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Weekly social-media duration and body image in a convenience sample of emerging-adult women in Lahore, Pakistan: a cross-sectional study

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Abstract

Background

Duration of social-media use combines heterogeneous exposures and may be a weak proxy for appearance-related experiences. We assessed categorical and monotonic associations with body image among women aged 18–29 years in a Lahore convenience sample.

Methods

This cross-sectional online survey contained 254 source records; consent and age exclusions left 238 eligible participants, and 234 contributed to the common primary-model sample. Body image was an operational 18-item adaptation (range 18–90; higher scores indicate more favorable body image). Ordinary least-squares regression used heteroskedasticity-consistent (HC3) inference. Model 2, adjusted for age, socioeconomic status and recruitment wave, was the primary total-association model; Model 3 additionally conditioned on activity and bullying/teasing as a sensitivity analysis.

Results

The unadjusted exposure omnibus test was unsupported ($F[3,230] = 2.04$, $p=.109$), as was the primary Model 2 test ($F[3,227] = 1.89$, $p=.131$; Benjamini-Hochberg [BH] $p=.131$). In Model 2, differences versus ≤ 3 h/week were 3.47 points for 4–6 h (95% CI 0.47 to 6.47; standardized B = 0.44, 95% CI 0.06 to 0.83), 2.06 for 7–9 h (95% CI -1.19 to 5.30; standardized B = 0.26, 95% CI -0.15 to 0.68), and 3.20 for ≥ 10 h (95% CI -0.16 to 6.57; standardized B = 0.41, 95% CI -0.02 to 0.84). Model 3 had raw $p=.043$ but BH $p=.130$. The original five-category test ($p=.086$), ordinal trend ($p=.311$), factor-score models after multiplicity correction, and all 20 ordinal-trend specifications were unsupported. Median incremental cross-validated R^2 was .0061.

Conclusions

There was no robust monotonic association between weekly social-media duration and body image. Category differences were non-monotonic, adjustment-sensitive and weak for prediction. The approximately 3-4-point estimates have no established minimum clinically important difference or suitable norms. Convenience sampling, self-report exposure, cross-sectional measurement and a structurally limited adapted outcome preclude causal or population-general claims.

Background

Body image includes how people perceive, evaluate and respond to their bodies [1]. Social media can heighten appearance comparison, thin-ideal internalization and concern about feedback, while also

exposing users to diverse or body-positive material. A systematic review documents relevant pathways and substantial variation across activities and platforms [2]. Meta-analytic associations with broad use are small on average [3], and causal reviews emphasize the limits of cross-sectional evidence [4]. Developmental-sociocultural theory suggests that platform features interact with peer salience and gendered appearance norms [5].

Time online is therefore an imperfect stand-in for appearance-related exposure. It cannot separate passive comparison from conversation, idealized imagery from body-positive content, or distress-driven use from use that precedes distress [6, 7]. In a meta-analysis, appearance-focused social-networking features were more strongly related to thin-ideal internalization than broad use [8]. A duration analysis should consequently examine shape, stability, and predictive value rather than rely on one adjusted p value.

Evidence from Pakistan remains comparatively limited despite a sociocultural context in which globalized digital appearance ideals coexist with local norms, family expectations, and socioeconomic constraints [9]. Existing Pakistani studies have linked social-media engagement or photo activity with body-image outcomes, but locally specific evidence remains methodologically heterogeneous [10, 11].

We examined weekly social-media duration and body image among women aged 18–29 years in a convenience sample recruited in Lahore, Pakistan. The term emerging adulthood is used descriptively for this age range, while recognizing that its social meaning and transitions may differ in Pakistan. The analysis estimated categorical associations, checked the adapted outcome's measurement properties, and evaluated monotonicity, sensitivity, wave consistency and predictive contribution. All secondary and factor-score analyses are exploratory.

Methods

Design, setting and participants

We analyzed a cross-sectional Google Forms survey collected in two recruitment waves during 2024 and 2025. Recruitment was online and non-probability based in Lahore. The archived project files do not document the specific platforms or lists used, whether snowballing or incentives were used, the sampling frame, or whether login/IP restrictions or other duplicate-submission controls were enabled. Consequently, a view, participation or response rate cannot be calculated. These details are reported as undocumented.

The source export contained 254 records. Hierarchical exclusions removed three records without valid consent, six with missing or unresolvable age and seven outside 18–29 years, leaving 238 eligible participants. Four records lacked at least one primary-model variable (one exposure, one activity and two bullying records); the common complete-case sample was 234. The sports model used 233 records, and the activity-adjusted sports sensitivity used 232 (Fig. 1). Eligibility beyond consent, self-reported woman/female gender and verified age 18–29 years was not documented in the archived materials.

Measures

Weekly social-media duration was self-reported using the question 'How many hours per week do you spend on social media?' with five categories (< 1, 1–3, 4–6, 7–9 and ≥ 10 h/week). The instrument did not specify whether respondents should report the past week or a typical week; the result is therefore a self-estimated weekly duration. Before modeling, the sparse < 1-hour category (n = 6) was combined with 1–3 hours, yielding ≤ 3, 4–6, 7–9 and ≥ 10 h/week. The original five-category and ordinal codings were retained as sensitivities. Self-reported digital-media duration is often discrepant from logged use [19].

Body image was measured using 18 adapted statements derived from the 19-item Body-Image Questionnaire [12]. Original item 4, concerning masculine/feminine appearance and sex-dependent scoring, was not administered. Bipolar semantic-differential anchors were converted to five agreement responses. Adapted items 1, 2, 3, 4, 7, 10, 12, 14 and 16 were independently confirmed as reverse-scored; all 18 items were required and summed (18–90), with higher values indicating more favorable body image. Changing item wording and response format can alter measurement properties [20]. Accordingly, the total is retained only as an operational, hypothesis-generating composite and not as the original validated questionnaire or a newly validated scale. The survey language, translation/adaptation procedure, pilot testing, adaptation supervision and instrument-permission status were not documented in the archived materials. Future work should consider validated alternatives such as the Body Appreciation Scale-2 [21] or Body Image States Scale [22], selected prospectively for the intended construct.

Model 2 adjusted for age, socioeconomic status and recruitment wave as credible pre-exposure contextual covariates. Model 3 additionally included activity and appearance-related bullying/teasing, measured cross-sectionally and therefore potentially confounders, mediators or colliders. Activity was collapsed to sedentary, lightly active, moderately active and very/super active; bullying was collapsed to Never, Rarely, Sometimes and Often/very often and entered as a four-level categorical factor with three dummy coefficients. The F(3,221) numerator degrees of freedom in Model 3 refer to the three social-media exposure coefficients, not ordinal coding of bullying. Body mass index, depression/anxiety, eating-disorder symptoms, self-esteem, platform, content and engagement were unmeasured (Figure S2).

Statistical analysis

Internal consistency was evaluated using Cronbach's α with a 2,000-replicate percentile bootstrap confidence interval, standardized α, polychoric ordinal α and one-factor McDonald's ω total. A one-factor ordinal confirmatory factor analysis used weighted least squares with mean-and-variance adjustment (WLSMV) and theta parameterization in lavaan. Parallel analysis (500 replications) and minimum-residual exploratory factor analysis (EFA) with oblimin rotation were secondary structural checks. For reviewer-requested exploratory outcomes, three ten Berge factor scores were calculated in the same sample and used in Models 1–3. Complete pattern loadings, communalities, variance, factor

correlations, score determinacy and all factor-score coefficients are reported in Additional file 1. No item was deleted and no residual correlation was added after inspecting fit.

Ordinary least-squares (OLS) models estimated mean differences in the 18-item sum, treated as approximately continuous because it spans 73 possible integer values. HC3 heteroskedasticity-consistent covariance was used because residual variance need not be constant; residual and influence diagnostics are disclosed in Additional file 1. Model 1 was unadjusted. Model 2-the primary total-association model-adjusted for centered age, socioeconomic status and recruitment wave. Model 3 was a conditional sensitivity additionally adjusting for activity and categorical bullying/teasing. All used the same N = 234 sample. Each model's three exposure coefficients were tested jointly; BH correction was applied across these three omnibus tests. Estimates include exact p-values, HC3 95% confidence intervals, and outcome-standard-deviation-standardized coefficients. Achieved precision and an 80%-power design-based minimum detectable contrast based on the observed HC3 standard error are reported without retrospective observed power.

Exploratory secondary HC3 models examined activity, bullying/teasing, sports participation, diet-plan status and body-image discussion, with BH correction across all five omnibus tests. The sports model excluded activity by design; a post hoc activity-adjusted sensitivity was reported adjacent to it. Sensitivities included original five-category exposure, ordinal trend, alternative scoring, influential-response exclusions, straight-line and duplicate-pattern exclusions, MM regression, bootstrap and leave-one-out refits, narrower age ranges, available-case analysis and wave interaction. Repeated stratified 10-fold cross-validation (100 repeats; fixed seeds) estimated incremental predictive performance. No sensitivity validates the adapted outcome. The study was not preregistered. Whether Wave 2 was planned before Wave 1 analysis or involved sequential peeking was not documented.

Results

Participant characteristics

Among 238 eligible participants, mean age was 21.3 years (SD 1.8); 96.2% were single and 82.4% reported middle socioeconomic status. Mean body-image score was 62.15 (SD 7.78; range 41–84). Exposure was available for 237 participants: 36 (15.2%) ≤ 3 h/week, 89 (37.6%) 4–6 h, 43 (18.1%) 7–9 h and 69 (29.1%) ≥ 10 h. Recruitment included 79 participants in 2024 and 159 in 2025; wave-by-exposure descriptives are in Additional file 1. The internet-connected, predominantly student, urban convenience sample is not representative of Lahore or Pakistani women (Table 1; Fig. 1).

Table 1
Participant characteristics in the eligible cohort (N = 238)

Characteristic	Category/statistic	Value	Missing n
Demographic characteristics			
Age, years	Mean (SD)	21.3 (1.8)	0
Socioeconomic status	Low	2 (0.8)	0
	Middle	196 (82.4)	0
	High	40 (16.8)	0
Marital status	Single	229 (96.2)	0
	Married	9 (3.8)	0
Family structure	Extended family	58 (24.7)	3
	Nuclear family	142 (60.4)	3
	Single-parent family	35 (14.9)	3
Participant education	Graduate degree	38 (16.1)	2
	Bachelor's degree	93 (39.4)	2
	Some college	77 (32.6)	2
	High school diploma or equivalent	26 (11.0)	2
	Less than high school	2 (0.8)	2
Behavioral characteristics			
Sports participation	No	97 (41.1)	2
	Yes	139 (58.9)	2
Activity level	Sedentary	77 (32.5)	1
	Lightly active	84 (35.4)	1
	Moderately active	56 (23.6)	1
	Very active	17 (7.2)	1
	Super active	3 (1.3)	1
Appearance-related bullying/teasing	Never	92 (39.0)	2

Note: Values are n (%) unless stated otherwise; percentages use each variable's nonmissing denominator. Higher body-image scores indicate more favorable body image.

Characteristic	Category/statistic	Value	Missing n
Demographic characteristics			
	Rarely	50 (21.2)	2
	Sometimes	61 (25.8)	2
	Often	21 (8.9)	2
	Very often	12 (5.1)	2
Diet-plan status	No	172 (72.6)	1
	Yes	65 (27.4)	1
Exposure			
Weekly social-media exposure	< 1 hour	6 (2.5)	1
	1–3 hours	30 (12.7)	1
	4–6 hours	89 (37.6)	1
	7–9 hours	43 (18.1)	1
	≥ 10 hours	69 (29.1)	1
Recruitment			
Recruitment wave	2024	79 (33.2)	0
	2025	159 (66.8)	0
Outcome			
Body-image composite (18–90)	Mean (SD)	62.2 (7.8)	0

Note: Values are n (%) unless stated otherwise; percentages use each variable's nonmissing denominator. Higher body-image scores indicate more favorable body image.

Outcome measurement properties

All eligible participants had complete item data. Cronbach's α was .770 (95% bootstrap CI .723 to .807), standardized α .778, ordinal α .814 and ω total .827; none establishes unidimensionality. The one-factor ordinal model fit poorly: scaled $\chi^2(135) = 616.30$, $p<.001$; comparative fit index=.785; Tucker-Lewis index=.756; root-mean-square error of approximation=.123 (95% CI .113 to .133); standardized root-mean-square residual=.111. Parallel analysis suggested three factors, and an exploratory three-factor solution explained 40.5% of item variance, but several low communalities and cross-loadings limited interpretation. Ten Berge score determinacy (R^2) was .867, .884 and .767. None of the nine factor-by-model omnibus tests survived BH correction across all nine (minimum adjusted p=.153). These same-sample results are exploratory and do not validate subscales.

Primary association

The primary Model 2 omnibus association was unsupported, F(3,227) = 1.895, p=.131; the unadjusted result was F(3,230) = 2.038, p=.109. Model 3 yielded F(3,221) = 2.754, raw p=.043, but this conditional result did not survive BH correction across the three-model family (adjusted p=.130); no model-level omnibus test had adjusted p<.05. In Model 2, contrasts versus ≤ 3 h/week were 3.47 points for 4–6 h (95% CI 0.47 to 6.47; p=.0236; standardized B=.445, 95% CI .060 to .829), 2.06 for 7–9 h (95% CI -1.19 to 5.30; p=.2128; standardized B=.264, 95% CI − .152 to .679), and 3.20 for ≥ 10 h (95% CI -0.16 to 6.57; p=.0622; standardized B=.411, 95% CI − .021 to .843). The 7-9-hour null and the lower estimate than adjacent categories argue against a monotonic dose response (Table 2; Fig. 2).

Table 2
Weekly social-media exposure and body-image composite across the model sequence

Model	Contrast	B (95% CI)	Std. B (95% CI)	Contrast p	Omnibus p	BH p
Model 1: unadjusted	4–6 vs ≤ 3 hours/week	3.45 (0.48, 6.42)	0.44 (0.06, 0.82)	.023	.109	.131
Model 1: unadjusted	7–9 vs ≤ 3 hours/week	1.98 (-1.29, 5.25)	0.25 (-0.17, 0.67)	.235	.109	.131
Model 1: unadjusted	≥ 10 vs ≤ 3 hours/week	3.36 (0.08, 6.63)	0.43 (0.01, 0.85)	.045	.109	.131
Model 2: primary (age + socioeconomic status + recruitment wave)	4–6 vs ≤ 3 hours/week	3.47 (0.47, 6.47)	0.44 (0.06, 0.83)	.024	.131	.131
Model 2: primary (age + socioeconomic status + recruitment wave)	7–9 vs ≤ 3 hours/week	2.06 (-1.19, 5.30)	0.26 (-0.15, 0.68)	.213	.131	.131
Model 2: primary (age + socioeconomic status + recruitment wave)	≥ 10 vs ≤ 3 hours/week	3.20 (-0.16, 6.57)	0.41 (-0.02, 0.84)	.062	.131	.131
Model 3: conditional sensitivity (+ activity + bullying)	4–6 vs ≤ 3 hours/week	3.84 (0.98, 6.69)	0.49 (0.13, 0.86)	.009	.043	.130
Model 3: conditional sensitivity (+ activity + bullying)	7–9 vs ≤ 3 hours/week	1.85 (-1.32, 5.03)	0.24 (-0.17, 0.64)	.251	.043	.130
Model 3: conditional sensitivity (+ activity + bullying)	≥ 10 vs ≤ 3 hours/week	3.48 (0.19, 6.76)	0.45 (0.02, 0.87)	.038	.043	.130

Note: B values are mean differences relative to ≤ 3 h/week with HC3 95% confidence intervals. Model 2 is primary and adjusts for age, socioeconomic status and recruitment wave. Model 3 additionally conditions on activity and categorical bullying/teasing. BH p is adjusted across the three model-level omnibus tests.

Figure 1 **The diagram reconciles 254 source records, 238 eligible participants, the primary complete-case sample (N = 234), the sports model (N = 233) and the activity-adjusted sports sensitivity (N = 232).**

Figure 2 **Age-, socioeconomic-status- and recruitment-wave-adjusted means with HC3 95% confidence intervals. Higher scores indicate more favorable body image. The 7-9-hour interval overlaps the reference distribution and remains visibly null.**

Secondary and robustness analyses

All five exploratory secondary omnibus tests are reported together. Raw and BH-adjusted p-values were: activity .00022/.00112; appearance-related bullying/teasing .00267/.00668; sports participation .00749/.01248; body-image discussion .17287/.21609; and diet-plan status .95864/.95864. The sports model used N = 233 and estimated 2.65 points (95% CI 0.72 to 4.59; p=.00749); after activity adjustment (N = 232), this attenuated to 1.84 points (95% CI -0.30 to 3.97; p=.09102). Relative to never, the Model 3 coefficient for sometimes experiencing bullying was − 4.46 points (95% CI -6.91 to -2.01), consistent with higher composite scores denoting more favorable body image. These exploratory associations are susceptible to residual confounding and multiplicity and are not causal effects.

The original five-category exposure test was unsupported (p=.08628), as was the ordinal trend (p=.31111) and 16-item outcome (p=.05164). Results were sensitive to post hoc exclusions: Cook's-distance flags p=.00209; the sole straight-line record p=.04989488668224253; duplicate-pattern flags p=.04287; and MM regression p=.06692. No records were excluded from the primary model on diagnostic grounds. Across 234 leave-one-out refits, omnibus p-values ranged .009-.071. The exposure-by-wave interaction was unsupported (p=.503), but the study was not designed or powered to establish absence of moderation. These mixed findings do not rescue the primary null result.

All 20 exploratory ordinal-trend confidence intervals included zero (median standardized estimate .084; range .071-.099), consistent with the prespecified ordinal trend p=.311. In repeated stratified 10-fold cross-validation, adding categorical duration changed R^2 by a median .0061 (mean .0056; 2.5th-97.5th percentile − .0066 to .0177) and improved root-mean-square error by a median .024. The predictive contribution was very small (Fig. 3; Additional file 1).

Figure 3 **Panel A displays model-adjusted mean composite scores across weekly-duration categories. Panel B summarizes standardized exploratory ordinal-trend estimates across 20 specifications; all confidence intervals include zero. Panel C summarizes incremental**

Panel A displays model-adjusted mean composite scores across weekly-duration categories. Panel B summarizes standardized exploratory ordinal-trend estimates across 20 specifications; all confidence intervals include zero. Panel C summarizes incremental cross-validated R^2 across 100 repeated stratified 10-fold analyses. These diagnostics do not supersede the primary Model 2 result.

Discussion

We found no robust monotonic association between weekly social-media duration and body image. The unadjusted and primary Model 2 omnibus tests were unsupported; a raw Model 3 signal did not survive correction across the model family. Contrasts were non-monotonic, with a null 7-9-hour category, and duration added approximately .006 to cross-validated R^2. Total time is therefore a weak, nonspecific marker of mixed online experiences rather than a causal dose.

This interpretation is consistent with the small average association reported in meta-analysis [3] and with reviews emphasizing heterogeneity in activities and content [2, 4]. Appearance comparison, thin-ideal internalization, photo engagement and feedback are closer to the proposed mechanisms than duration itself [8, 13, 14]. Body-positive posts can also improve aspects of body satisfaction in the short term [15]. Combining these experiences into one duration category can readily produce a weak or non-monotonic association.

Activity, bullying/teasing and sports showed stronger exploratory relationships. The negative bullying coefficients are directionally coherent because higher outcome scores are more favorable. However, activity and bullying were measured concurrently and may be confounders, mediators or colliders. Sports attenuated after activity adjustment, indicating that the planned secondary estimate did not isolate a stable activity-independent association.

The adapted outcome was internally consistent but not unidimensional. The omitted item, rewritten statement format and altered anchors can change the construct and its score distribution. Same-sample EFA factor scores were also structurally imperfect and did not produce multiplicity-robust exposure findings. The 18-item total should therefore be viewed only as an operational composite. Prospectively selected and locally evaluated instruments such as BAS-2 or BISS would provide a firmer measurement basis.

Strengths and limitations

Strengths include a frozen-source reproducible pipeline, independent scoring verification, common-sample model comparison, HC3 inference, explicit model-family and secondary-family multiplicity correction, complete reporting of unfavorable results, exploratory factor-score analyses, achieved-precision estimates, repeated cross-validation and disclosed diagnostics.

Limitations are substantial. Convenience recruitment of an internet-connected, predominantly student, urban sample creates volunteer, selection and non-response bias and prevents population or national inference. Because invitations/views were not logged against a defined sampling frame, a response rate is not calculable. Self-reported duration is prone to recall and category misclassification and may correlate poorly with logged use [19]. Outcome and exposure were reported in the same survey at the same time, creating common-method variance. Cross-sectional timing leaves reverse causation unresolved. Body mass index, depression/anxiety, eating-disorder symptoms, self-esteem, platform, content, engagement and other social context were unmeasured; their omission could bias estimates in either direction. Activity and bullying may be downstream or collider variables. The reference category was small, Wave 1 was imprecise, and wave planning/peeking was undocumented. The adapted outcome lacked unidimensional fit, appropriate norms and an established minimum clinically important difference (MCID); therefore, approximately 3–4 points cannot be interpreted as clinically or practically important. Sensitivity analyses do not validate the score or establish causality.

Conclusions

In this Lahore convenience sample, weekly social-media duration was not robustly or monotonically associated with body image and contributed little to prediction. The data do not show that longer use improves body image. Longitudinal, preregistered studies should use validated and locally evaluated body-image instruments, logged or well-anchored duration measures, and direct assessments of content, comparison, engagement, mental health and body mass index.

Abbreviations

BAS-2
Body Appreciation Scale-2
BH
Benjamini-Hochberg
BISS
Body Image States Scale
CFA
confirmatory factor analysis
CFI
comparative fit index
CI
confidence interval
EFA
exploratory factor analysis
FDR
false-discovery rate
HC3
heteroskedasticity-consistent covariance estimator 3
MAE
mean absolute error
MCID
minimum clinically important difference
OLS
ordinary least squares
RMSEA
root-mean-square error of approximation
RMSE
root-mean-square error
SD
standard deviation
SRMR

standardized root-mean-square residual
TLI
Tucker-Lewis index
WLSMV
weighted least squares with mean-and-variance adjustment.

Declarations

Ethics approval and consent to participate
Ethical approval for this study was obtained from the Institutional Review Board of Azra Naheed Medical College, Lahore, Pakistan. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki. Electronic informed consent was obtained from all participants prior to completing the survey.

Consent for publication
Not applicable.

Availability of data and materials
The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests
The authors declare that they have no competing interests.

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Authors' contributions

TA contributed to conceptualization, methodology, formal analysis, software, visualization, validation, project administration, writing the original draft, and reviewing and editing the manuscript. FK contributed to conceptualization, investigation, data curation, project administration, writing the original draft, and reviewing and editing the manuscript. AIm, AyM, AbM and HA contributed to investigation, data curation, resources, validation, and reviewing and editing the manuscript. All authors approved the final manuscript and accept accountability for their contributions. Adaptation supervision was not documented in the archived materials.

Authors' information

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Figures

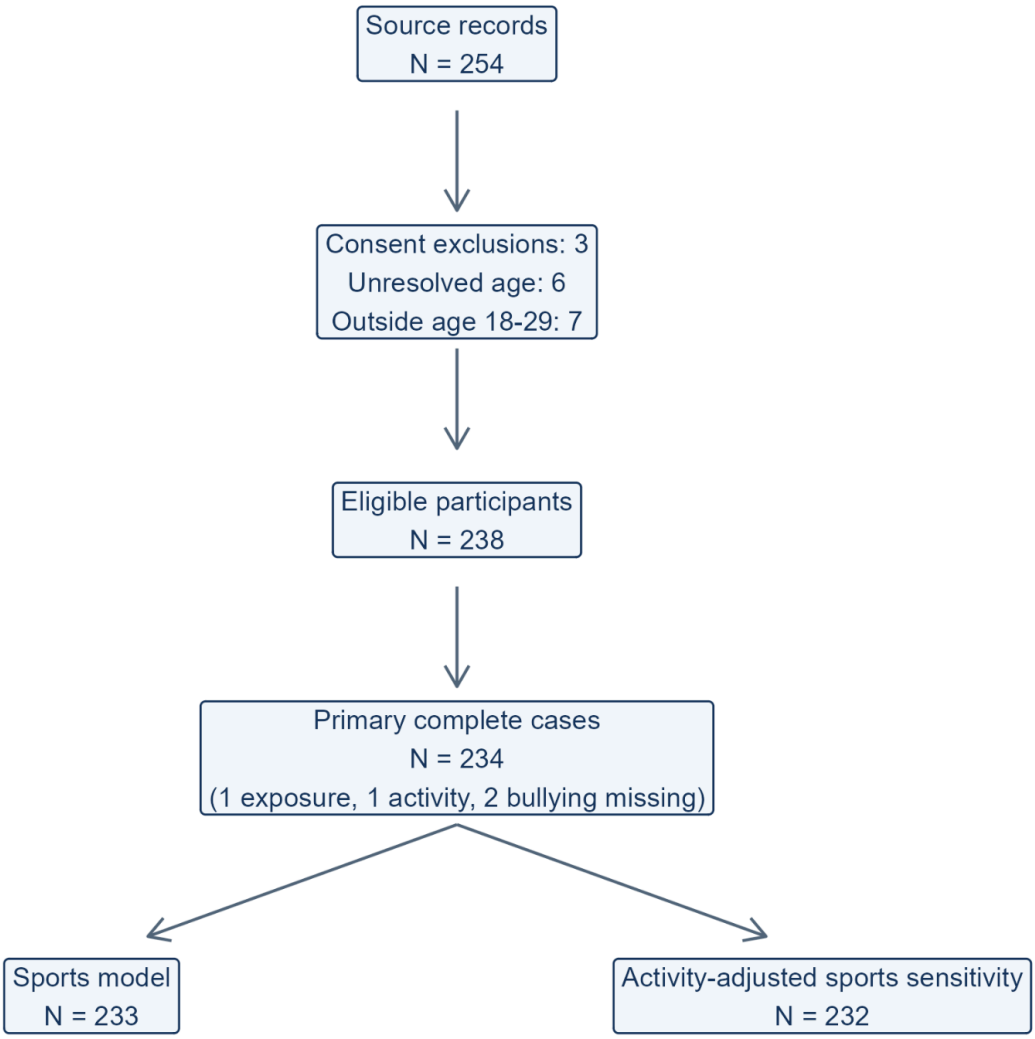


Figure 1

Participant flow and analysis-specific sample sizes.

The diagram reconciles 254 source records, 238 eligible participants, the primary complete-case sample (N=234), the sports model (N=233) and the activity-adjusted sports sensitivity (N=232).

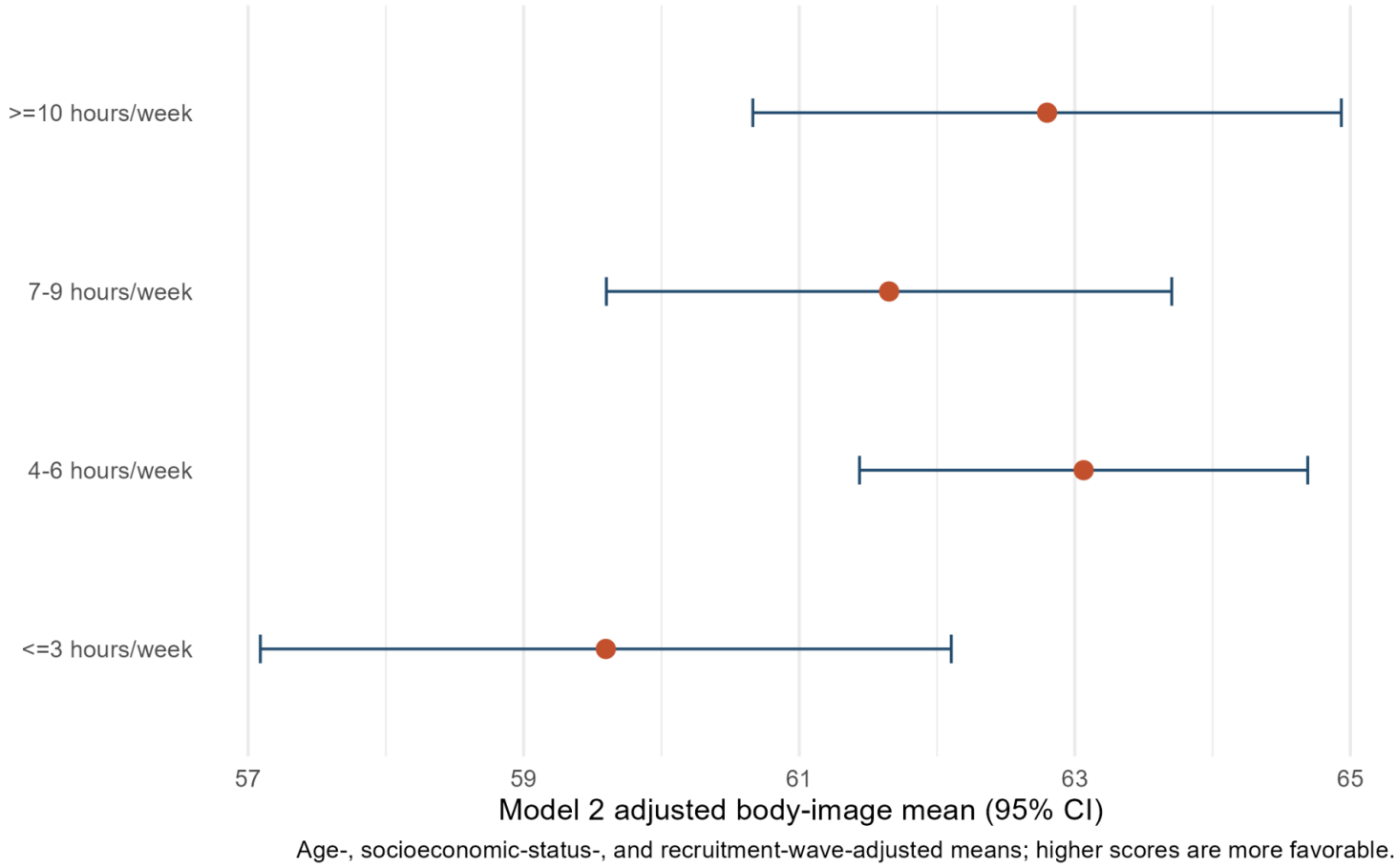


Figure 2

Model 2 adjusted body-image means.

Age-, socioeconomic-status- and recruitment-wave-adjusted means with HC3 95% confidence intervals. Higher scores indicate more favorable body image. The 7-9-hour interval overlaps the reference distribution and remains visibly null.

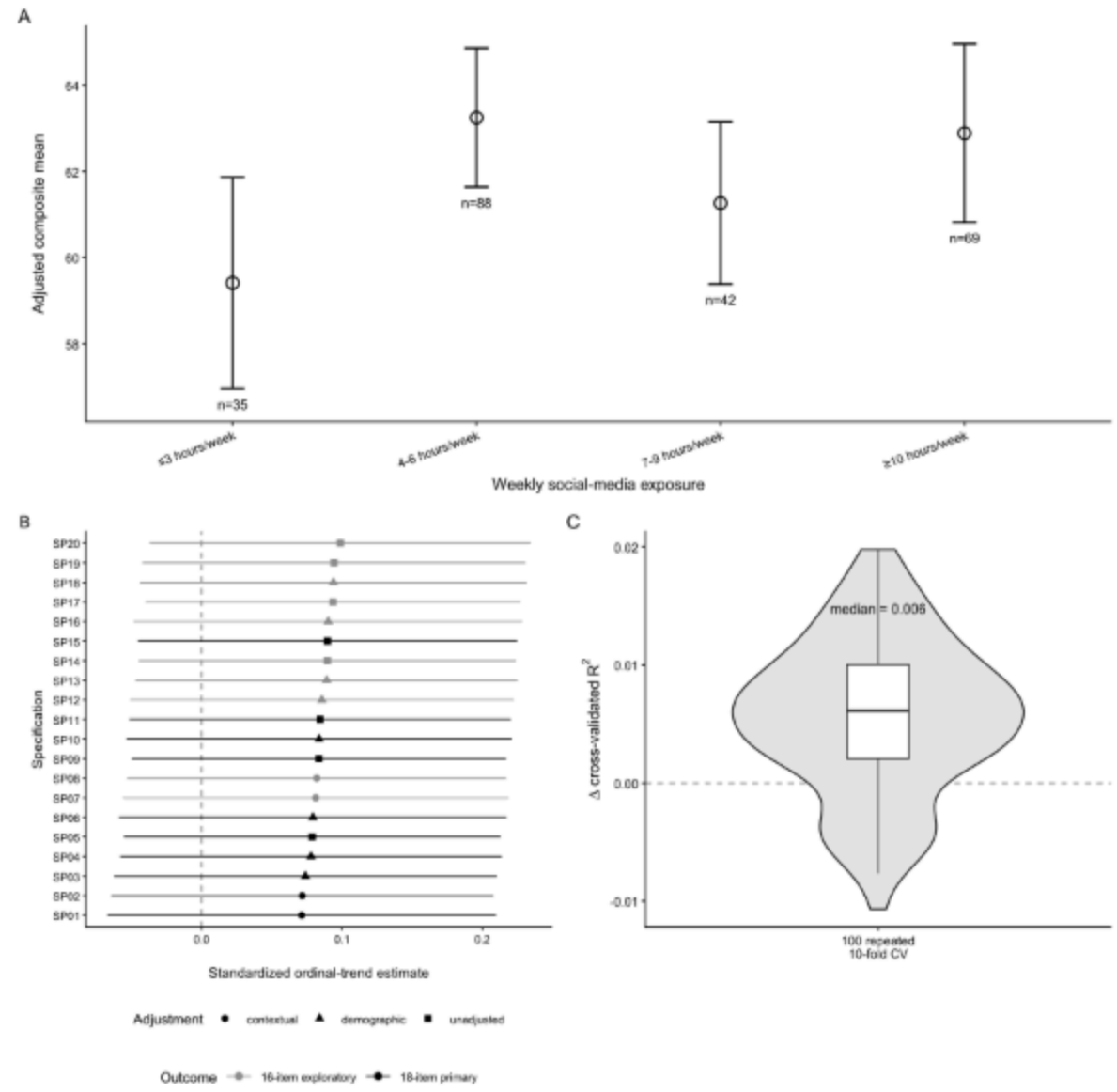


Figure 3

Exploratory specification and prediction diagnostics.

Panel A displays model-adjusted mean composite scores across weekly-duration categories. Panel B summarizes standardized exploratory ordinal-trend estimates across 20 specifications; all confidence intervals include zero. Panel C summarizes incremental.

Supplementary Files

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

- Additionalfile1SupplementaryAppendix.docx
- Additionalfile2RReproducibilityPackage.zip