adults aged ≥ 18 years who had lived in Lagos State for ≥ 6 months, travelled outside their immediate neighbourhood for routine activities on ≥ 3 days per week, had a regular commuting route and gave informed consent. These criteria ensured that every participant had a stable, repeated commuting exposure. Exclusion criteria were inability to complete the questionnaire independently, temporary residence, no regular commuting pattern, and an acute medical or psychological crisis at recruitment.

2.4 Sample size

The sample size was calculated with a single-proportion formula, assuming a distress prevalence of 30%, 95% confidence and 5% absolute precision, giving a minimum of 323 participants ($1.96^2 \times 0.30 \times 0.70 / 0.05^2$). Applying a design effect of 1.5 for cluster sampling gave 485, and allowing for 15% non-

response gave 570. The target was rounded up to 620 to provide about 155 events at the anticipated prevalence, supporting a multivariable model of roughly 15 parameters at about 10 events per parameter; events-per-variable rules are only a rough guide [22]. A total of 624 participants were included in the analysis.

2.5 Sampling procedure

A multistage sampling approach was used to spread the sample across areas with different traffic conditions: (1) LGAs representing different urban contexts were randomly selected; (2) communities were randomly selected within each LGA; (3) households were systematically selected within wards; and (4) one eligible adult per household was randomly invited to participate.

2.6 Measures

Traffic congestion exposure (primary exposure)

Congestion exposure was operationalised through (a) average daily congestion-related delay, categorised as < 30, 30–59, 60–89 and ≥ 90 minutes (primary exposure); (b) average total daily commuting time; and (c) the frequency of severe congestion (< 1, 1–3 and ≥ 4 days per week). Delay was chosen as the primary exposure because it expresses congestion directly as time lost, separate from the length of the journey itself.

Perceived commuting stress (secondary exposure)

Commuting stress was measured with items covering the stress domains of the MCSS [16], summed so that higher scores indicate greater stress. This captured the commuter's experience of the journey, which objective exposure measures cannot.

Psychological distress (outcome)

Distress was measured with the K6, which asks about nervousness, hopelessness, restlessness, depression, feeling that everything is an effort and worthlessness during the previous 30 days [17]. Each item is scored 0–4, giving a total of 0–24, with higher scores indicating greater distress. A score ≥ 13 defined high psychological distress, the threshold conventionally used for serious distress and distinct from the lower threshold used for moderate distress [23]. Optimal thresholds can vary by population; Kessler-type scales have shown acceptable reliability in African samples [18], but a Lagos-specific validation was not conducted.

Covariates

Covariates were age, sex, marital status, educational attainment, employment status, monthly household income, residential LGA, primary commuting mode, sleep duration, physical activity, previous diagnosis of a mental-health condition and perceived neighbourhood safety. They were chosen on theoretical

grounds using the causal diagram in Fig. 1 [24], so that adjustment targeted plausible confounders rather than variables on the causal pathway.

2.7 Questionnaire and data collection

The structured questionnaire had five sections: sociodemographic characteristics, commuting characteristics, congestion exposure, commuting stress and psychological distress. Keeping exposure and outcome in one instrument allowed each participant's commute and distress to be linked directly.

2.8 Statistical analysis

Data were analysed with IBM SPSS Statistics 26. Continuous variables are summarised as means (SD) and categorical variables as n (%). Trends across ordered congestion categories were tested with a linear-by-linear test, and associations between continuous congestion, commuting-stress and distress scores were examined using regression analysis.

Binary logistic regression was used to examine factors associated with high psychological distress. Crude odds ratios were first estimated. Variables of theoretical importance (Fig. 1) and/or with $p < 0.20$ in bivariable analysis were entered into the multivariable model, which included congestion exposure, commuting stress and sociodemographic and behavioural covariates. Adjusted odds ratios (aORs), 95% CIs and p-values are reported. Because the design is cross-sectional, associations are not interpreted as causal effects.

3. Results

3.1 Participant characteristics

Participants were predominantly young to middle-aged, educated and economically active (Table 1). Mean age was 36.8 years (SD 10.9); 58.0% were aged 30–49 years and only 17.3% were aged ≥ 50 years. Women made up 55.6% of the sample, 50.6% were married or cohabiting, 64.9% held a bachelor's or postgraduate degree, and 89.3% were employed (71.2%) or self-employed (18.1%). This profile describes a working-age urban population for whom daily travel is routine, which suits the study question, but it also means the findings apply mainly to educated, employed adults and less to older residents (17.3% aged ≥ 50 years) or to students and unemployed people (10.7%). The next section describes how this population commuted.

Table 1
Sociodemographic characteristics of participants (N = 624)

Characteristic	n (%)
Total	**624 (100.0)**
Age, mean (SD), years	36.8 (10.9)
Age group, years	
18–29	154 (24.7)
30–39	205 (32.9)
40–49	157 (25.2)
≥ 50	108 (17.3)
Sex	
Male	277 (44.4)
Female	347 (55.6)
Marital status	
Single	270 (43.3)
Married/cohabiting	316 (50.6)
Separated/divorced/widowed	38 (6.1)
Education	
Secondary or below	128 (20.5)
Diploma/NCE	91 (14.6)
Bachelor's degree	286 (45.8)
Postgraduate	119 (19.1)
Employment	
Employed	444 (71.2)
Self-employed	113 (18.1)
Student/unemployed/other	67 (10.7)

Percentages are column percentages of N = 624. NCE, Nigeria Certificate in Education.

3.2 Commuting and congestion characteristics

Commuting was long and congestion was frequent (Table 2). Public buses and minibuses were the most common primary mode (42.9%), followed by private cars (27.4%). The median daily commuting time was 108 minutes (IQR 75–150); 43.3% commuted for ≥ 120 minutes a day and 13.9% for ≥ 180 minutes. Nearly half (46.6%; 291/624) reported severe congestion on at least four days per week, and 47.0% lost ≥ 60 minutes a day to congestion delay, including 20.8% who lost ≥ 90 minutes. These figures mean that, for many participants, congestion is a near-daily feature of the journey rather than an occasional event, and for a substantial minority the time lost to traffic alone approaches or exceeds an hour and a half. Because each of the four delay categories contained at least 20% of the sample (20.8–29.8%), the data offer the contrast needed to examine dose–response relationships in the sections that follow.

Table 2
Commuting and traffic congestion characteristics (N = 624)

Variable	n (%)
Primary commuting mode	
Public bus/minibus	268 (42.9)
Private car	171 (27.4)
Motorcycle/tricycle	74 (11.9)
Rail	43 (6.9)
Multiple modes	68 (10.9)
Daily commuting time	
< 60 min	98 (15.7)
60–119 min	256 (41.0)
120–179 min	183 (29.3)
≥ 180 min	87 (13.9)
Daily congestion delay	
< 30 min	145 (23.2)
30–59 min	186 (29.8)
60–89 min	163 (26.1)
≥ 90 min	130 (20.8)
Severe congestion frequency	
< 1 day/week	72 (11.5)
1–3 days/week	261 (41.8)
≥ 4 days/week	291 (46.6)

Percentages are column percentages of N = 624.

3.3 Perceived commuting stress

Commuting stress increased steadily with congestion delay (Table 3). The mean score rose from 25.8 (SD 6.7) in the < 30-minute group to 39.0 (SD 7.1) in the ≥ 90-minute group, a difference of 13.2 points, and the proportion with high commuting stress rose from 26.9% to 66.9% (p for trend < 0.001). Overall, the mean score was 31.7 (SD 8.4) and 277 participants (44.4%) had high commuting stress. A p-value for trend below 0.001 shows that this graded rise is very unlikely to be due to chance; it means that, in

this sample, the more time commuters lost to congestion, the heavier the perceived burden, with two-thirds of those losing ≥ 90 minutes a day reporting high stress, about 2.5 times the proportion among those losing < 30 minutes. Notably, more than a quarter of commuters with the least delay still reported high stress, which suggests that factors other than delay, such as crowding, safety or unpredictability, may also shape the commuting experience. This gradient is the first link in the pathway proposed in Fig. 1.

Table 3
Perceived commuting stress by daily congestion delay

Congestion delay	Mean commuting-stress score (SD)	High stress, n (%)
< 30 min	25.8 (6.7)	39 (26.9)
30–59 min	29.4 (7.2)	69 (37.1)
60–89 min	33.1 (7.8)	82 (50.3)
≥ 90 min	39.0 (7.1)	87 (66.9)
Overall	**31.7 (8.4)**	**277 (44.4)**

Percentages are row percentages within each congestion category (group sizes 145, 186, 163, 130). p for trend < 0.001 (linear-by-linear test).

3.4 Psychological distress

Psychological distress also rose with congestion delay (Table 4; Fig. 2a). The mean K6 score increased from 7.8 (SD 4.1) to 14.1 (SD 5.1) across the delay categories, and the prevalence of high distress rose from 13.8% to 19.4%, 30.1% and 41.5% (p for trend < 0.001). Overall, the mean K6 score was 10.8 (SD 5.2) and 159 participants (25.5%) met the criterion for high distress. These figures mean that commuters with ≥ 90 minutes of daily delay were three times as likely to have high distress as those with < 30 minutes (41.5% versus 13.8%), and that the average K6 score in the highest-delay group (14.1) already exceeded the threshold of 13 for high distress, whereas the average in the lowest-delay group (7.8) lay well below it. The increase also accelerated: the step from the first to the second category was 5.6 percentage points, but the steps beyond 60 minutes were 10.7 and 11.4 points, so most of the added burden appeared once delay exceeded an hour. This pattern raises the question of how much of the gradient persists after other factors are considered.

Table 4
Psychological distress by daily congestion delay

Congestion delay	Mean K6 score (SD)	High distress (K6 ≥ 13), n (%)
< 30 min	7.8 (4.1)	20 (13.8)
30–59 min	9.7 (4.6)	36 (19.4)
60–89 min	11.7 (5.0)	49 (30.1)
≥ 90 min	14.1 (5.1)	54 (41.5)
Overall	**10.8 (5.2)**	**159 (25.5)**

K6 range 0–24. Percentages are row percentages. p for trend < 0.001 (linear-by-linear test).

3.5 Bivariable associations

In crude analyses, the odds of high distress increased progressively with congestion delay (Table 5). Relative to < 30 minutes, the crude odds ratio was 1.50 for 30–59 minutes (95% CI 0.84–2.69; p = 0.17), 2.70 for 60–89 minutes and 4.42 for ≥ 90 minutes (95% CI 2.51–7.78). Distress was also associated with a commute of ≥ 120 minutes (OR 1.94), severe congestion on ≥ 4 days per week (OR 2.71), high commuting stress (OR 4.03, 95% CI 2.79–5.83) and sleep < 6 hours per night (OR 2.14), all p < 0.001; age and sex were not significantly associated. The p-value of 0.17 for the 30–59-minute category, with a confidence interval that spans 1, shows that the data are compatible with no difference from the reference group, so the excess odds emerge only from 60 minutes of delay upwards. Likewise, the intervals for age (OR 0.82, 95% CI 0.57–1.18) and sex (OR 1.31, 95% CI 0.91–1.89) include 1, so there is no clear evidence of a difference by either. These crude estimates do not account for overlap among the exposures, which the multivariable model addresses next.

Table 5
Bivariable (crude) associations with high psychological distress

Predictor	Crude OR	95% CI	p-value
Age ≥ 40 years	0.82	0.57–1.18	0.28
Female sex	1.31	0.91–1.89	0.14
Daily commute ≥ 120 min	1.94	1.34–2.82	< 0.001
Congestion delay 30–59 min	1.50	0.84–2.69	0.17
Congestion delay 60–89 min	2.70	1.53–4.77	< 0.001
Congestion delay ≥ 90 min	4.42	2.51–7.78	< 0.001
Severe congestion ≥ 4 days/week	2.71	1.84–4.00	< 0.001
High commuting stress	4.03	2.79–5.83	< 0.001
Sleep < 6 hours/night	2.14	1.44–3.18	< 0.001

OR, odds ratio; CI, confidence interval. Reference categories: age < 40 years; male; commute < 120 min; congestion delay < 30 min; severe congestion < 4 days/week; low commuting stress; sleep ≥ 6 hours.

3.6 Multivariable analysis

After adjustment, the associations were weaker but several remained clear (Table 6; Fig. 2b). In the fully adjusted model, which includes commuting stress, delay of ≥ 90 minutes was associated with 2.31-fold higher odds of high distress relative to < 30 minutes (aOR 2.31, 95% CI 1.37–3.91; p = 0.002), severe congestion on ≥ 4 days per week with 1.61-fold higher odds (95% CI 1.04–2.50; p = 0.033), high commuting stress with 3.18-fold higher odds (95% CI 2.08–4.86; p < 0.001) and sleep < 6 hours with 1.73-fold higher odds (95% CI 1.12–2.68; p = 0.013). Estimates for the 60–89-minute delay category (aOR 1.74, 95% CI 0.94–3.23; p = 0.08) and a commute of ≥ 120 minutes (aOR 1.43, 95% CI 0.94–2.18; p = 0.09) did not reach the 5% significance level. The model's discrimination was acceptable (AUC 0.78, 95% CI 0.74–0.82). Several points aid interpretation. Compared with the crude estimates, the adjusted odds ratios for delay ≥ 90 minutes fell from 4.42 to 2.31, for severe congestion from 2.71 to 1.61 and for commuting stress from 4.03 to 3.18, which indicates that the exposures partly overlap with one another and with the covariates. Because commuting stress lies on the hypothesised pathway between congestion and distress (Fig. 1), the congestion estimates represent associations not mediated by stress and are expected to be smaller than the total associations. The p-values of 0.08 and 0.09 indicate borderline evidence: the intervals include 1, so the data cannot rule out no association, yet the point estimates point in the same direction as the significant findings. Finally, because high distress was common (25.5%), odds ratios overstate the corresponding relative risks; the crude prevalence ratio for delay ≥ 90 minutes was 3.0 (41.5% versus 13.8%), compared with a crude odds ratio of 4.42. The Discussion considers what these results mean.

Table 6
Multivariable logistic regression for high psychological distress

Predictor	Adjusted OR	95% CI	p-value
Age ≥ 40 years	0.86	0.57–1.30	0.47
Female sex	1.24	0.83–1.85	0.29
Tertiary education	0.89	0.58–1.36	0.59
Employed/self-employed	1.11	0.70–1.77	0.65
Daily commute ≥ 120 min	1.43	0.94–2.18	0.09
Congestion delay 30–59 min	1.21	0.65–2.24	0.55
Congestion delay 60–89 min	1.74	0.94–3.23	0.08
Congestion delay ≥ 90 min	**2.31**	**1.37–3.91**	**0.002**
Severe congestion ≥ 4 days/week	**1.61**	**1.04–2.50**	**0.033**
High commuting stress	**3.18**	**2.08–4.86**	**< 0.001**
Sleep < 6 hours/night	**1.73**	**1.12–2.68**	**0.013**

Bold rows: p < 0.05. Tertiary education is defined as a bachelor's or postgraduate degree. The model was also adjusted for marital status, household income, primary commuting mode and residential LGA.

4. Discussion

4.1 Principal findings

This study shows that, among 624 Lagos commuters, congestion exposure and perceived commuting stress were each associated with psychological distress. The prevalence of high distress rose from 13.8% to 41.5% across categories of daily delay, and after adjustment a delay of ≥ 90 minutes (aOR 2.31), severe congestion on ≥ 4 days per week (aOR 1.61) and high commuting stress (aOR 3.18) remained independently associated with distress, supporting H1–H3. These results indicate that both how much time commuters lose and how they experience the journey are linked to their mental state. Each finding is discussed below in terms of its trend, its meaning, how it compares with earlier work and what it implies.

4.2 Congestion delay and psychological distress

Distress rose in a graded way with daily congestion delay, tripling from 13.8% to 41.5% (Table 4), and the association of delay ≥ 90 minutes with distress persisted after adjustment (aOR 2.31, 95% CI 1.37–3.91). The shape of the gradient suggests a threshold: the 30–59-minute category did not differ clearly from the reference (aOR 1.21, 95% CI 0.65–2.24), whereas the largest increments in prevalence occurred

beyond 60 minutes, and the mean K6 score in the ≥ 90-minute group (14.1) already exceeded the cut-off of 13. In practical terms, distress seems to become common once congestion consumes more than an hour of the day, plausibly because lost time reduces sleep, rest and family life and reduces control over how the day is spent. This direction agrees with systematic reviews linking congestion, delay and commute duration to negative affect and psychophysiological distress [8, 9] and with the wider commuting-and-wellbeing literature [10, 11], and it matches the positive correlation between perceived stress and congestion reported in a small Lagos study [20]. Unlike most of that evidence, which originates in high-income settings [19], our findings extend the association to a large African city and express it against a distress threshold rather than a general wellbeing score. The implication is that interventions aimed at the longest delays, rather than marginal savings on short journeys, may yield the largest mental-health gains, although this needs to be tested.

4.3 Perceived commuting stress

High commuting stress showed the strongest adjusted association with distress (aOR 3.18, 95% CI 2.08–4.86), and its prevalence climbed from 26.9% to 66.9% across delay categories (Table 3). The fall from a crude OR of 4.03 to an adjusted OR of 3.18 shows that part of the association is shared with congestion and the covariates, but a substantial independent association remains. This suggests that the subjective experience of the journey captures psychological burden beyond the time lost in traffic, in line with the view that commuters differ in how they respond to identical conditions. Our results agree with reviews reporting higher perceived stress among public-transport commuters [12] and with evidence that commuting effects spill over into home and work life [9], and they support the use of multimodal scales such as the MCSS [16]. The comparison with the congestion estimates should not be over-read: the two variables are measured on different scales and cut-offs, commuting stress is a plausible mediator, and both were self-reported by the same respondents, which can inflate associations through shared-method bias. The implication is that measures targeting the quality of the journey, such as reliable schedules, commuter information, comfort and safety, may complement efforts to reduce delay, and that perceived stress should be measured alongside objective exposure in future work.

4.4 Severe congestion frequency and commute duration

Frequent severe congestion (≥ 4 days per week) was independently associated with distress (aOR 1.61, 95% CI 1.04–2.50), whereas a commute of ≥ 120 minutes was borderline after adjustment (aOR 1.43, 95% CI 0.94–2.18; p = 0.09) despite a clear crude association (OR 1.94). The weakening of the commute-duration estimate indicates that much of its crude effect overlaps with congestion delay and commuting stress, and it suggests that time lost to congestion, rather than total time travelled, is the more relevant exposure, although collinearity among these indicators limits firm conclusions. The independent signal for the frequency of severe congestion points towards repeated, hard-to-predict disruption as a feature of the commute that matters. This is consistent with reviews that identify commute duration as relevant to emotional wellbeing and mental health [9] and with the call for better evidence on journey reliability [8]; our frequency measure is only a coarse proxy for unpredictability. For planners, the implication is that the frequency of severe disruption should be monitored in addition to average journey times.

4.5 Sleep duration

Sleeping fewer than six hours was independently associated with distress (aOR 1.73, 95% CI 1.12–2.68), although the estimate was smaller than the crude one (OR 2.14). Short sleep and distress are plausibly linked in both directions, since distress disturbs sleep and long or congested journeys can shorten it through early departures and late returns, and a cross-sectional design cannot separate these routes. The finding echoes evidence that long commute times are associated with sleep problems among workers [13] and is consistent with lost restorative time being one pathway from congestion to distress. It implies that measures that protect sleep, such as flexible working hours, may be worth testing alongside transport improvements.

4.6 Prevalence of distress and commuting stress

One in four participants (25.5%) had high distress at a K6 threshold of ≥ 13, and 44.4% had high commuting stress. Because ≥ 13 identifies the more severe end of the distress spectrum [23], this indicates that a sizeable share of working-age Lagos commuters is likely to need support. The prevalence cannot be compared directly with other Nigerian estimates, which used different instruments, thresholds and populations, such as health workers during the COVID-19 pandemic [5] and university students [6], although distress was also common in those samples. The reliability of Kessler-type scales in African samples [18] supports their use here, but the absence of a Lagos-specific validation means that the prevalence should be treated as indicative. The implication is that screening and support for commuters, and for workplaces that employ long-distance commuters, deserve consideration alongside structural measures.

4.7 Implications for policy and practice

Congestion and the commuter experience should be treated as a mental-health concern in Lagos transport and urban planning. In this sample, 47.0% of commuters lost ≥ 60 minutes a day to congestion, the range in which distress rose most sharply, and commuting stress was high in nearly half. Reviews of urban and transport planning argue that reducing car dependence and improving public and active transport can bring health and environmental benefits [3, 4], which supports candidate measures for Lagos such as more reliable and higher-capacity public transport, better multimodal integration, improved commuter information, safer pedestrian infrastructure, reduced unnecessary travel demand and flexible working where feasible. Because evidence on the reliability dimension is still thin [8], such measures should be evaluated, ideally with natural-experiment designs. These findings are relevant to transport agencies, employers and health planners alike: individual-level mental-health services remain a global priority [2], but they are not a substitute for structural improvements to the transport environment.

4.8 Strengths and limitations

The study's main strength is that it measured congestion exposure, perceived commuting stress and a standardised distress outcome in the same 624 commuters, in a setting that is under-represented in the literature, with a confounder set informed by a causal diagram. These features allowed exposure and

experience to be examined together, but several limitations temper the findings. First, the cross-sectional design precludes causal inference, and reverse causation is plausible: people with distress may perceive travel more negatively or choose different commutes. Second, congestion and commuting stress were self-reported and subject to recall and common-method bias; reviews call for objective and physiological measures [9, 12]. Third, the K6 is a screening instrument rather than a diagnostic interview, and its cut-off has not been validated specifically in Lagos. Finally, residual confounding by neighbourhood characteristics, occupational and financial stress, social support and co-exposures such as traffic noise and air pollution [14, 15] is likely. These limitations mean that the associations should be read as correlates rather than effects.

4.9 Future research

Future work should combine GPS-derived travel time, route-level speeds and travel-time variability with repeated psychological assessment, to test whether changes in congestion exposure precede changes in distress. Probability-based sampling, continuous exposure modelling, validation of the MCSS and K6 in Lagos, transparent handling of any missing data, for example by multiple imputation [25], and sensitivity analyses for unmeasured confounding would strengthen causal interpretation. Such studies would show whether the thresholds and pathways suggested here hold up, and would give planners the stronger evidence they need to act.

5. Conclusions

Among adult commuters in Lagos State, greater daily congestion delay, frequent severe congestion and higher perceived commuting stress were independently associated with high psychological distress, and distress rose most steeply once delay exceeded an hour a day. These cross-sectional, self-reported associations do not establish causation, but they indicate that journey reliability and commuter experience deserve attention in urban transport and mental-health policy. Prospective studies with objective mobility measures are needed to determine whether reducing congestion exposure would lower distress.

Declarations

Ethics approval and consent to participate

Ethical approval (LSHREC/2026/0614) was sought from the Lagos State Health Ethics Committee on 20th August, 2026.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author contributions (CRediT)

OVO and AKS conceived and conceptualise the study. AAR and AAO provided guidance on study methodology and writing structure. OVO carried out the data analysis. OOE, AJA, OBJ, ESS and MJ supported the formal analysis, writing, result interpretation, review and editing. AKS supervised the research process.

Use of generative AI

Claude (Anthropic) was used to organise ideas and an approach for the study and to assist with generating pictures. The authors wrote the manuscript, collected the data, performed the analysis, reviewed and edited all text, verified the references, and take full responsibility for the content of the manuscript.

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Availability of data and materials

The questionnaire is publicly available. The dataset and analysis code are available from the corresponding author upon official request.

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Figures

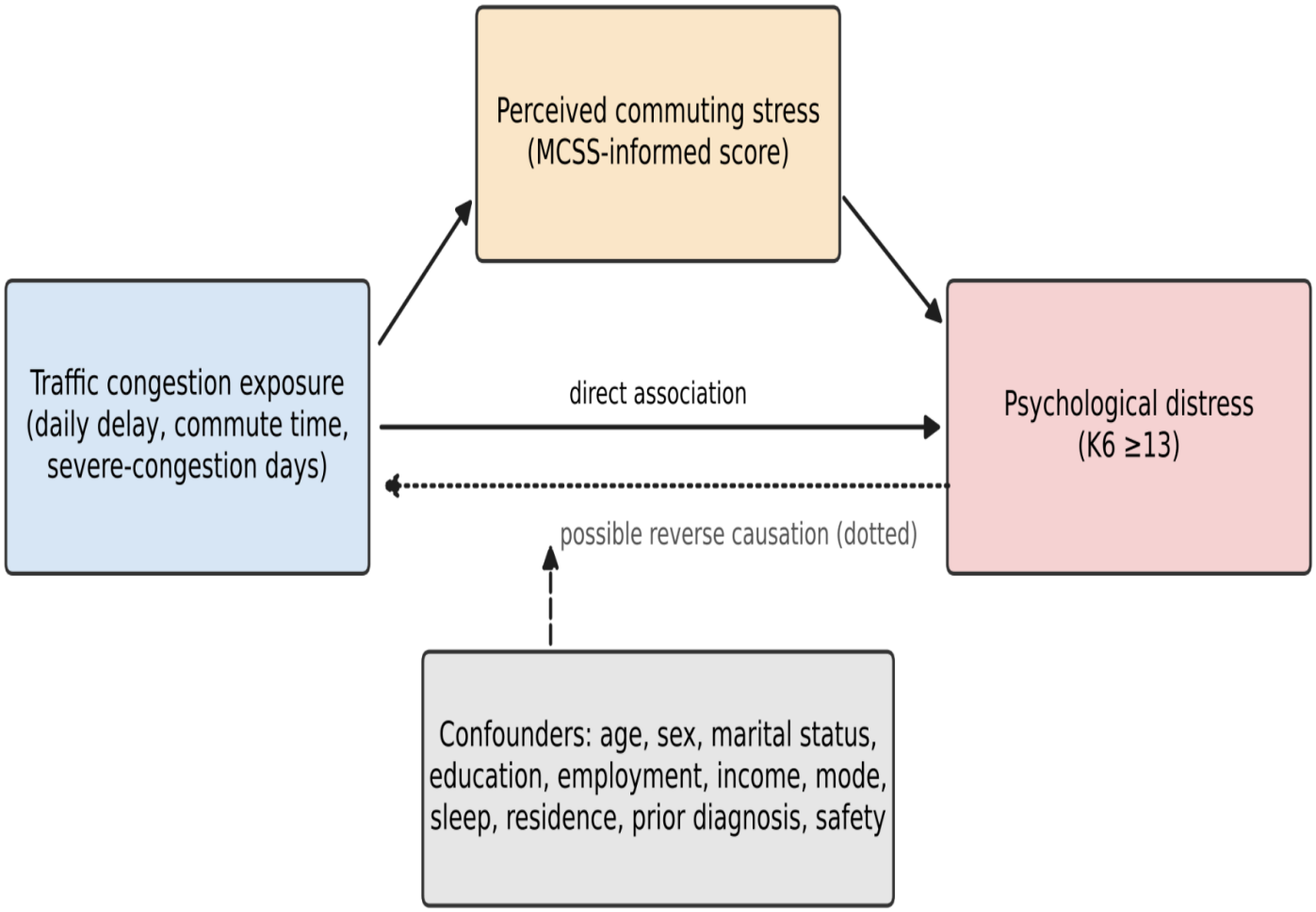


Figure 1

Conceptual framework. Congestion exposure may relate to distress directly and through perceived commuting stress; reverse causation is possible. Adjusting for commuting stress therefore estimates the association not mediated by stress.

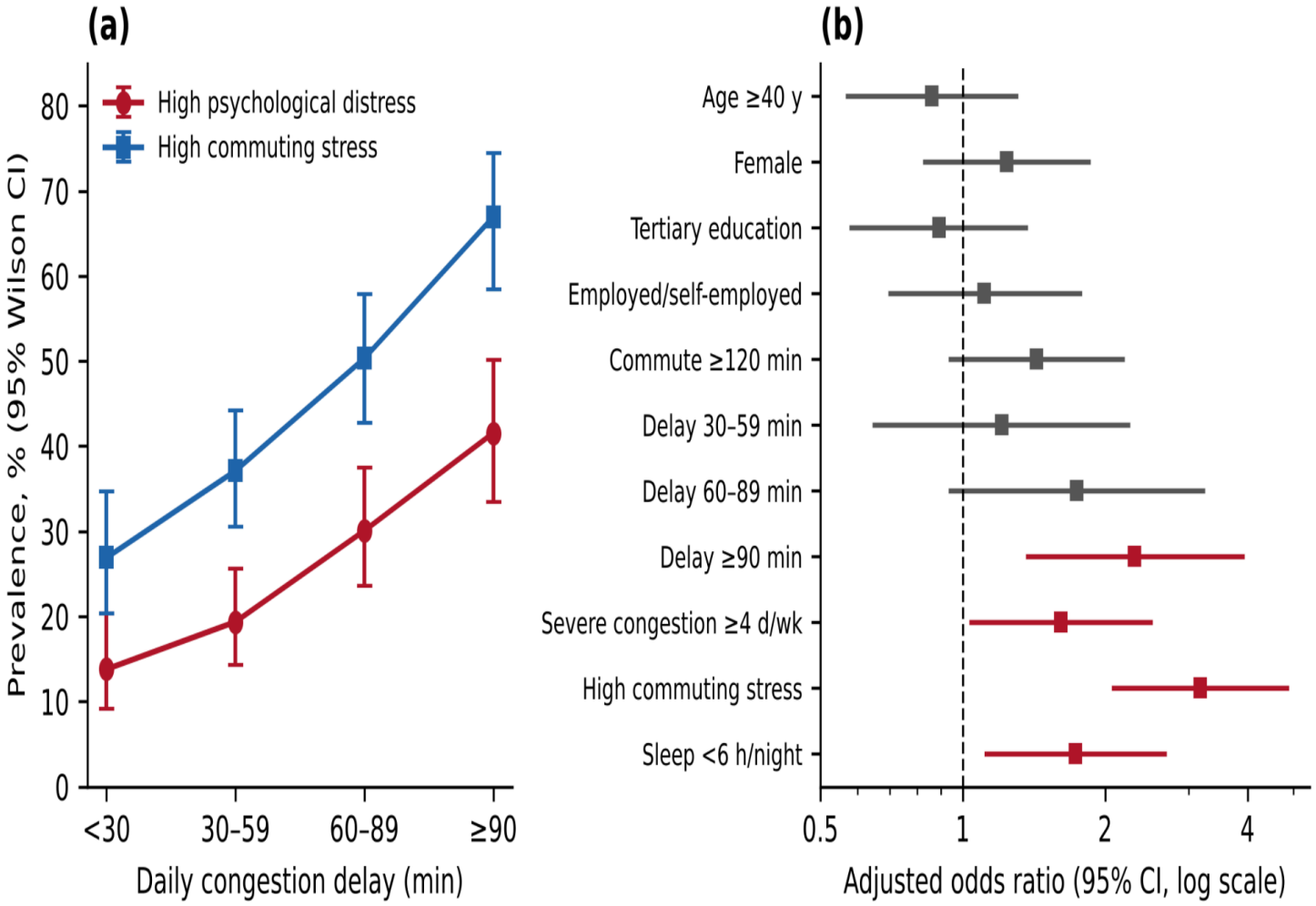


Figure 2

(a) Prevalence of high psychological distress and high commuting stress by daily congestion delay, with 95% Wilson confidence intervals. (b) Adjusted odds ratios (95% CI) from the multivariable model (Table 6); red indicates $p<0.05$.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryFileQuestionnaire.docx