SCROLLING THROUGH STRATIFICATION

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http://octopusresearch.tools

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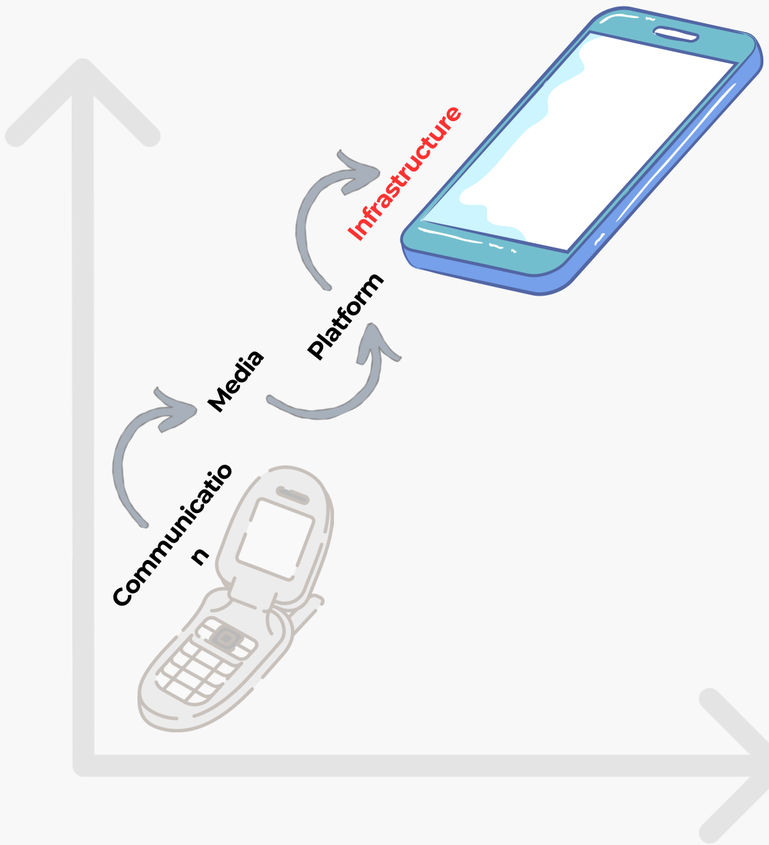
“If (almost) everyone has a smartphone, why does digital inequality still exist?”

Why this research now?



Smartphones = foundational layer of social life

Ubiquitous, pervasive, always-on

But usage is not uniform

Research still relies mostly on self-reports

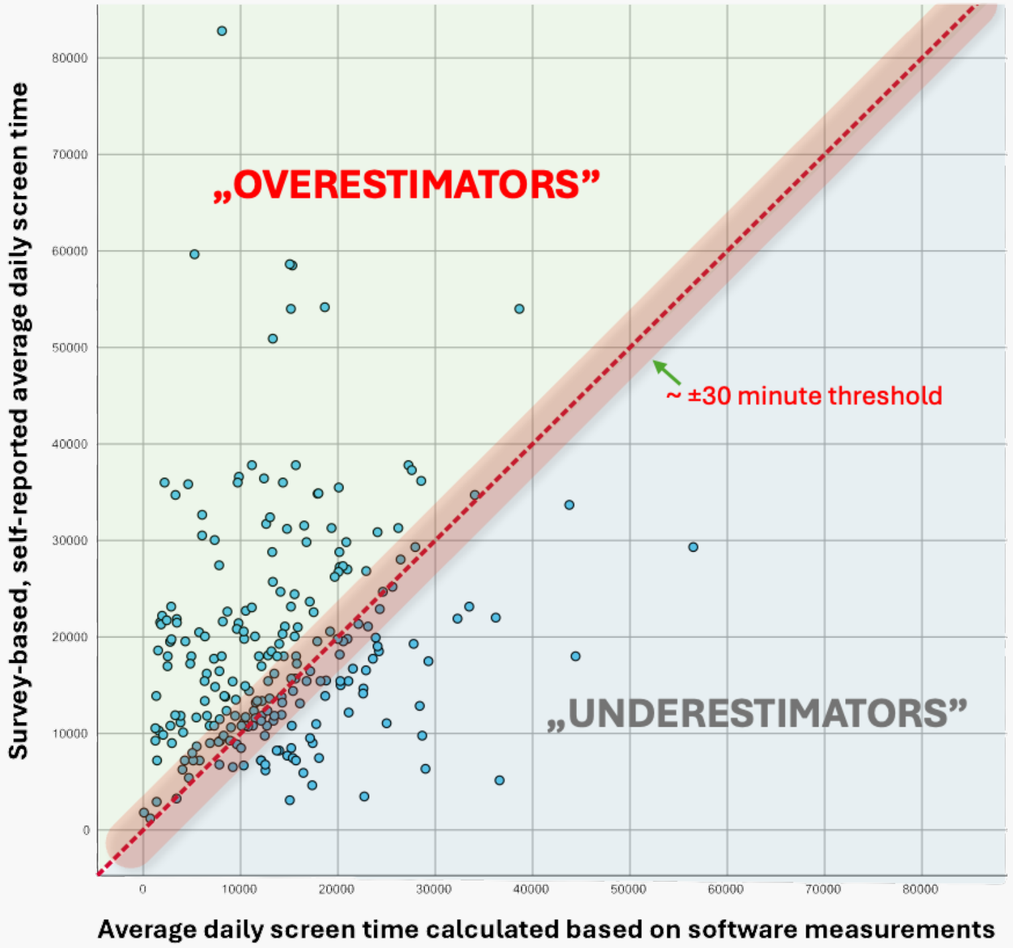
The missing link in digital divide research

Digital inequality (now) shaped by:

- Differences in use, not access
- Functional vs. entertainment patterns
- Digital capital & unequal outcomes

We know surprisingly little about the structure of actual everyday digital practices...

The measurement gap



Self-reports fail because:

- People overestimate (or underestimate) use
- Fragmented sessions hard to recall
- App categories remembered poorly
- No insight into rhythms or sequences

We need observed behavior...

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High -resolution smartphone telemetry with traditional survey measures.

The data:

- 498 adult smartphone users
- Representative online sample, collected in March -May, 2024
- ~17 days per person
- ~10.6 million OS log events (Android only)
- App episodes + screen sessions
- Linked to occupational data (ESeC)
- **Ecological validity**

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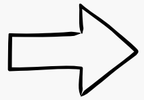
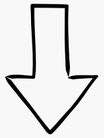
The pipeline from raw log data to meaningful behavioural data

Name of the event	Description of the event
ACTIVITY_PAUSED	An event type that indicates that an activity has been moved to the background.
ACTIVITY_RESUMED	An event type that indicates that an activity has been moved to the foreground.
ACTIVITY_STOPPED	An event type that indicates that an activity has become invisible in the UI.
CONFIGURATION_CHANGE	An event type that indicates a change in device configuration.
DEVICE_SHUTDOWN	An event type that indicates that Android is running.
DEVICE_STARTUP	An event type that indicates that Android runtime has started.
FOREGROUND_SERVICE_START	An event type that indicates that a foreground service has started.
FOREGROUND_SERVICE_STOP	An event type that indicates that a foreground service has stopped.
SCREEN_INTERACTIVE	An event type that indicates that the screen has entered an interactive state (enabled for full user interaction, rather than ambient display or other non-interactive states).
SCREEN_NON_INTERACTIVE	An event type that indicates that the screen has entered a non-interactive state (completely turned off or switched to a non-interactive state, such as ambient display).
USER_INTERACTION	An event type that indicates that the user has interacted with a package in some way.



seq_id	seq_nrcid	nrcid	appname	packagename	eventtype	savedtime
5992118	111692	19698	com.google.android.apps.auto.carservice.gmscorecompat.CarStartupServiceImpl	com.google.android.projection.gearhead	Foreground_Service_Start	2024-05-02T14:37:56Z
5992119	111692	19698		android	Screen_Interactive	2024-05-02T14:40:59Z
5992120	111692	19698	com.sec.android.app.launcher.Launcher	com.sec.android.app.launcher	Activity_Resumed	2024-05-02T14:41:00Z
5992121	111692	19698	com.google.android.apps.auto.carservice.gmscorecompat.CarStartupServiceImpl	com.google.android.projection.gearhead	Foreground_Service_Stop	2024-05-02T14:41:09Z
5992122	111692	19698	com.sec.android.app.launcher.Launcher	com.sec.android.app.launcher	Activity_Paused	2024-05-02T14:41:13Z
5992123	111692	19698	com.waze.FreeMapAppActivity	com.waze	Activity_Resumed	2024-05-02T14:41:13Z
5992124	111692	19698	com.waze.WazeAppService	com.waze	Foreground_Service_Start	2024-05-02T14:41:14Z
5992125	111692	19698	com.waze.FreeMapAppActivity	com.waze	Activity_Paused	2024-05-02T14:41:14Z
5992126	111692	19698	com.waze.MainActivity	com.waze	Activity_Resumed	2024-05-02T14:41:14Z
5992127	111692	19698	com.sec.android.app.launcher.Launcher	com.sec.android.app.launcher	Activity_Stopped	2024-05-02T14:41:14Z
5992128	111692	19698	com.waze.MainActivity	com.waze	Activity_Paused	2024-05-02T14:41:24Z
5992129	111692	19698	com.waze.navigate.location_preview.LocationPreviewActivity	com.waze	Activity_Resumed	2024-05-02T14:41:24Z
5992130	111692	19698	com.waze.MainActivity	com.waze	Activity_Stopped	2024-05-02T14:41:25Z
5992131	111692	19698	com.waze.navigate.location_preview.LocationPreviewActivity	com.waze	Activity_Paused	2024-05-02T14:41:41Z
5992132	111692	19698	com.waze.MainActivity	com.waze	Activity_Resumed	2024-05-02T14:41:41Z
5992133	111692	19698	com.waze.WazeAppService	com.waze	Foreground_Service_Start	2024-05-02T14:41:43Z
5992134	111692	19698	com.waze.MainActivity	com.waze	Activity_Paused	2024-05-02T14:41:51Z
5992135	111692	19698	com.waze.routes.RoutesActivity	com.waze	Activity_Resumed	2024-05-02T14:41:51Z
5992136	111692	19698	com.waze.routes.RoutesActivity	com.waze	Activity_Paused	2024-05-02T14:41:57Z



nrcid int	appname str	packagename str	session_id int	episode_id int	start_time POSIXct	end_time POSIXct	end_re... str	duration_sec int
19932	Dialer/telephony app.	com.asus.dialer	1	1	2024-04-12 19:45:07	2024-04-12 19:45:09	switch	2
19932	Asus home launcher.	com.asus.launcher	1	2	2024-04-12 19:45:09	2024-04-12 19:45:11	switch	2
19932	K-9 Mail	com.fsck.k9	1	3	2024-04-12 19:45:11	2024-04-12 19:45:25	stopped	14
19932	K-9 Mail	com.fsck.k9	3	1	2024-04-12 19:51:16	2024-04-12 19:51:35	switch	19
19932	Asus home launcher.	com.asus.launcher	3	2	2024-04-12 19:51:35	2024-04-12 19:51:36	screen_off	1
19932	Asus home launcher.	com.asus.launcher	6	1	2024-04-12 20:31:48	2024-04-12 20:32:08	switch	20
19932	Google Chrome	com.android.chrome	6	2	2024-04-12 20:32:08	2024-04-12 20:33:53	switch	105
19932	Asus home launcher.	com.asus.launcher	6	3	2024-04-12 20:33:53	2024-04-12 20:34:16	switch	23
19932	Google Chrome	com.android.chrome	6	4	2024-04-12 20:34:16	2024-04-12 20:35:27	switch	71
19932	Asus home launcher.	com.asus.launcher	6	5	2024-04-12 20:35:27	2024-04-12 20:38:46	switch	199
19932	Core OS package inst…	com.google.android.…	6	6	2024-04-12 20:38:46	2024-04-12 20:38:59	switch	13
19932	Android permission c…	com.google.android.…	6	8	2024-04-12 20:39:50	2024-04-12 20:39:52	switch	2
19932	Android permission c…	com.google.android.…	6	10	2024-04-12 20:39:53	2024-04-12 20:39:56	stopped	3
19932	Android permission c…	com.google.android.…	6	12	2024-04-12 20:40:10	2024-04-12 20:40:20	switch	10
19932	Android permission c…	com.google.android.…	6	14	2024-04-12 20:40:23	2024-04-12 20:40:27	switch	4
19932	System settings app.	com.android.settings	6	16	2024-04-12 20:40:31	2024-04-12 20:40:44	switch	13
19932	System settings app.	com.android.settings	6	18	2024-04-12 20:41:02	2024-04-12 20:41:11	switch	9
19932	Android permission c…	com.google.android.…	6	19	2024-04-12 20:41:11	2024-04-12 20:41:26	switch	15
19932	System settings app.	com.android.settings	6	20	2024-04-12 20:41:26	2024-04-12 20:41:27	switch	1
19932	System settings app.	com.android.settings	6	22	2024-04-12 20:41:39	2024-04-12 20:41:42	switch	3
19932	Android permission c…	com.google.android.…	6	23	2024-04-12 20:41:42	2024-04-12 20:41:57	switch	15
19932	System settings app.	com.android.settings	6	24	2024-04-12 20:41:57	2024-04-12 20:41:59	switch	2
19932	Asus home launcher.	com.asus.launcher	6	26	2024-04-12 20:42:36	2024-04-12 20:42:45	switch	9

Condensed five -category version of the European Socio -economic Classification (ESeC) scheme

ESeC category	Typical occupations	Nature of employment relationship	Social status characteristics	Sample %
Higher-level Service Class (Higher Salariat)	university lecturer, engineer, lawyer, company manager, doctor	"Service relationship" – long-term security, autonomous decision-making	High social status, stable and rising income	8%
Lower-level Service Class (Lower Salariat)	teacher, accountant, IT specialist, HR specialist, middle manager	Modified service relationship – high professional knowledge, but limited autonomy	Upper-middle class status, stable income	30%
Intermediate Class	administrator, dispatcher, secretary, office manager, shift supervisor	Mixed regulation – partly service, partly employment contract relationship	Middle class, moderate security, organizational dependence	18%
Skilled Workers	locksmith, mechanic, electrician, driver, maintenance worker	Modified employment contract – technical qualifications, but low decision-making autonomy	Lower-middle class, stable physical employment	13
Unskilled Workers	cleaner, salesperson, public worker, factory worker, operator	Basic employment contract – low qualifications, easily replaceable workforce	Basic employment contract – low qualifications, easily replaceable workforce	30%

Research questions

1

Do occupational groups differ in their use of smartphones?

How does total smartphone screen time vary across occupational groups in Hungary? Does time spent on the device reflect structured differences in work routines, lifestyles, and access to digital resources?

2

Is inequality about how long or what for?

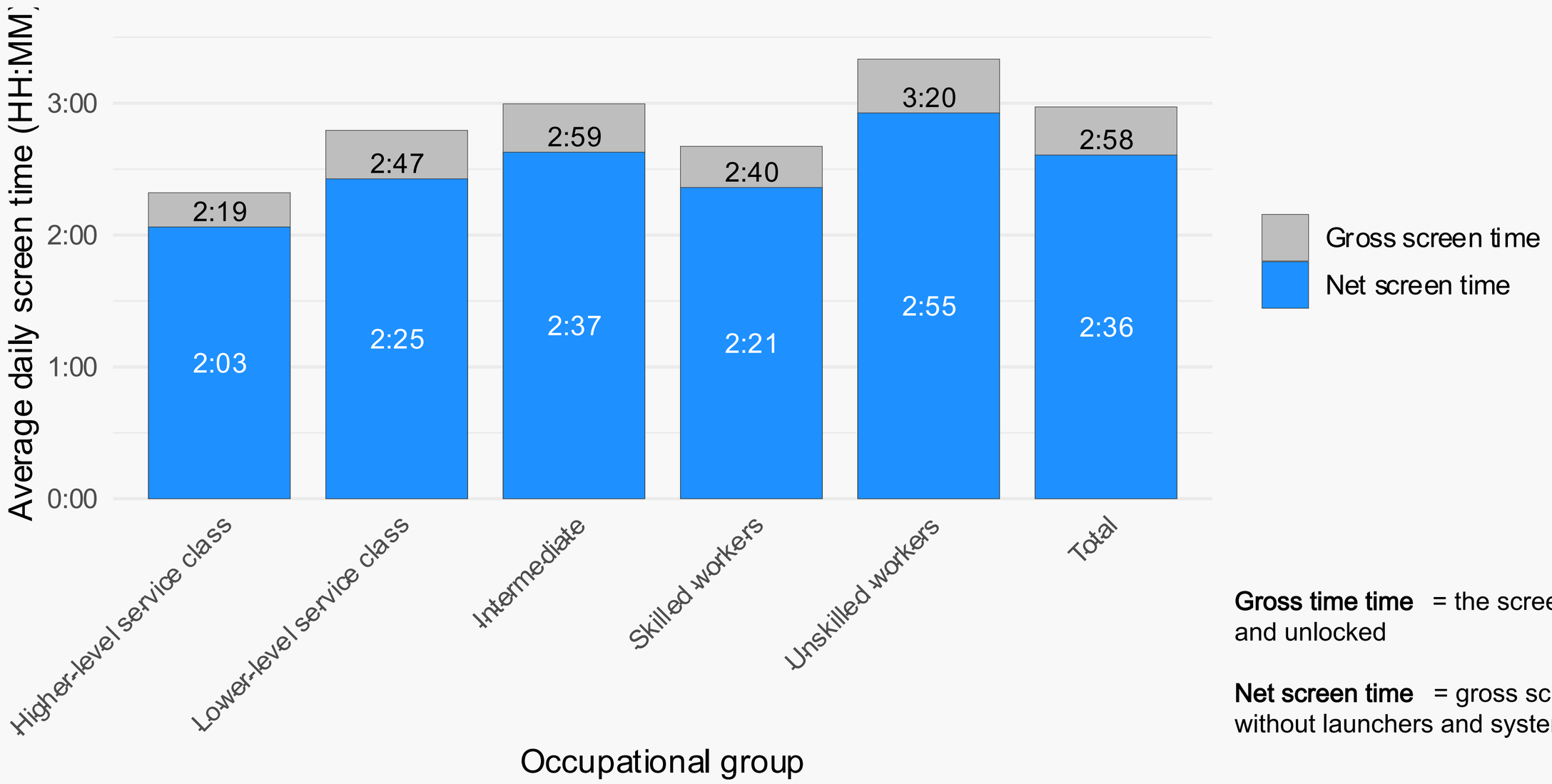
To what extent do patterns of app usage differ by occupational status? Are higher - status occupations associated with more “capital -enhancing” uses, while lowerstatus occupations are linked to leisure-oriented and entertainment use?

3

Can we identify distinct digital lifestyles and link them to occupational stratification?

How do telemetry -derived clusters of smartphone use, combined with survey context, reveal structural patterns of digital behavior and their links to social and occupational stratification?

RQ1: Screen time



Gross time time = the screen was on and unlocked

Net screen time = gross screen time without launchers and system apps

RQ1: Screen time

Table 1: OLS regression predicting log(*avg_daily_screen_time_net*)

Variable	Estimate	Std. Error	t	p
Intercept	9.5671***	0.1311	72.95	< .001
TFR5 = Higher-level service class	-0.1029	0.1072	-0.96	0.338
TFR5 = Lower-level service class	-0.0152	0.0632	-0.24	0.810
TFR5 = Intermediate	-0.0554	0.0742	-0.75	0.455
TFR5 = Skilled workers	-0.0010	0.0830	-0.01	0.991
Age (years)	-0.0153***	0.0031	-4.92	< .001
Female (vs. male)	-0.0280	0.0368	-0.76	0.448
Avg. daily screen time on other devices (min)	-0.0005**	0.0002	-2.64	0.009
Residual SE: 0.717 (df = 445)				
Multiple $R^2 = 0.103$, Adjusted $R^2 = 0.089$				
$F(7, 445) = 7.31$, $p < .001$				

Note. Dependent variable: log(*avg_daily_screen_time_net*).
TFR5 is entered as a set of dummies with *Unskilled workers* as the reference category.
24 observations deleted due to missingness. Weighted least squares (weight = `suly`).
Significance: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Occupational differences in screen time → disappear after controls

Age = strongest predictor

Smartphone vs laptop/tablet substitution

Intensity ≠ digital inequality

Screen time is a poor indicator of digital inequality

Temporal rhythms: Surprisingly universal

Daypart	Daytype	Higher-level service	Lower-level service class	Inter-mediate	Skilled workers	Unskilled workers
Early morning (05:00 – 08:59)	*Weekday*	11%	10%	9%	13%	11%
Morning (09:00 – 11:59)	*Weekday*	20%	21%	21%	20%	22%
Afternoon (12:00 – 17:59)	*Weekday*	30%	31%	29%	27%	29%
Evening leisure (18:00 – 21:59)	*Weekday*	22%	22%	25%	26%	24%
Late evening (22:00 – 23:59)	*Weekday*	14%	12%	13%	11%	11%
Night (00:00 – 04:59)	*Weekday*	4%	4%	3%	4%	4%
	Total	**100%**	**100%**	**100%**	**100%**	**100%**
Early morning (05:00 – 08:59)	*Weekend*	8%	7%	9%	13%	10%
Morning (09:00 – 11:59)	*Weekend*	20%	24%	21%	24%	26%
Afternoon (12:00 – 17:59)	*Weekend*	28%	27%	28%	28%	25%
Evening leisure (18:00 – 21:59)	*Weekend*	24%	25%	25%	24%	24%
Late evening (22:00 – 23:59)	*Weekend*	13%	12%	14%	10%	12%
Night (00:00 – 04:59)	*Weekend*	6%	5%	4%	3%	4%
	Total	**100%**	**100%**	**100%**	**100%**	**100%**

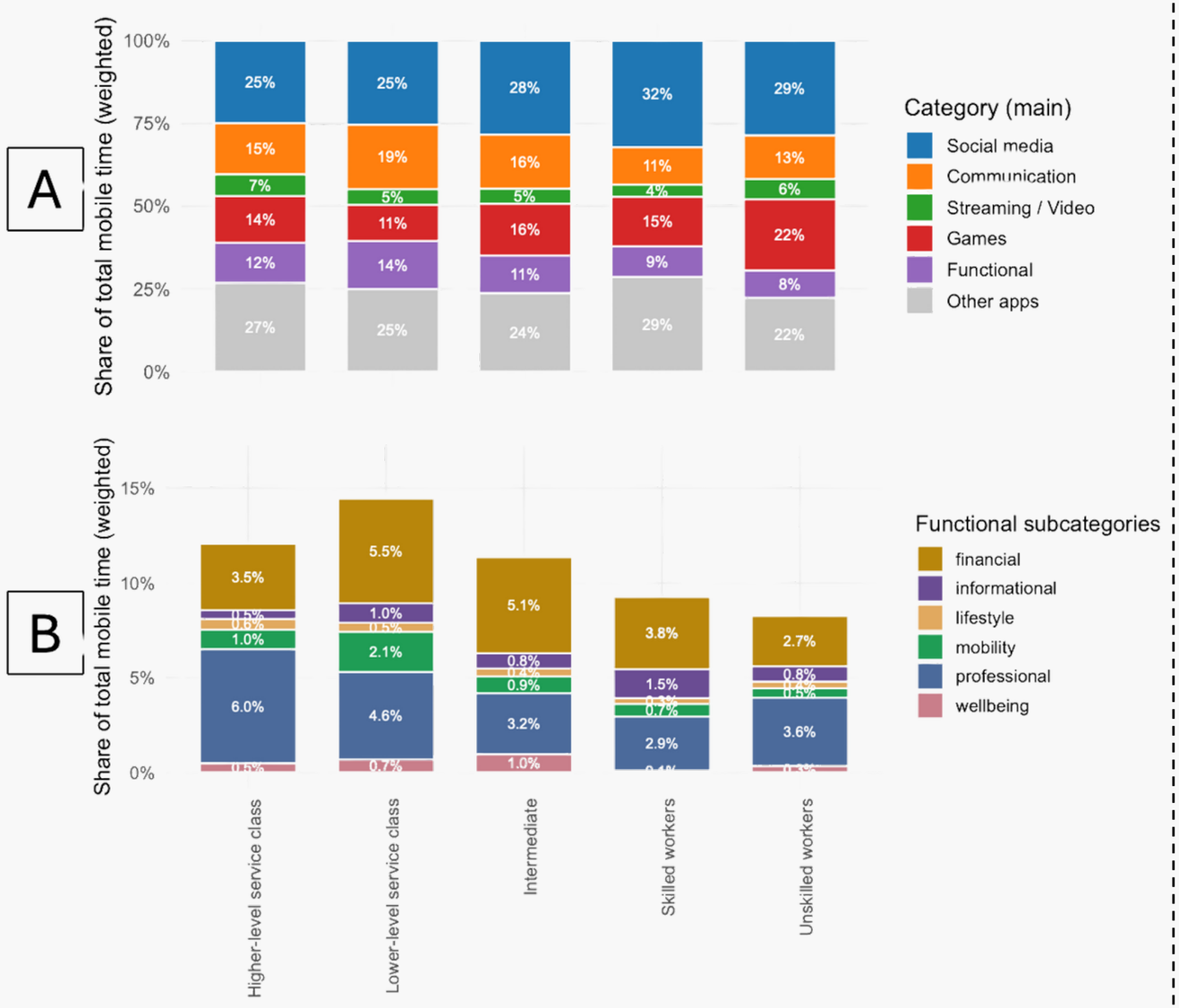
"Evening leasure" peaks

Skilled workers vs. all others (?)

Only small occupational differences.

RQ2: App (category) use composition

Proportional app category screen time in occupational groups

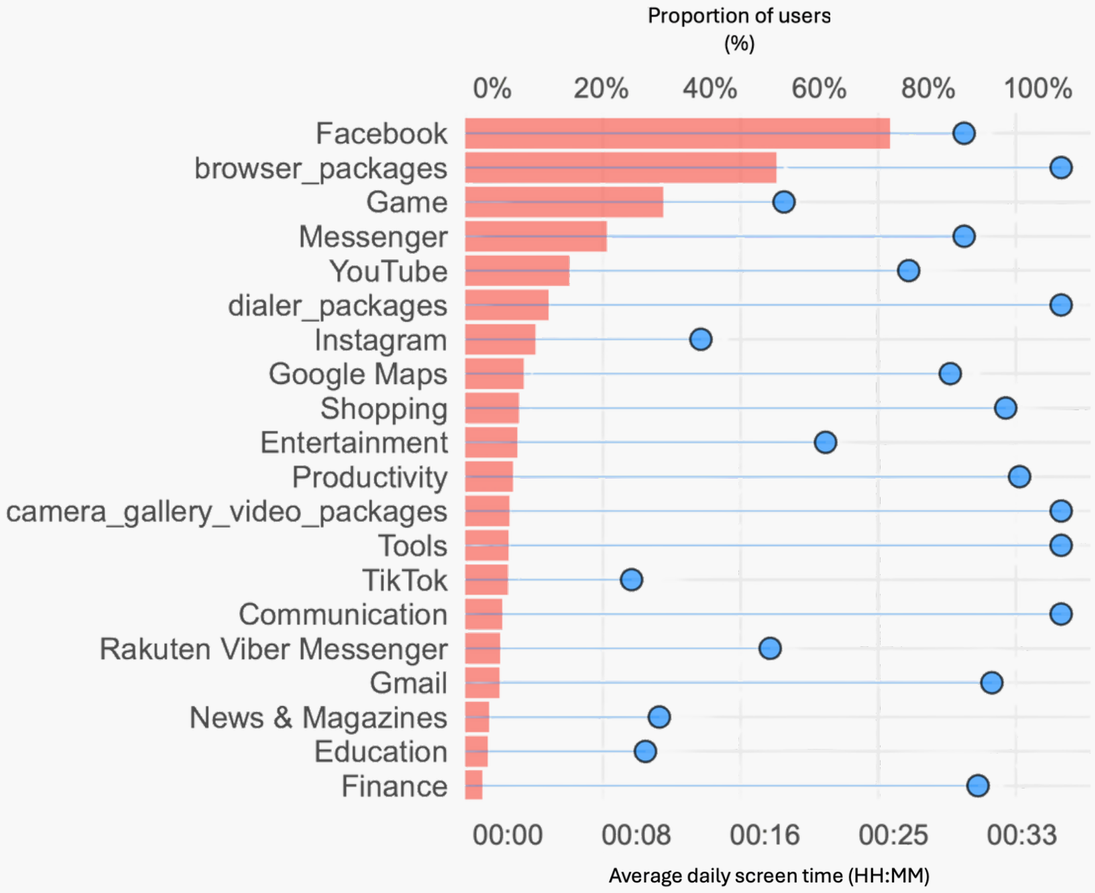


Signs of strong stratification:

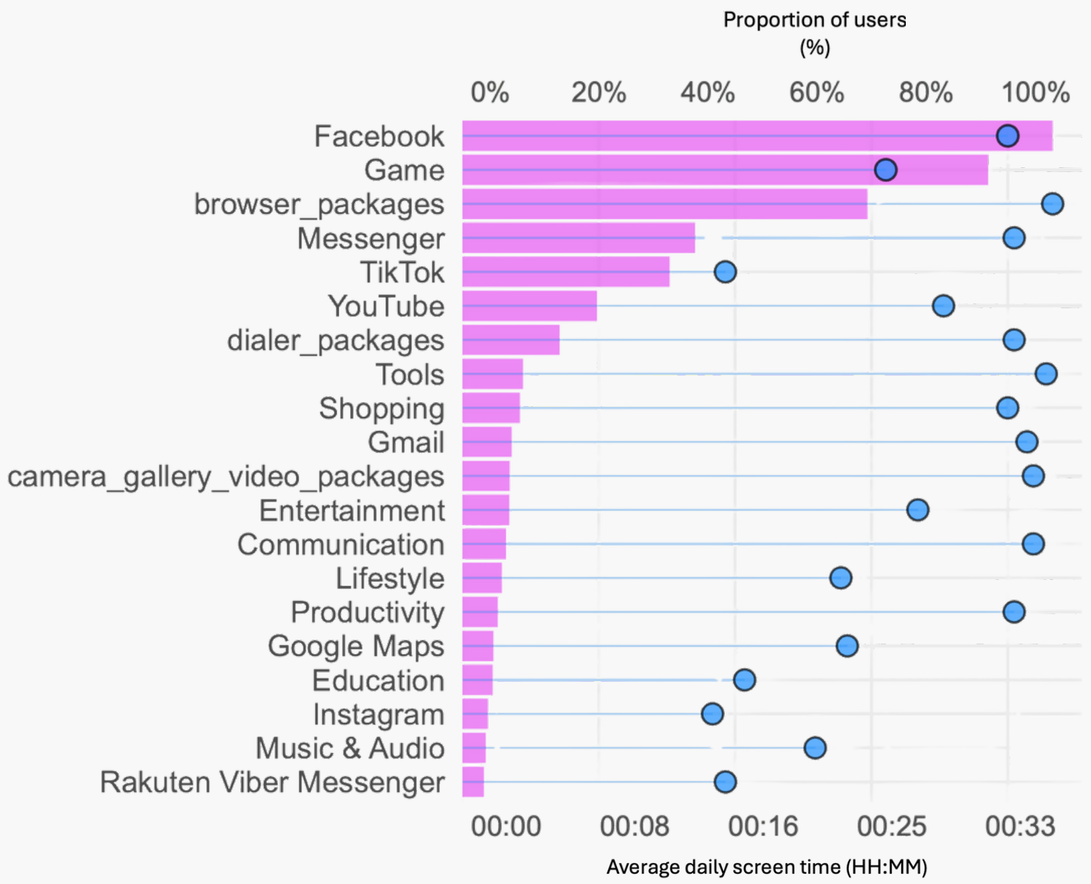
- **Higher -status** → functional, informational, professional apps
- **Lower -status** → entertainment, games, passive social media
- **Unskilled workers** → smartphone as "main digital gateway"

RQ2: Detailed app profiles by (selected) occupation groups

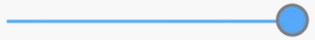
Higher -level service class



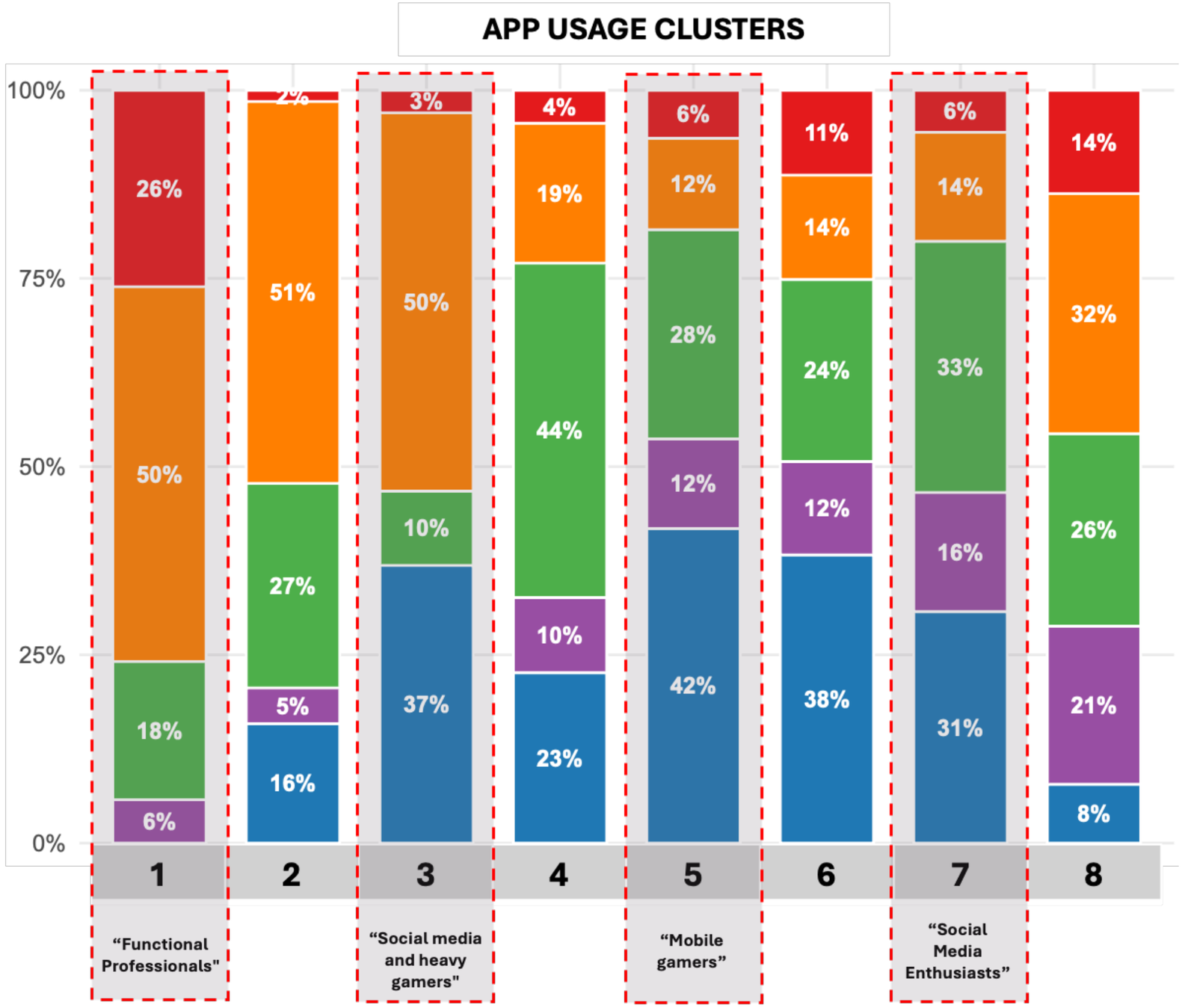
Unskilled workers



Average group-wise daily screen time (calculated for the entire group)



Group-wise user ratio (penetration)



(1) Functional professionals :

goal-directed, low social media

(2) Social media and heavy gamers :

intensive entertainment power-users

(5) Mobile gamers :

heavy entertainment, phone-first

(7) Social media enthusiasts :

intensive, mobile-only engagement

Occupational status group

- Higher-level Service Class
- Lower-level Service Class
- Intermediate Class
- Skilled Workers
- Unskilled Workers

What it all means

1. Digital inequality lives in content, not screen time.
2. Smartphones amplify existing social advantages.
3. Digital lifestyles are stratified but hybrid.

(A few...) limitations

Android -only; iOS excluded

Limited 360° telemetry (only one screen)

Self-selection in participation

Seasonal impact (spring = summer?)

No in-app content

Move towards a sustainable (real) probability -based panel that lasts for at least 6 months (~ OctoSense)

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