Movement Behaviour Questionnaire (MBQ)
User guide for hard copy administration and scoring

Version 1.0 (for hard copy administration)

This manual provides general information on using the Movement Behaviour Questionnaire (MBQ) and a description of the scoring system. This manual is a supplement to the MBQ hard copies and MBQ Excel scoring spreadsheet (available upon request: s.trost@uq.edu.au).

Introduction

- The MBQ is a validated "fit-for-purpose" rapid assessment tool for measuring movement behaviours in children aged 0 – 5 years.
- The behaviours assessed by the MBQ include active play, tummy time (MBQ-B only), restrained time (MBQ-B only), screen time and sleep.
- The MBQ is available in four versions: MBQ-B (open version), MBQ-B (closed version), MBQ-C (open version), and MBQ-C (closed version).
- The psychometrics of the MBQ-B and MBQ-C have been evaluated and are described below.

Psychometric properties of the MBQ

As part of the EPOCH CRE, a study was conducted to evaluate the test-retest reliability and concurrent validity of the open-ended and closed-ended versions of the MBQ-B and MBQ-C. A total of 300 parent-child dyads completed the 10-day study protocol (MBQ-B: N=85; MBQ-C: N=215). To assess validity, children wore an accelerometer on the non-dominant wrist (ActiGraph GT3X+) for 7 days and parents completed 2 x 24-hour activity diaries recording screen time and sleep on two separate days. For babies (i.e., not yet walking), parents completed 2 x 24-hour activity diaries recording tummy time, active play, restrained time, screen time, and sleep on days 2 and 5 of the 7-day monitoring period. To assess test-retest reliability, parents were randomised to complete either the open- or closed-ended versions of the MBQ on day 7 and on day 10. Test-retest intraclass correlation coefficients (ICC's) were calculated using generalized linear mixed models and validity was assessed via Spearman correlations.

Test-retest reliability for the MBQ-B was good to excellent with ICC's ranging from 0.80 – 0.94 and 0.71 – 0.93 for the open- and closed-ended versions, respectively. For both versions, significant positive correlations were observed between 24-hour diary and MBQ-B reported tummy time, active play, restrained time, screen time, and sleep (rho = 0.39 – 0.87). Test-retest reliability for the MBQ-C was moderate to excellent with ICC's ranging from 0.68 – 0.98 and 0.44 – 0.97 for the open- and closed-ended versions, respectively. For both the open- and closed-ended versions, significant positive correlations were observed between 24-hour diary and MBQ-C reported screen time and sleep (rho = 0.44 – 0.86); and between MBQ-C reported and device-measured time in total active play and energetic play (rho = 0.27 – 0.42).

User information

Which MBQ should I use?

- MBQ-B: For babies who are yet to reach their walking milestone.
- MBQ-C: For children who can walk.
- Open-ended version (responses are provided in hours and minutes per day): Useful for research applications to collect data for statistical purposes.
- Closed answer version (response options are selected within a range): End users may prefer to administer the MBQ with closed answer responses; useful for clinical or primary care settings where the MBQ Index scoring system allows for patient feedback.

What are the differences between the MBQ-B and MBQ-C?

- The MBQ-B includes a tummy time item for babies who are yet to reach their rolling milestone, once babies can roll an active play item encompasses broader physical activities – thus, the MBQ is suitable from birth.
- The MBQ-B includes an item on restrained time.
- The MBQ-C assesses physical activity and screen time separately for weekdays and weekend days and calculates a weighted daily average for daily total active play, energetic play, passive screen time, and interactive screen time.
- The MBQ-C assesses sleep routine in addition to sleep duration.

Scoring information

Calculation of outcome variables

- Each MBQ hard copy version includes instructions for administrators to manually calculate outcome variables.
- The Excel scoring spreadsheet enables automatic calculation of MBQ outcome variables for each health behaviour by entering MBQ responses.
- Administrators can view scores for the outcome variables on Excel scoring spreadsheet directly or when data is exported to a statistical program.
- Also included are indicator variables for adherence to guidelines for each behaviour and the 24-hour movement guidelines (active play, screen time and sleep behaviours).
- The table below lists the outcome variables calculated from items in the MBQ-B and MBQ-C, respectively.

Behaviour	MBQ-B Outcome Variables	MBQ-C Outcome Variables
Active play	- Tummy time (for babies not rolling) - Guideline adherence for tummy time - Active play (for babies rolling) - Guideline adherence for active play	- Weekday total active play - Weekday energetic play - Weekend day total active play - Weekend day energetic play - Weighted average of energetic play - Weighted average of total active play - Guideline adherence
Restrained time	- Restrained bout time - Daily restrained time - Guideline adherence	NA
Screen time [1,2,3]	- Passive screen time - Interactive screen time - Total screen time - Guideline adherence	- Weekday passive screen time - Weekday sedentary passive screen time - Weekday interactive screen time - Weekday sedentary interactive screen time - Weekend day passive screen time - Weekend day sedentary passive screen time - Weekend day interactive screen time - Weekend day sedentary interactive screen time

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		- Weighted average of passive screen time - Weighted average of sedentary passive screen time - Weighted average of interactive screen time - Weighted average of sedentary interactive screen time - Weighted average of total screen time - Weighted average of total sedentary screen time - Guideline adherence
Sleep	- Day sleep (i.e., napping) - Night sleep - Total sleep - Guideline adherence	- Day sleep (i.e., napping) - Night sleep - Total sleep - Sleep routine - Guideline adherence
24-hour Movement Guidelines	- Guideline adherence	- Guideline adherence

[1] Passive screen time is defined as 'watching' television programs, videos/internet clips or movies on a television, computer, or portable/mobile device such as iPad, tablet, or smartphone.

[2] Interactive screen time is defined as 'playing' games, looking at photos, or video chatting (e.g. FaceTime, Zoom, Skype) on a screen-based device such as a computer or laptop, video game console, iPad, tablet, or smartphone.

[3] Sedentary screen time is defined as screen time that is done whilst seated/lying down i.e., calculated by the difference between MBQ items for (1) total screen time and (2) screen time whilst standing.

<u>Truncation of extreme values on the open-ended versions of the MBQ.</u>

- Implausible or extreme values for the following outcome variables are truncated to the 95th percentile from the validation study dataset.

MBQ	Outcome variable	Truncated value
MBQ-B (open version)	Total tummy time	180 minutes per day
MBQ-B (closed version)	Total tummy time	180 minutes per day
MBQ-B (open version)	Total active play	480 minutes per day
MBQ-B (open version)	Total restrained time	360 minutes per day
MBQ-B (closed version)	Total restrained time	360 minutes per day
MBQ-C (open version)	Weekday total active play	480 minutes per day
MBQ-C (open version)	Weekend day total active play	480 minutes per day
MBQ-C (open version)	Weekday energetic play	360 minutes per day
MBQ-C (open version)	Weekend day energetic play	360 minutes per day

1. MBQ-B (open version)

1.1. Calculation of outcome variables – variable names and description.

Outcome and item number	Description and calculation
TUMMY TIME AND ACTIVE PLAY	
Total tummy time (Q1A and Q1B)	Total tummy time in minutes per day for babies who are yet to roll. For babies who can roll, this variable will be missing. _____times (Q1A) x _____minutes per time (Q1B)
Tummy time (Q1A truncated)	Total tummy time. Extreme values (> 180 minutes) truncated to 180 minutes per day. If total tummy time <= 180 minutes, this variable will equal 'Total tummy time'.
Tummy time Guideline adherence	Adherence with tummy time guideline for babies who are yet to roll of at least 30 minutes of tummy time per day. 1 = Yes, 0 = No. For babies who can roll, this variable will be missing.
Total active play (Q2)	Total active play in minutes per day for babies who can roll. For babies who are yet to roll, this variable will be missing. Q2 (_____hours x 60) + _____minutes
Total active play (Q2 truncated)	Total active play for babies who can roll. Extreme values (> 480 minutes) truncated to 480 minutes per day. If total active play <= 480 minutes, this variable will equal ' Total active play '.
Active play Guideline adherence	Adherence with active play guideline for babies who can roll of at least 30 minutes of active play per day. 1 = Yes, 0 = No. For babies who are yet to roll, this variable will be missing.
RESTRAINED TIME	
Usual restrained time (Q3B)	Restrained time in minutes per bout per day. Q3B (_____hours x 60) + _____minutes
Total restrained time (Q3A and Q3B)	Total restrained time in minutes per day. _____times (Q3A) x usual restrained time (Q3B)
Total restrained time (Q3A and Q3B truncated)	Total restrained time. Extreme values (> 360 minutes) truncated to 360 minutes per day. If total restrained time is <= 360 minutes this variable will equal 'Total restrained time'.
Restrained time Guideline adherence	Adherence with restrained time guideline of not more than 1 hour at a time of restrained time (such as in a stroller, car seat or highchair). 1 = Yes, 0 = No.
SCREEN TIME	
Non-interactive screen time (Q4)	Passive screen time in minutes per day. Q4 (_____hours x 60) + _____minutes

Interactive screen time (Q5)	Interactive screen time in minutes per day. Q5 (_____hours x 60) + _____minutes
Total screen time	Total screen time in minutes per day. 'Non-interactive screen time' + 'Interactive screen time'
Screen time Guideline adherence	Adherence with screen time guideline of no screen time for babies/children under 2 years. 1 = Yes, 0 = No.
SLEEP	
Night sleep (Q6)	Time spent in night sleep in minutes per day. Q6 (_____hours x 60) + _____minutes
Day sleep (Q7)	Time spent in day sleep in minutes per day. Q7 (_____hours x 60) + _____minutes
Total sleep	Total sleep in minutes per day. 'Night Sleep' + 'Day Sleep'
Sleep Guideline adherence	Adherence with guideline for sleep of at least 14 hours per day for babies until 3 months, at least 12 hours per day for babies aged 4 to 11 months, or at least 11 hours per day for babies/children aged 12 months or older. 1 = Yes, 0 = No.
Adherence with 24-hour movements guidelines	
24-hour movement guideline adherence	Adherence with the 24-hour movement guidelines. 1 = Yes, 0 = No. **For babies who are yet to roll:** This condition would be true (1) if the baby met all 3 recommendations for tummy time, screen time, and sleep (based on age): 1. Tummy time Guideline adherence = '1' AND 2. Screen time Guideline adherence = '1' AND 3. Sleep Guideline adherence = '1' **For babies who can roll:** This condition would be true (1) if the baby met all 3 recommendations for active play, screen time, and sleep (based on age): 1. Active play Guideline adherence = '1' AND 2. Screen time Guideline adherence = '1' AND 3. Sleep Guideline adherence = '1'

2. MBQ-B (closed version)

2.1. Calculation of outcome variables – variable names and description.

Variable name	Description
TUMMY TIME AND ACTIVE PLAY	
Total tummy time (Q1A and Q1B)	Total tummy time in minutes per day for babies who are yet to roll. For babies who can roll, this variable will be missing.
	Product of the frequency of tummy time (Q1A) and the duration of tummy time (Q1B). Duration is based on the mid-point of each response category for Q1B where 1 = 2.5, 2 = 7.5, 3 = 12.5, 4 = 18, 5 = 23, 6 = 28, or the maximum value for 7 = 30.
	_____times (Q1A) x usual tummy time (Q1B)
Tummy time (Q1A truncated)	Total tummy time. Extreme values (> 180 minutes) truncated to 180 minutes per day. If total tummy time <= 180 minutes, this variable will equal ' Total tummy time '.
Tummy time Guideline adherence	Adherence with active play guideline for babies who are yet to roll of at least 30 minutes of tummy time per day. 1 = Yes, 0 = No. For babies who can roll, this variable will be missing.
Total active play (Q2)	Total active play in minutes per day for babies who can roll. For babies who are yet to roll, this variable will be missing.
	Duration is based on the mid-point of each response category for Q2 where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, or the maximum value for 6 = 120.
Active Play Guideline adherence	Adherence with active play guideline for babies who can roll of at least 30 minutes of active play per day. 1 = Yes, 0 = No. For babies who are yet to roll, this variable will be missing.
RESTRAINED TIME	
Usual restrained time (Q3B)	Restrained time in minutes per bout per day.
	Duration is based on the mid-point of each response category for Q3B where 1 = 7.5, 2 = 22.5, 3 = 37.5, 4 = 52.5, 5 = 75, 6 = 105, or the maximum value for 7 = 120.
Total restrained time (Q3A and Q3B)	Total restrained time in minutes per day.
	Product of the frequency of restrained time (Q3A) and the duration of restrained time (Q3B).
	_____times (Q3A) x usual restrained time (Q3B)
Total restrained time (Q3A and Q3B truncated)	Total restrained time. Extreme values (> 360 minutes) truncated to 360 minutes per day. If total restrained time is <= 360 minutes this variable will equal 'Total restrained time'.

Restrained time Guideline adherence	Adherence with restrained time guideline of not more than 1 hour at a time of restrained time (such as in a stroller, car seat or highchair). 1 = Yes, 0 = No.
SCREEN TIME	
Non-interactive screen time (Q4)	Passive screen time in minutes per day. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q4 where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, or the maximum value for 6 = 120.
Interactive screen time (Q5)	Interactive screen time in minutes per day. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q5 where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, or the maximum value for 6 = 120.
Total screen time	Total screen time in minutes per day. 'Non-interactive screen time' + 'Interactive screen time'
Screen time Guideline adherence	Adherence with screen time guideline of no screen time for babies/children under 2 years. 1 = Yes, 0 = No.
SLEEP	
Night sleep (Q6)	Total night sleep in minutes per day. Duration is based on the minimum possible value where 1 = 300, or the mid-point of each response category for Q6 where 2 = 420, 3 = 540, 4 = 660, 5 = 780, or the maximum value for 6 = 840.
Day sleep (Q7)	Total day sleep in minutes per day. Duration is based on the minimum possible value where 1 = 30, or the mid-point of each response category for Q7 where 2 = 90, 3 = 150, 4 = 210, or the maximum value for 5 = 240.
Total sleep	Total sleep in minutes per day. 'Night Sleep' + 'Day Sleep'
Sleep Guideline adherence	Adherence with guideline for sleep between 14 and 17 hours per day for babies until 3 months, between 12 and 16 hours per day for babies aged 4 to 11 months, or between 11 and 14 hours per day for babies/children aged 12 months or older. 1 = Yes, 0 = No.
Adherence with 24-hour movements guidelines	
24-hour movement guideline adherence	Adherence with the 24-hour movement guidelines. 1 = Yes, 0 = No. **For babies who are yet to roll:** This condition would be true (1) if the baby met all 3 recommendations for tummy time, screen time, and sleep (based on age): 1. Tummy time Guideline adherence = '1' AND 2. Screen time Guideline adherence = '1' AND 3. Sleep Guideline adherence = '1'

	For babies who can roll:
	This condition would be true (1) if the baby met all 3 recommendations for active play, screen time, and sleep (based on age):
	1. Active play Guideline adherence = '1' AND
	2. Screen time Guideline adherence = '1' AND
	3. Sleep Guideline adherence = '1'

3. MBQ-C (open version)

3.1. Calculation of outcome variables – variable names and description.

Scoring variable	Description
PHYSICAL ACTIVITY	
Weekday total active play (Q1A)	Weekday total physical activity in minutes per day. Q1A (_____hours x 60) + _____minutes
Weekday total active play (Q1A truncated)	Weekday total physical activity. Extreme values (> 480 minutes) truncated to 480 minutes per day. If weekday total physical activity <= 480 minutes, then this variable will equal 'Weekday total active play'.
Weekday energetic play (Q1B)	Weekday energetic play in minutes per day. Q1B (_____hours x 60) + _____minutes
Weekday energetic play (Q1B truncated)	Weekday energetic play. Extreme values (> 360 minutes) truncated to 360 minutes per day. If weekday energetic play <= 360 minutes, then this variable will equal 'Weekday energetic play'.
Weekend day total active play (Q2A)	Weekend day total physical activity in minutes per day. Q2A (_____hours x 60) + _____minutes
Weekend day total active play (Q2A truncated)	Weekend day total physical activity. Extreme values (> 480 minutes) truncated to 480 minutes per day. If weekend day total physical activity <= 480 minutes, then this variable will equal 'Weekend day total active play'.
Weekend day energetic play (Q2B)	Weekend day energetic play in minutes per day. Q2B (_____hours x 60) + _____minutes
Weekend day energetic play (Q2B truncated)	Weekend day energetic play. Extreme values (> 360 minutes) truncated to 360 minutes per day. If weekend day MVPA <= 360 minutes, then this variable will equal 'Weekend day energetic play'.
Weighted average of total active play	Weighted average of total physical activity in minutes per day. ((Weekday total active play x 5) + (Weekend day total active play x 2)) / 7
Weighted average of energetic play	Weighted average of energetic play in minutes per day. ((Weekday energetic play x 5) + (Weekend day energetic play x 2)) / 7

Physical activity Guideline adherence	Adherence with physical activity guideline for children of at least 3 hours of total physical activity per day, including 1 hour of energetic play. 1 = Yes, 0 = No.
SCREEN TIME	
Weekday passive screen time (Q3A)	Weekday passive screen time in minutes per day. Q3A (_____hours x 60) + _____minutes
Weekday passive screen time <u>while standing</u> (Q3B)	Weekday passive screen time while standing in minutes per day. Q3B (_____hours x 60) + _____minutes
Weekend day passive screen time (Q4A)	Weekend day passive screen time in minutes per day. Q4A (_____hours x 60) + _____minutes
Weekend day passive screen time <u>while standing</u> (Q4B)	Weekend day passive screen time while standing in minutes per day. Q4B (_____hours x 60) + _____minutes
Weekday SEDENTARY passive screen time	Weekday SEDENTARY passive screen time in minutes per day. Weekday passive screen time - Weekday passive screen time <u>while standing</u> <u>NOTE.</u> If weekday passive screen time <u>while standing</u> exceeds total passive screen time, 'Weekday passive screen time' should be used to calculate the weighted average for Weekday SEDENTARY passive screen time.
Weekend day SEDENTARY passive screen time	Weekend day SEDENTARY passive screen time in minutes per day. Weekend day passive screen time - Weekend day passive screen time <u>while standing</u> <u>NOTE.</u> If weekend day passive screen time <u>while standing</u> exceeds total passive screen time, 'Weekend day passive screen time' should be used to calculate the weighted average for Weekend day SEDENTARY passive screen time.
Weighted average of passive screen time	((Weekday passive screen time x 5) + (Weekend day passive screen time x 2)) / 7
Weighted average of SEDENTARY passive screen time	((Weekday SEDENTARY passive screen time x 5) + (Weekend day SEDENTARY passive screen time x 2)) / 7
Weekday interactive screen time (Q5A)	Weekday interactive screen time in minutes per day. Q5A (_____hours x 60) + _____minutes
Weekday interactive screen time <u>while standing</u> (Q5B)	Weekday interactive screen time while standing in minutes per day. Q5B (_____hours x 60) + _____minutes
Weekend day interactive screen time (Q6A)	Weekend day interactive screen time in minutes per day. Q6A (_____hours x 60) + _____minutes
Weekend day interactive screen time <u>while standing</u> (Q6B)	Weekend day interactive screen time while standing in minutes per day. Q6B (_____hours x 60) + _____minutes

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Weekday SEDENTARY interactive screen time	Weekday SEDENTARY interactive screen time in minutes per day. Weekday interactive screen time - Weekday interactive screen time <u>while standing</u> <u>NOTE.</u> If weekday interactive screen time <u>while standing</u> exceeds total interactive screen time, 'Weekday interactive screen time' should be used to calculate the weighted average for Weekday SEDENTARY interactive screen time.
Weekend day SEDENTARY interactive screen time	Weekend day SEDENTARY interactive screen time in minutes per day. Weekend day interactive screen time - Weekend day interactive screen time <u>while standing</u> <u>NOTE.</u> If weekend day interactive screen time <u>while standing</u> exceeds total interactive screen time, 'Weekend day interactive screen time' should be used to calculate the weighted average for Weekend day SEDENTARY interactive screen time.
Weighted average of interactive screen time	((Weekday interactive screen time x 5) + (Weekend day interactive screen time x 2)) / 7
Weighted average of SEDENTARY interactive screen time	((Weekday SEDENTARY interactive screen time x 5) + (Weekend day SEDENTARY interactive screen time x 2)) / 7
Weighted average of total screen time	Total screen time; the sum of weighted averages for passive and interactive screen time ('Weighted average of passive screen time' and 'Weighted average of interactive screen time').
Weighted average of total SEDENTARY screen time	Total SEDENTARY screen time; the sum of weighted averages for SEDENTARY passive and interactive screen time ('Weighted average of SEDENTARY passive screen time' and 'Weighted average of SEDENTARY interactive screen time')
Screen time Guideline adherence	Adherence with screen time guideline of no screen time for children under 2 years or no more than 1 hour per day of sedentary screen time for children aged 2 to 5 years. 1 = Yes, 0 = No.
SLEEP	
Night sleep (Q7)	Time spent in night sleep in minutes per day. Q7 (_____hours x 60) + _____minutes
Day sleep (Q8)	Time spent in day sleep in minutes per day. Q8 (_____hours x 60) + _____minutes
Total sleep	Total sleep in minutes per day. Night Sleep + Day Sleep
Sleep Guideline adherence	Adherence with guideline for sleep of at least 11 hours per day for children aged less than 3 years or at least 10 hours per day for children aged 3 years or older. 1 = Yes, 0 = No.

Adherence with 24-hour movements guidelines	
24-hour movement guideline adherence	Adherence with the 24-hour movement guidelines. 1 = Yes, 0 = No.
	This condition would be true (1) if the child met all 3 recommendations for physical activity, screen time (based on age), and sleep (based on age):
	1. Physical activity Guideline adherence = '1' AND 2. Screen time Guideline adherence = '1' AND 3. Sleep Guideline adherence = '1'

4. MBQ-C (closed version)

4.1. Calculation of outcome variables – variable names and description.

Variable name	Description
PHYSICAL ACTIVITY	
Weekday total active play (Q1A)	Weekday total physical activity in minutes per day. Duration is based on the minimum possible value where 0 = 0 or the mid-point of each response category for Q1A where 1 = 15, 2 = 45, 3 = 90, 4 = 150, 5 = 210, or the maximum value for 6 = 240.
Weekday energetic play (Q1B)	Weekday energetic play in minutes per day. If Q1A = 0, then Q1B = 0. If Q1A is missing, then Q1B is missing. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q1B where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, or the maximum value for 6 = 120. If duration for Q1B > Q1A duration, set Q1B = Q1A.
Weekend day total active play (Q2A)	Weekend day total physical activity in minutes per day. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q2A where 1 = 15, 2 = 45, 3 = 90, 4 = 150, 5 = 210, or the maximum value for 6 = 240.
Weekend day energetic play (Q2B)	Weekend day energetic play in minutes per day. If Q2A = 0, then Q2B = 0. If Q2A is missing, then Q2B is missing. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q2B where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, or the maximum value for 6 = 120. If duration for Q2B > Q2A duration, set Q2B = Q2A.
Weighted average of total active play	Weighted average of total physical activity in minutes per day. ((Weekday energetic play x 5) + (Weekend day energetic play x 2)) / 7
Weighted average of energetic play	Weighted average of energetic play in minutes per day. ((Weekday total active play x 5) + (Weekend day total active play x 2)) / 7
Physical activity Guideline adherence	Adherence with physical activity guideline for children of at least 3 hours of total physical activity per day, including 1 hour of energetic play. 1 = Yes, 0 = No.
SCREEN TIME	
Weekday passive screen time (Q3A)	Weekday passive screen time in minutes per day. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q3A where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, 6 = 150, or the maximum value for 7 = 240.

Weekday passive screen time <u>while standing</u> (Q3B)	Weekday passive screen time while standing in minutes per day.
	If Q3A = 0, then Q3B = 0. If Q3A is missing, then Q3B is missing.
	Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q3B where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, 6 = 150, or the maximum value for 7 = 240.
	If duration for Q3B > Q3A duration, set Q3B = Q3A.
Weekend day passive screen time (Q4A)	Weekend day passive screen time in minutes per day.
	Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q4A where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, 6 = 150, or the maximum value for 7 = 240.
Weekend day passive screen time <u>while standing</u> (Q4B)	Weekend day passive screen time while standing in minutes per day.
	If Q4A = 0, then Q4B = 0. If Q4A is missing, then Q4B is missing.
	Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q4B where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, 6 = 150, or the maximum value for 7 = 240.
	If duration for Q4B > Q4A duration, set Q4B = Q4A.
Weekday SEDENTARY passive screen time	Weekday SEDENTARY passive screen time in minutes per day.
	Weekday passive screen time - Weekday passive screen time <u>while standing</u>
	<u>NOTE.</u> If weekday passive screen time <u>while standing</u> exceeds total passive screen time, 'Weekday passive screen time' should be used to calculate the weighted average for Weekday SEDENTARY passive screen time.
Weekend day SEDENTARY passive screen time	Weekend day SEDENTARY passive screen time in minutes per day.
	Weekend day passive screen time - Weekend day passive screen time <u>while standing</u>
	<u>NOTE.</u> If weekend day passive screen time <u>while standing</u> exceeds total passive screen time, 'Weekend day passive screen time' should be used to calculate the weighted average for Weekend day SEDENTARY passive screen time.
Weighted average of passive screen time	((Weekday passive screen time x 5) + (Weekend day passive screen time x 2)) / 7
Weighted average of SEDENTARY passive screen time	((Weekday SEDENTARY passive screen time x 5) + (Weekend day SEDENTARY passive screen time x 2)) / 7
Weekday interactive screen time (Q5A)	Weekday interactive screen time in minutes per day.
	Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q5A where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, 6 = 150, or the maximum value for 7 = 240.
Weekday interactive screen time <u>while standing</u> (Q5B)	Weekday interactive screen time while standing in minutes per day.
	If Q5A = 0, then Q5B = 0. If Q5A is missing, then Q5B is missing.

	Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q5B where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, 6 = 150, or the maximum value for 7 = 240. If duration for Q5B > Q5A duration, set Q5B = Q5A.
Weekend day interactive screen time (Q6A)	Weekend day interactive screen time in minutes per day. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for 6A where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, 6 = 150, or the maximum value for 7 = 240.
Weekend day interactive screen time <u>while standing</u> (Q6B)	Weekend day interactive screen time while standing in minutes per day. If Q6A = 0, then Q6B = 0. If Q6A is missing, then Q6B is missing. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q6B where 1 = 7.5, 2 = 22.5, 3 = 45, 4 = 75, 5 = 105, 6 = 150, or the maximum value for 7 = 240. If duration for Q6B > Q6A duration, set Q6B = Q6A.
Weekday SEDENTARY interactive screen time	Weekday SEDENTARY interactive screen time in minutes per day. Weekday interactive screen time - Weekday interactive screen time <u>while standing</u> <u>NOTE.</u> If weekday interactive screen time <u>while standing</u> exceeds total interactive screen time, 'Weekday interactive screen time' should be used to calculate the weighted average for Weekday SEDENTARY interactive screen time.
Weekend day SEDENTARY interactive screen time	Weekend day SEDENTARY interactive screen time in minutes per day. Weekend day interactive screen time - Weekend day interactive screen time <u>while standing</u> <u>NOTE.</u> If weekend day interactive screen time <u>while standing</u> exceeds total interactive screen time, 'Weekend day interactive screen time' should be used to calculate the weighted average for Weekend day SEDENTARY interactive screen time.
Weighted average of interactive screen time	((Weekday interactive screen time x 5) + (Weekend day interactive screen time x 2)) / 7
Weighted average of SEDENTARY interactive screen time	((Weekday SEDENTARY interactive screen time x 5) + (Weekend day SEDENTARY interactive screen time x 2)) / 7
Weighted average of total screen time	Total screen time; the sum of weighted averages for passive and interactive screen time ('Weighted average of passive screen time' and 'Weighted average of interactive screen time').
Weighted average of total SEDENTARY screen time	Total SEDENTARY screen time; the sum of weighted averages for SEDENTARY passive and interactive screen time ('Weighted average of SEDENTARY passive screen time' and 'Weighted average of SEDENTARY interactive screen time')

Screen time Guideline adherence	Adherence with screen time guideline of no screen time for children under 2 years or no more than 1 hour per day of sedentary screen time for children aged 2 to 5 years. 1 = Yes, 0 = No.
SLEEP	
Night sleep (Q7)	Total night sleep in minutes per day. Duration is based on the minimum possible value where 1 = 360, or the mid-point of each response category for Q7 where 2 = 420, 3 = 540, 4 = 660, 5 = 780, or the maximum value for 6 = 840.
Day sleep (Q8)	Total day sleep in minutes per day. Duration is based on the minimum possible value where 0 = 0, or the mid-point of each response category for Q8' where 1 = 30, 2 = 90, 3 = 150, 4 = 210, or the maximum value for 5 = 240.
Total sleep	Total sleep in minutes per day. Night Sleep + Day Sleep
Sleep Guideline adherence	Adherence with guideline for sleep of at least 11 hours per day for children aged less than 3 years or at least 10 hours per day for children aged 3 years or older. 1 = Yes, 0 = No.
Adherence with 24-hour movements guidelines	
24-hour movement guideline adherence	Adherence with the 24-hour movement guidelines. 1 = Yes, 0 = No. This condition would be true (1) if the child met all 3 recommendations for physical activity, screen time (based on age), and sleep (based on age): 1. Physical activity Guideline adherence = '1' AND 2. Screen time Guideline adherence = '1' AND 3. Sleep Guideline adherence = '1'

5. MBQ Index

The MBQ Index (MBQI) is calculated from responses to the closed version of the MBQ-B and MBQ-C. Scores on the MBQI reflect a child's overall compliance with public health recommendations for physical activity, screen time, and sleep. Scores are calculated for each health behaviour and a summary score is calculated by averaging scores in each domain. Scores can range from 0 to 100, with scores from 0 – 24 considered "well below recommended levels", 25 – 49 "below recommended levels, 50 – 74 "working towards recommended levels" and, 75 – 100 "meeting or exceeding recommended levels". Apart from screen time (where zero screen time receives a score of 100), a score of 75 reflects meeting the minimum level stated in the recommendation.

Clinicians and allied health professionals working in health care settings may use the MBQI as a tool for monitoring obesity-related behaviours and providing personalised feedback and/or counselling to improve children's physical activity, screen time, and sleep behaviours. The MBQI may also be used for behaviour change interventions involving goal setting, monitoring, and reinforcement. Public health agencies may find the MBQI a useful tool for increasing awareness about children's movement behaviours and social market campaigns targeting healthy lifestyle behaviours and early prevention of childhood obesity.

5.1. MBQ-B: Calculation of MBQ Index variables – variable names and description.

Variable name	Description
TUMMY TIME AND ACTIVE PLAY	
Tummy time index	MBQ Index for tummy time. IF 'Total tummy time' > 40, Tummy time index = 100 IF 'Total tummy time' <= 40, Tummy time index = ('Total tummy time' /40) x 100
Active Play index	MBQ Index for active play. IF 'Total Active Play' > 40, Active Play index = 100 IF 'Total Active Play' <= 40, Active Play index = ('Total Active Play' /40) x 100
RESTRAINED TIME	
baby_restrained_index	MBQ Index for restrained time. IF Q3B = 1, Restrained time index = 100 IF Q3B = 2, Restrained time index = 95 IF Q3B = 3, Restrained time index = 85 IF Q3B = 4, Restrained time index = 75 IF Q3B = 5, Restrained time index = 50 IF Q3B = 6, Restrained time index = 25 IF Q3B = 7, Restrained time index = 0

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SCREEN TIME	
baby_swatch_index	MBQ Index for passive screen time. IF Q4 = 0, Non-interactive screen time index = 100 IF Q4 = 1, Non-interactive screen time index = 75 IF Q4 = 2, Non-interactive screen time index = 50 IF Q4 = 3, Non-interactive screen time index = 25 IF Q4 = 4, Non-interactive screen time index = 10 IF Q4 = 5, Non-interactive screen time index = 5 IF Q4 = 6, Non-interactive screen time index = 0
baby_pwatch_index	MBQ Index for interactive screen time. IF Q5 = 0, Interactive screen time index = 100 IF Q5 = 1, Interactive screen time index = 75 IF Q5 = 2, Interactive screen time index = 50 IF Q5 = 3, Interactive screen time index = 25 IF Q5 = 4, Interactive screen time index = 10 IF Q5 = 5, Interactive screen time index = 5 IF Q5 = 6, Interactive screen time index = 0
SLEEP	
Sleep index raw score	Total sleep – MBQ Index raw score. **IF baby is aged 0 to 3 months [1].** Sleep index raw score = (('Total sleep' – 300)/ 720) *100 (Index = 100 when Total Sleep is 17 hours or more) **IF baby is aged 4 to 11 months [2].** Sleep index raw score = (('Total sleep' – 300)/ 560) *100 (Index = 100 when Total Sleep is 14.3 hours or more) **IF baby is aged 12 months or older [3].** Sleep index raw score = (('Total sleep' – 300)/ 480) *100 (Index = 100 when Sleep is 13 hours or more)
Sleep index	MBQ Index for total sleep. IF Sleep index raw score > 100, Sleep index = 100 IF Sleep index raw score <= 100, Sleep index = Sleep index raw score

MBQ INDEX – SUMMARY SCORE	
MBQ-B index summary score	MBQ Index summary score is based on the average of index scores for each behaviour. **IF baby is yet to roll [0]:** MBQ-B index summary score = Mean (Tummy time index, Restrained time index, Non-interactive screen time index, Interactive screen time index, Sleep index) **IF baby can roll [1]:** MBQ-B index summary score = Mean (Active play index, Restrained time index, Non-interactive screen time index, Interactive screen time index, Sleep index)

5.2. MBQ-C: Calculation of MBQ Index variables – variable names and description.

MBQ Index Variable	Description
PHYSICAL ACTIVITY	
Physical activity index	MBQ Index for physical activity. = ('Weighted average of total active play'/ 240) x 100
Energetic play index	MBQ Index for energetic play. IF 'Weighted average of energetic play' > 80, Energetic play index = 100 IF 'Weighted average of energetic play' <= 80, Energetic play index = ('Weighted average of energetic play' /80) x 100
SCREEN TIME	
Passive screen time index	MBQ Index for passive screen time. = (1 - ('Weighted average of passive screen time'/ 240)) x 100
SEDENTARY passive screen time index	MBQ Index for SEDENTARY passive screen time. = (1 - ('Weighted average of SEDENTARY passive screen time'/ 240)) x 100
Interactive screen time index	MBQ Index for interactive screen time. = (1 - ('Weighted average of interactive screen time'/ 240)) x 100
SEDENTARY interactive screen time index	MBQ Index for SEDENTARY interactive screen time. = (1 - ('Weighted average of SEDENTARY interactive screen time'/ 240)) x 100

SLEEP	
Sleep index raw score	Total sleep – MBQ Index raw score.
	IF child is younger than 3 years [1], [2].
	Sleep index raw score =
	(('Total sleep' - 300)/ 480) x 100
	(Index = 100 when Total Sleep is 13 hours or more; 75 when Total Sleep is 11 or more)
	IF child is 3 years or older [3], [4], or [5].
	Sleep index raw score =
	(('Total sleep' - 240)/ 480) x 100
	(Index = 100 when Total Sleep is 12 hours or more; 75 when Total Sleep is 10 hours or more)
Sleep index	MBQ Index for total sleep.
	IF Sleep index raw score > 100, Sleep index = 100
	IF Sleep index raw score <= 100, Sleep index = Sleep index raw score
Sleep routine index	MBQ Index for sleep routine.
	= (Q9/ 4) x 100
MBQ INDEX – SUMMARY SCORE	
MBQ-C index summary score	MBQ Index summary score is based on the average of index scores for each behaviour.
	= mean (Physical activity index, Energetic play index, Passive screen time index, SEDENTARY passive screen time index, Interactive screen time index, SEDENTARY interactive screen time index, Sleep index, Sleep routine index)