

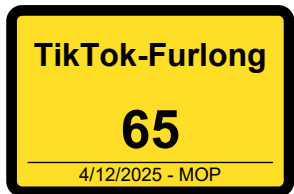
AMENDED Exhibit 544

PLAINTIFFS' OMNIBUS OPPOSITION TO DEFENDANTS' MOTIONS FOR SUMMARY JUDGMENT

Case No.: 4:22-md-03047-YGR

MDL No. 3047

In Re: Social Media Adolescent Addiction/Personal Injury Products Liability Litigation



[P&C] U18 Balanced Engagement Index (BEI)

Background & Opportunity

Our youth centered design product team (digital well-being, family pairing & user education) has had trouble in the past identifying a clear and long term north star metric, due to the challenge of measuring "wellbeing". Instead of this, we have set more granular success metrics (safety feature adoption, reduction in problematic screen time, etc.). Given all the development and learning in this space over the past few years, we are now at a place where we want to implement a true north star metric for the first time in closely partnership with our Youth Safety and Wellbeing policy team, in order to solve for:

1. Uniform long term thinking across the team
2. Insufficient linkage between existing T&S success metrics and our pillar goal

In continuing to mature our metric framework around this product development work, this will aid in faster prioritization, opportunity identification, and more efficient alignment with other teams.

Externally, mounting requests from the digital service act (DSA) highlight the need for uniform, high-quality data, and product standards. To ensure consistency and align with industry standards, we propose developing a refined metric that accurately reflects our pillar goal. This initiative aims to establish a robust metrics ecosystem, enhancing our positioning within MS and T&S internally, while also aligning seamlessly with external industrial standards.

honey_pot

Metrics Proposal

Balanced Engagement Index = 1 - Unbalanced Engagement Rate

Metrics Status & Problems

- * BEI is relatively **stable** at around **96.4%** in August, indicating more than 95% of minors are experiencing balanced engagements on our platform
- * BEI is comprised of 4 secondary segments: Contract, Content, Conduct & Contact. Among them, **Contract & Content** segments are the **top 2** segments that take up **85% unbalanced engagement**

Redacted - Attorney Client

- * Contract segment has the second highest unbalanced penetration rate among dau at around **17%** and **83%** of this segment hit minors hit the daily duration limit of 3.5hrs, **40.5%** of them hit the excessive duration limit and **22%** of them hit the night duration limit
- * Content segment has the highest unbalanced penetration rate among dau at around **18%**. **98%** of this segment group is because of being exposed to unbalanced content and hits the unapproved vv% limit of 1%. **2.2%** of this segment group hit because of proactive report behavior, which is a strong signal indicating they experience unbalanced engagement
- * Retention analysis suggests **unbalanced minors tend to be a less sticky but a more random** group, and **Contract & Content** hold the top 2 high retention rate indicating the **high stickiness of unbalanced minors** within these two segments
- * The april-batch launched product solutions are mainly focused on time/contract segments, where we observed **all positive impacts** on minor duration metrics including **-1.44%** in avg daily duration, **-7.55%** in avg night duration, **-4.88%** in avg excessive day duration and **-8.32%** in avg excessive night duration from April to May.
- * The retention metrics of minors, especially from contract hit groups of minors, tell the story from the perspective that minors tend to **perform better within a short period of time given systematic reminders**. But it is **difficult to maintain** good time habits
- * The average unapproved vv% of content-segment-hit minors tripled that of the overall minor group, and almost doubled that of the adult group
- * Minors have a higher report penetration rate than adult groups, while the overall minor group has a lower report action rate than that of adult group

Solutions

Systematic

- * **Continue systematic intervention leveraging product solutions** in other time related feature enablement such as night reminder, 'take a break' reminder for excessive usage etc, which is estimated to reduce the penetration of time segment and overall BEI

Customized

- * Since contract hit minors are the top 1 high retention rate with the highest stickenss, a **customized operation solution with adjusted intensity or design** can be applied
- * Density and disperse for content segment minors

Commented [2]: Curious if any examples/ideas come to mind? This just means a solution only visible to those contract hit minors right?

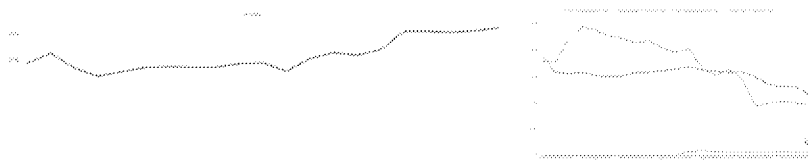
Commented [3]: @Jordan Furlongit means the solution can be more strict or more customized when it comes to super heavy users segment

* CG education may be applied to minor groups for better understanding of our policy and potentially higher accuracy of report

Success Metric Proposal

New North-star Metric

The goal of digital well-being pillar is to **promote balanced engagement** among teen users (13-18 years old). To define balanced engagement, we studied teen behavior on our platform including: tBEI creation, consumption and interaction data. And on top of user behavior, we would also dig into tBEI usage of time to understand the full picture of tBEI life on TikTok. The full details of the study can be found here: [[HYPERLINK](https://bytedance.us.feishu.cn/docx/DESQdGLnJoGyqv8bKlumsymsZb) "https://bytedance.us.feishu.cn/docx/DESQdGLnJoGyqv8bKlumsymsZb" \h]



2023 Q3 Metric

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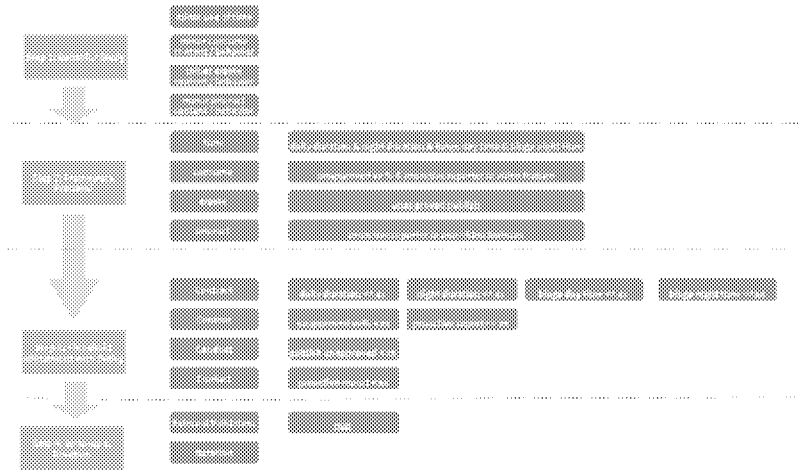
last_quarter_moon

Now we propose to measure minors' balanced engagement by Minor balanced Engagement Index:

$$\text{balanced Engagement Index} = 1 - \text{unbalanced Engagement Rate}$$

unbalanced engagement is derived from a combination of rule-based segment criteria based on minors' behavior or habits on our platform. And the rate comes from the unbalanced engagement minor on that day divided by minor DAU

Metric Proposal Process



Metric Proposal Research

Minor Behavior Study

last_quarter_moon

Contract

- On average, minors spend ~1.8 hrs per day on our platform. **3%** of minors are **heavy users** whose daily use duration is **more than 6 hrs**.
- Minors spend **93%** of tBEI active time on **consumption**, especially videos, 4% of tBEI time on **interactions** such as comment or chat / DM and 3% on **creation**.
- Excessive users are users who continuously use TikTok for more than 80 mins at day or more than 60 mins at night. **6.95%** of active minors at **nighttime** are excessive users and **4.18%** of **daytime** active minors are excessive users. Among all minor users, only **0.62%** turned on session break reminder feature. Among excessive users who enabled this feature, we observe tBEI average duration has been reduced by **4%** at night and **1%** at day compared with those who didn't.

Content

- * Unapproved v/v% among minors has a skewed distribution with roughly 20% minor more than 1%, meaning for every 100 views minors consumed, there will be 1 unapproved.
- * Minor report penetration rate is higher than that of adults, while the report

Redacted - Attorney Client

Commented [6]: Hi@Lydia Kang& <at@Jordan Furlongse

Redacted - Attorney Client

Redacted - Attorney Client

action rate of minors is lower than that of adults, indicating the potential education needs of CG among minor groups.

Conduct

* Minor creation's publish violation rate (**0.18%**) is lower than the overall publish violation rate (**0.76%**). And the top 3 minor creations' violation issues are MS, IARG and SSHDA. And the top violation policy title is suspected underage users.

Contact

* The top 5 minor proactive report feature pillars are video, account, photo_mode, live and comment

Policy Framework

To keep platform efforts consistent in protecting and educating minors, we keep this metric design principle aligned with the policy team's 4 Cs framework

Source: [HYPERLINK

"https://bytedance.sg.feishu.cn/docx/OCTfdaLKNox4HAXUIHKIQLXsgTE" \h]

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Policy Recommendation

Source: [HYPERLINK

"https://bytedance.us.feishu.cn/docx/MNi6dpkHXomwZdxqW1QuYFI2sWd" \h]

* The "Daytime" definition need not be limited to school hours, but should range from **7 am - 10 pm** (7am, 10pm). For U18 users, high usage during the day should be defined as more than **3.5 hours** per day.

* Nighttime should be defined as **10 pm - 7 am** (10pm, 7am), and heavy nighttime usage should be **2+ hour(s)**.

* Excessive sessions should be defined as more than **90 consecutive minutes during the day** or more than **60 consecutive minutes during the night**.

* To focus on more severe problems via adding one more layer - if a user hits 2 out of 3 (time, consume, create) then we would think the user has unbalanced engagements instead of existing strict criteria . Once a user hits any of these detailed criteria, the user will be classified as unbalanced engagement minors.

Sub-metrics Distribution

Redacted - Attorney Client

Commented [17]: Hi@Nikki Soo@Curtis Barnesyes, it's in

Redacted - Attorney Client

Distribution data range: Aug 23'

Minor definition based on age gate

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_fwQ3T3]

Daily Duration Distribution

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_wMBUhF]

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_6PcAHW]

Night Duration Distribution

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_0YagiF]

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_M8fTLM]

* On average, minors spend 97 mins the whole day while 41.15% of them spend less than 1hr per day, and 3% of them are heavy users who spend more than 6hrs per day.

* Minors spend less than adults during the night time. The average night duration for minors is less than 24mins and 82% of minors spend less than 1hr at night (10pm-8am), while 5% of minors spend more than 2hrs

excessive - Day Session Distribution

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_YpiwR6]

excessive - Night Session Distribution

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_Us hyle]

* We name users who continuously use TikTok for more than 90 mins in the day or more than 60 mins at night as excessive users. Though the average excessive day duration is 142.97 mins. And the average excessive night duration is 89.75 mins.

Unapproved vv% Distribution

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_CjtfRq]

Unapproved vv% = unapproved vv / total vv

* The average unapproved vv% of minors is 0.71% and we observed more than 20% minors actually exceed the 1% threshold

Report Distribution

Commented [31]: Do we have any insights on how a TT binge user engages with other platforms (i.e. I use TT for 2 hours a day, IG for 2 hours, Discord for 3 hours)? Is there a correlation that TT binge users love TT to the point they don't use the other platforms?

Commented [32]: @Maninder Malhino we don't, you can probly consult with user research team to see whether they can find this data, thx

Commented [33]: Do we mean "continuous" here?

Commented [34]: @Christina Crimminshere i mean binge users' day usage duration average

Commented [35]: @Claire Zhangif we define binge users as '90 consecutive minutes during the day and more than 60 consecutive minutes during the night', should the avg duration be min 60 mins?

Data: July 23' Data

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_2i42yQ]

* The average report penetration rate for minors is 0.08%, which is slightly higher than that of adults. While for non-video pillars, the report penetration rate is 0.11% and slightly lower than that of adults.

Proposed BEI Definition

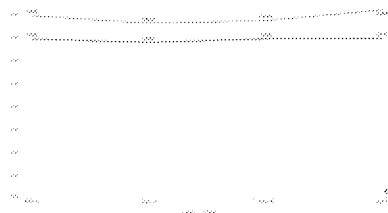
After extracting criteria from user behavior study, accompanied with policy suggested threshold and YSW framework, we'd propose the BEI and its detailed definition as below -

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_wi9ilo]

Metrics Application

BEI Trends

Overall Index Trendline



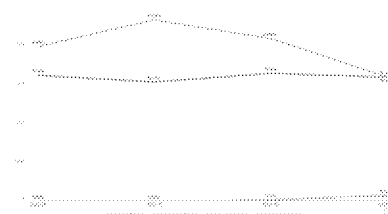
* BEI is a relatively **stable** metric, while minor showed a 0.7pp decrease from April to May but gradually picking up to **96.4%** in August.

* Minor BEI always better perform that of adult

Secondary Segments unbalanced Penetration Rate Trendline

Penetration Rate = #unbalanced user/#DAU

Minor



* The decrease of BEI in May is mainly due to content segments with its penetration rate having a 3.36pp increase. While the contract segment had a -0.84pp decrease which aligns with our screen time related product

launch timeline

Data Snapshot

Data: 8/20

- User Group is based on age gate info users input themselves
 - O18 may need different time or other criteria compared with minors.
- However, to guarantee an apple-to-apple comparison, here we applied the same criteria among adults

RoW Overall (RoW)

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_1hLFyf]
10/10 data
Definition -> CC only among Minor
Live -> group by age gate % (大盘数)
[sheet-QerZsWcrUhSm67t7WrxuMnavsog_BfbT2y]

RoW Secondary (RoW)

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_OtmSVy]

10/10 data
[sheet-QerZsWcrUhSm67t7WrxuMnavsog_5pN9HN]

Minor unbalanced Hits Combination (RoW)

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_Xh9s39]

grapes

Summary

- **Contract & Content** segments are the **top 2** segments that take up **85% unbalanced engagement**
- Contract segment has the second highest unbalanced penetration rate among dau at around 17% and 83% of this segment hit minors hit the daily

duration limit of 3.5hrs, 40.5% of them hit the excessive duration limit and 22% of them hit the night duration limit

- * Content segment has the highest unbalanced penetration rate among dau at around 18%. 98% of this segment group hits the unapproved vv% limit of 1% and only 2.2% of them hit because of the proactive report as a strong signal of unbalanced engagement

Unbalanced Retention

Data: 8/1-8/20

Detailed data: [[HYPERLINK](#)

"https://bytedance.us.feishu.cn/sheets/JtNdsdK6rh2uaHtCDZeu92fKsd9?sheet=95da31"

\h]||

U18/O18 is based on age gate info users input themselves

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_BwKiWw]

Further compared with DAU retention 88% (1d), 85% (7d), 79% (30d), it seems **unbalanced minors tend to be a less sticky but a more random group**

Commented [36]: @Claire Zhang Can you please re-name this to BEI retention

Secondary Segment Decompose

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_0iTBK1]

bell

Summary

- * To compare overall minor unbalanced retention rate with DAU retention rate - 88% (1d), 85% (7d), 79% (30d), it seems **unbalanced minors tend to be a less sticky but a more random group**

- * Further decompose BEI's secondary segments, **Contract & Content** hold the top 2 high retention rate indicating the **high stickiness of unbalanced minors** within these two segments and suggesting **more systematic intervention**

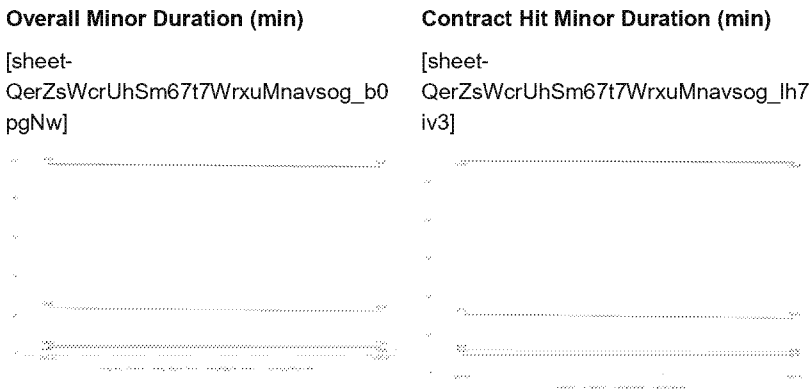
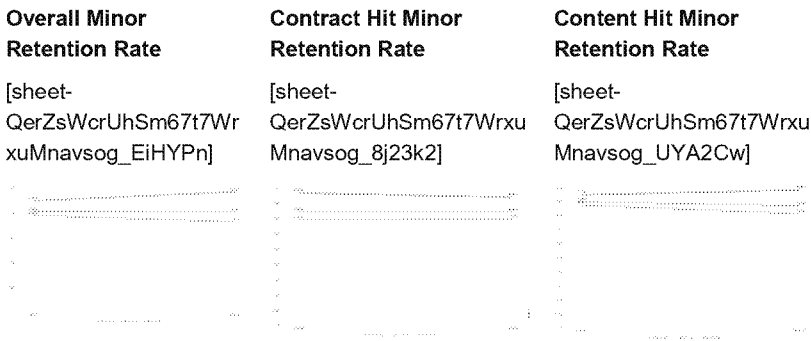
Pre v.s. Post Minor Comparison

Data: 4/15-6/1

Detailed data: [[HYPERLINK](#)

"https://bytedance.us.feishu.cn/sheets/JtNdsdK6rh2uaHtCDZeu92fKsd9?sheet=95da31"
\\h]

Previously, we have launched a few product solutions as good examples of system interventions, including family pairing upsell on 4/17, screen time management enablement on 4/26 and mute notification on 4/27. After comparing cohort pre and post product launches, we noticed the impact brought as below -



bell

Summary

✦ The april-batch launched product solutions are mainly focused on time/contract segments, where we observed **all positive impacts they brought** on minor duration metrics including ~1.44% in avg daily duration, ~7.56% in avg

night duration, -4.88% in avg excessive day duration and -8.32% in avg excessive night duration from April to May.

* The retention metrics of minors, especially from contract hit groups of minors, tell the story from a different perspective that minors tend to **perform better within a short period of time given systematic reminders**. But it is **difficult to maintain** good time habits, and we witnessed decreasing trends of 1d (-1.4pp) & 7d (-0.1pp) retention rate while a slightly higher relapse of unbalanced engagement habits from the 14d (+0.5pp) retention rate from April to May.

Solutions

- * **Continue systematic intervention leveraging product solutions** in other time related feature enablement such as night reminder, 'take a break' reminder for excessive usage
- * Since contract hit minors are the top 1 high retention rate with the highest stickenss, a **customized operation solution with adjusted intensity or design** can be applied

Content Segment Decompose

Data: 8/1-8/20

U18/O18 is based on age gate info users input themselves

- * Avg unapproved vv %

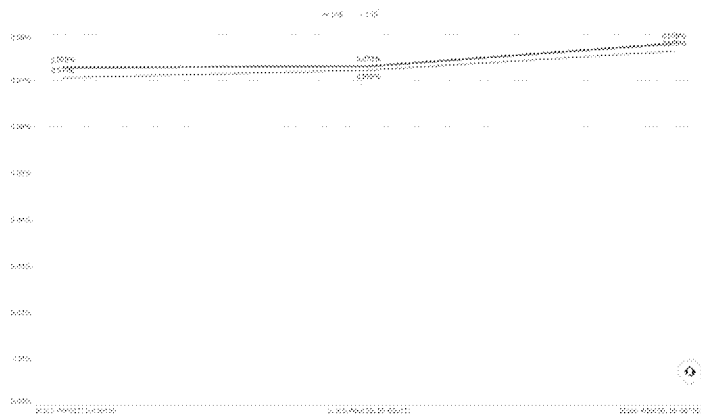
[sheet-QerZsWcrUhSm67t7WrxuMnavsog_LZI2iB]

- * Are they in bubble? density? -> table permission acquiring

Data: 8/20

[HYPERLINK "https://bytedance.feishu.cn/docx/ShjmdLG3yo4N2XxIDOdCuGUznxc" \h]

- * Overall report penetration rate (#repoter/#DAU)



- **Report action rate**

Report action rate = #reports objects & results of unapproved / #reports objects

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_13P7ZX]

bell

Summary

- The average unapproved vv% of content segment hit minors tripled that of the overall minor group, and almost doubled that of the adult group
- Minors have a higher report penetration rate than adult groups. And content segment hit minor group has the highest report action rate aligned with its unapproved vv%. While the overall minor group has a lower report action rate than that of adult group

Solutions

- density and disperse for content segment minors
- CG education may be applied to minor groups for better understanding of our policy and potentially higher accuracy of report

Future Iteration

1. To iterate the existing definition of BEI to a more holistic view via expanding more into time, consumption, creation and interaction segments. And include both RoW, EU, & TTP data to have a global performing metric.
2. Collaborate with stakeholders in MS, including Product, Policy, etc, to build, test and iterate the application of this BEI metric into OKR & roadmap design, data monitoring on dashboard, routine business root-cause analysis and upgrade.

Reference

Time Spent Distribution

golf

This duration distribution indicates minors' time spent -

Consumption: 93%

Interaction: 4%

Creation: 3%

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_xUWvq5]

Full RoW data - [HYPERLINK

"https://bytedance.us.feishu.cn/sheets/CCWQsOW0yhBsBAtmOR6uZyBpsLb?sheet=gGxRrM" \h]

Query: - https://aeolus-

va.bytedance.net/#/queryEditor/files/2453690?folderId=739068&taskId=281474984463556&sToken=767bcde0267a1580a4eb2b6e7a9d413f17a1c35871b56285e7682204745636a8859f190050d11ee276256a758b0909ef4aa559ce469d9deea6349bcc80e5cf37029f52d73e3a30ca4b0ed3596576b8b6

Commented [37]: Hi@Jack Nicastrothis is the query link, if we can have US data would be great~ thanks a lot!

Jack Nicastro : [OnIt] 2023-08-08 08:02:50

Digital Well-being Scope

[sheet-QerZsWcrUhSm67t7WrxuMnavsog_yvDxrG]

Passive vs. Active usage

* Tie strength increases with both one-on-one communication, such as posts, comments, and messages, and through reading friends' broadcasted content, such as status updates and photos. **The effect is greater for composed pieces, such as comments, posts, and messages than for "one-click" actions such as "likes."** Facebook has a greater impact on non-family relationships and ties who do not frequently communicate via

Commented [38]: @Jordan Furlongfrom my perspective, it can be an interesting study to conduct after we have completed healthy engagement index definition, at that time, we can check the correlation between the unhealthy user and their engagement or not to prove, otherwise right now we can't prove it

Jordan Furlong : [THUMBSUP] 2023-07-07 09:42:45

other channels. - [HYPERLINK "https://research.facebook.com/publications/growing-closer-on-facebook-changes-in-tie-strength-through-site-use/" \h]

- *Passive = only viewing or liking ≠ comments, DMs, posts

* "Prior research indicates that Facebook usage predicts declines in subjective well-being over time. How does this come about? We examined this issue in 2 studies using experimental and field methods. In Study 1, cueing people in the laboratory to use Facebook passively (rather than actively) led to declines in affective well-being over time. Study 2 replicated these findings in the field using experience-sampling techniques. It also demonstrated how passive Facebook usage leads to declines in affective well-being: by increasing envy. **Critically, the relationship between passive Facebook usage and changes in affective well-being remained significant when controlling for active Facebook use, non-Facebook online social network usage, and direct social interactions**". - [HYPERLINK

"https://security.larksuite.com/link/safety?target=https%3A%2F%2Fppw.kuleuven.be%2Fokp%2F_pdf%2FVerduyn2015PFUUA.pdf&scene=ccm&logParams=%7B%22location%22%3A%22ccm_default%22%7D&lang=en-US" \h]

* "Active use of social media, where the person is in **direct interaction with others**, has been found to contribute to less loneliness and fewer mental health symptoms ([HYPERLINK "https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8804162/" \l "B22" \h], [HYPERLINK "https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8804162/" \l "B24" \h]). Passive use, on the other hand, such as **scrolling through others' posts**, has been associated with increased depressive symptoms, rumination and generally poorer mental health outcomes ([HYPERLINK "https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8804162/" \l "B24" \h], [HYPERLINK "https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8804162/" \l "B26" \h]) - [HYPERLINK "https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8804162/" \h]

Time Spent

Source: [HYPERLINK "https://bytedance.us.feishu.cn/docx/doxusgdhZAIzrDKZDuRLhWXaskf" \h]

1. Objective excessive usage (6 hours+ / day = 99th percentile): Currently this is 10m users / 1.3% DAU. Only 7% (700k) of these users are using existing STM tools, indicating we need to take a stronger approach to helping them curb harmful screen time.
2. Subjective excessive usage (hours vary by user) = Users who are not using the app for an extreme amount of time but signal that they need support with screen time management
3. Late night usage: Users are active on TikTok when they should be sleeping. Usage data indicates this is an issue for more than 20% of minors, and suggests adults are impacted as well
 - **19%** of global L1 (age 13-15) DAU and **25%** of global L2 (age 16-17) DAU are active (screen duration > 0) on TikTok 12AM-5AM

◦ 25% of global L345 (age 18+) DAU are active on TikTok 12AM-5AM, and 16% are active 1AM-5AM globally

◦ Source: [HYPERLINK

"https://bytedance.us.feishu.cn/docx/doxusCy1SQOkB54Sq1r3BQK0svh" \h]

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REDACTION TYPE: PRIVILEGE