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Parents' knowledge, perceptions and support around appropriate physical activity, screen time and sleep time levels for children

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Abstract

Background: Many governments worldwide have established guidelines regarding children's physical activity and sedentary behaviors linked to positive health outcomes. While research has established low adherence to these guideline levels, it is unclear whether parents' knowledge, perceptions, and support around these behaviors might be barriers to adherence.

Aims: This study examines parents' knowledge and agreement with guideline levels of physical activity, screen time, and sleep time, as well as their support for these behaviors.

Methods: Parents of 5–12-year-old children who presented to a regional general practitioner (GP) office in New South Wales (NSW) responded to a survey regarding their child's physical activity, screen, and sleep time, as well as what they believed to be guideline levels, their perceived ideal levels, and the levels of support they provide for each of these behaviors.

Results: Parents' perceived ideal levels for their child's physical activity and screen time were more ambitious than government levels and were consistent with sleep time guidelines. There were, however, few associations between parent support levels and children's actual or perceived ideal levels of these behaviors.

Discussion: The findings suggest that parents' perceptions of ideal levels of physical activity and sedentary behavior may not hinder adherence to government guidelines. However, inconsistent, or ineffective support strategies can constrain adherence and thus be a viable intervention target.

Keywords: Children, Physical activity, Screen time, Sleep, Parent, Guidelines

Internationally, many governments have introduced daily guidelines regarding ideal levels of modifiable daily behaviors in an effort to improve population-level health and well-being (Department of Heath and Aged care, 2021; Tremblay et al., 2016). While healthy eating guidelines are perhaps best known, recent introductions and revisions have also sought to make recommendations on daily levels of physical activity, sedentary behavior,

and sleep. For instance, in 2021 the Australian government released its evidence-based physical activity and sedentary behaviour guidelines (Department of Heath and Aged care, 2021). This is in the context of increasing prevalence of overweight and obesity among Australian adults (62.8% overweight or obese as at 2012), and Australian children and young people (25.7% were overweight or obese as at 2012, compared to 20.9% in 1995; ABS 2013a (Australian Bureau of Statistics (ABS), 2013a).

Australia's guidelines indicate that children 5–12 years of age should engage in at least 60 min of moderate to vigorous physical activity (MVPA) each day and should limit the use of electronic media for entertainment ('screen time') to no more than 2 h each day (Department of Heath and Aged care, 2021). Similarly, The Active Start Guidelines were introduced in 2020 by the Society of Health and Physical Educators (SHAPE) America in an effort to support young children's healthy physical development. These recommendations outline the kinds and length of physical activities that are advised for preschool-aged children, with a focus on the critical role that caregivers play in supporting their physical health. The recommendations stress the need of both planned and unplanned movement for kids' general health by recommending at least 60 min of structured physical activity each day, to be complemented by as much as several hours of unstructured physical play (Switzler, 2022).

There are currently no Australian recommendations about sleep time. However, there is growing acknowledgement of the importance of adequate sleep for health and wellbeing. For instance, the Canadian 24-h movement guidelines for children and youth (Tremblay et al., 2016), on which international experts conferred, recommends that children aged 5–12 years should have 9–11 h of uninterrupted sleep per day. Adherence to these guidelines is important for individual and societal health and wellbeing, given findings that achieving these levels of physical activity, sleep and screen time results in improved health and fitness (Department of Heath and Aged care, 2021; Tremblay et al., 2016).

Participating in daily physical activity, getting enough sleep, and limiting screen time can result in a broad range of positive outcomes for children. For instance, 60 min per day of MVPA is associated with decreased adiposity, as well as improved health (i.e., cardiometabolic, musckuloskeletal, mental), cardiorespiratory fitness, and academic performance (Okely et al., 2012; Roman-Vinas et al., 2016). A dose–response relationship has been found for many of these outcomes, indicating that more physical activity is associated with greater the benefits (Okely et al., 2012; Poitras et al., 2016). Increasing sleep time is similarly associated with reduced adiposity, emotional regulation, mental health, academic performance, and quality of life (Chaput et al., 2016). Regarding screen time, results of a systematic review of sedentary behavior in children indicated that higher durations of screen time were associated with: increased adiposity; increased cardiometabolic risk factors; poorer behavioral conduct and prosocial behaviors; lower fitness; and lower self-esteem (Carson et al., 2016).

In addition to their independent effects, these behaviors have a cumulative effect on health and wellbeing. In regards to Canada's movement guidelines (i.e., 60 min MVPA, $\leq$2 h screen time, and 9–11 h sleep for 5–13 years), research found the more guidelines met (i.e., 1, 2 or 3 guidelines) the better the health outcomes (Janssen et al., 2017). This was consistent regardless of the combination of guidelines met.

However, despite the health and societal benefits associated with children meeting daily MVPA, sleep and screen time guidelines, adherence to these levels is poor. For instance, a multinational study conducted by Roman-Vinas et al. (2016) investigated the adherence of 60 min of MVPA, 9–11 sleep, and $\leq$2 h of screen time per day in 9–11 years across 12 countries (including Australia) of varying levels of economic development. Of the 6128 participants, only 7.2% met all three guidelines, and 19% met none. Australia had the highest proportion of children meeting all three guidelines (14.9% adherence) and lowest proportion meeting none of the recommendations (7.1%). The data available on Australian children's MVPA and screen time from 2011 to 2013 Australian Health Survey (Department of Health, 2014) indicated only 33% of 5–12-year-old children achieved 60 min/day of MVPA and 29% met the 2-h daily limit for screen time. While there is no national data on Australian children's sleep time adherence, the results of Roman-Vinas et al. (2016) study estimate that 75.8% of Australian children achieve 9–11 h of sleep per night.

Given the current low levels of adherence to physical activity, screen time, and sleep time guidelines in Australia (although the latter are not yet formally established as guidelines), it is important to understand the factors that may affect children's adherence. To this end, a systematic review by (Biddle et al., 2011) identified parental influence, social support, local crime, access to facilities, distance from home to school, and time spent outside as factors influencing children's daily physical activity levels. Influential factors that emerge while assessing children's screen time include family screen time, parental reinforcement, and household rules and restrictions (Granich et al., 2010).

This plausible alternative further highlights the importance of parental support for their children's health-related behaviors. For instance, within parent role modeling, the available research indicates that the more MVPA parents engage in, either themselves (Garriguet et al., 2017; Pugliese & Tinsley, 2007; Yao & Rhodes, 2015) or with their child (Pyper et al., 2016; Yao & Rhodes, 2015), the more MVPA children engage in. This relationship also holds for screen time, with higher levels of daily parent screen time positively associated with their child's screen time (Bleakley et al., 2013; Brindova et al., 2014; Garriguet et al., 2017; Pyper et al., 2016). Another aspect of parental support involves facilitating their child's health-related behaviors. For instance, children show higher levels of MVPA when: enrolled in physical activities such as sports (Garriguet et al., 2017); they receive transportation from their parent(s) to engage in physical activity (Pyper et al., 2016; Yao & Rhodes, 2015); and/or are provided with equipment to use in physical activities (Yao & Rhodes, 2015). For screen and sleep time, enforcement of rules has also been shown to be influential. For instance, when parents enforce rules around screen time limits, children are more likely to meet daily screen time guidelines (Brindova et al., 2014; Pyper et al., 2016). Similarly, when children have a specific bedtime enforced, they are more likely to meet sleep guidelines (Pyper et al., 2017). Parent encouragement and praise is also shown to positively influence children's health behaviors (Pyper et al., 2016; Yao & Rhodes, 2015).

Aims

It is thus clear that parent perceptions and support play an important role in children's levels of physical activity, screen time and sleep time, yet little is known about parents' knowledge of the guidelines, what parents deem to be appropriate levels of these

behaviors, and amount of support they provide for their children to reach these levels. As such, the research questions guiding this study were:

1. Are parents aware of the guideline levels of physical activity, screen time and sleep time?
2. Do parental perceptions of appropriate levels of physical activity, screen time and sleep time differ from government guideline recommendations?
3. Are parent perceptions of ideal levels of physical activity, screen time and sleep time associated with the level of support they provide for these behaviors?

Given finding that guideline-adherence levels are low among Australian children (Department of Health, 2014), and research in other areas suggesting this may be related to parent perceptions and support [e.g., Yao and Rhodes (2015)], it was expected that parents' knowledge and perceptions of appropriate levels of physical activity, screen time and sleep would be lower than recommended government guidelines. behaviors Further, it was hypothesized that higher levels of support would be provided if parents believed that higher levels of physical activity and sleep time and lower levels of screen time were required. Therefore, levels of parental support would be associated with parental perceptions of appropriate levels of these behaviors.

Methods

Participants

Participants were 61 parents of 5–12-year-old children who attended a GP appointment between Oct. 2017 and Feb. 2018 at a regional GP office in NSW, Australia. The sample was comprised of 75.4% mothers (24.6% fathers), and 96.7% identified themselves as the primary carer. Parent qualifications were: 13.1% less than year 12; 1.6% year 12 or equivalent; 37.7% diploma, trade, apprenticeship or certificate; and 19.7% post-graduate qualification. All were fluent speakers/readers of English.

Parents reported on demographics, physical activity, screen time and sleep for: (i) the child attending the appointment with them; or (ii) if none or multiple children attending, their oldest child in this age range (to preempt clustering effects). The sample of children on which parents reported was comprised of 50.8% males with a mean age of 8.92 years (SD = 2.46). The mean socio-economic indexes for areas (SEIFA) decile for the child's area of residence was 5.84 (SD = 1.19; range = 1–8), indicating low-to-moderate SES sample. If the child was present when the survey was completed, height and weight measurements were recorded using a provided height chart and scale. Height was reported for 31 children (M = 135.65 cm, SD = 14.60). Weight was recorded for 36 children (M = 31.34 kg, SD = 12.50). These height and weight means are consistent with median expected height and weight for this age group.

Measures

Survey questions were based on existing longitudinal and governmental surveys, and explored: (a) levels of 5–12-year-old children's physical activity, screen time and sleep; (b) parent perceptions of appropriate levels of these behaviors; and (c) levels of parental support for these behaviors. Survey items are described below.

Physical activity

The item to capture children's physical activity was adapted from the Australian Bureau of Statistics' (ABS) National Nutrition and Physical Activity Survey 2011–12 (Australian Bureau of Statistics (ABS), 2013a) and Healthy Active Preschool Years (HAPPY) study (Hinkley et al., 2012). Specifically, consistent with both surveys, parents reported their child's average daily physical activity as an open response, in minutes. This was preceded by a definition of physical activity and examples, which have been used across multiple studies (Australian Bureau of Statistics (ABS), 2013a). In contrast to the ABS and HAPPY surveys, however, the current study asked parents to report their child's average physical activity per day over the past 7 days. This contrasts 1-day recall in the ABS survey (which can introduce atypical estimates if based on an atypical day of physical activity) and 1-month recall in the HAPPY survey (which can make estimation over this length of time difficult). In both cases, however, the survey items showed evidence of associations with objective measures of physical activity and its correlates (Hinkley et al., 2012). The current item was expected to show validity and reliability similar to previous items.

As no survey items could be found regarding parents' knowledge and perceived ideal levels of physical activity guidelines, questions were developed for the current study based on the item about physical activity levels (i.e., 'What do you feel is the ideal amount of daily physical activity for your child?'; 'What do you think is the government's recommended level of daily physical activity for 5–12-year-old children?').

In addition, questions on parental support for physical activity were drawn from a study by Trost and Loprinzi (2011) on correlates of child physical activity. These items—one item on each of encouragement, participation, facilitation, monitoring, and education—asked parents to indicate the frequency of these forms of support from 1 (never) to 5 (daily) (e.g., 'In the last 7 days, how often have you played outside or done physical activity or sports with your child?'). These items have shown good psychometric and test–retest reliability (Trost et al., 2003). The full survey can be found at Appendix A.

Screen time

The screen time item mirrored the format of the physical activity question and was similarly consistent with Australian Bureau of Statistics (ABS) (2013a) survey items. Parents' perceived ideal levels of screen time and knowledge of guideline recommendations also paralleled the physical activity items. As there were no questions about support for limiting screen time, parental support for physical activity questions were modified to reflect parental support to reduce/limit screen time, while maintaining the same dimensions of support (e.g., encouragement: 'In the last 7 days, how often have you encouraged your child to limit or reduce his/her screen time; e.g., take breaks from watching or playing?'; participation: 'In the last 7 days, how often have you limited or reduced your own screen time as a model for your child?').

Sleep time

All sleep time questions were also modeled from physical activity items, except that sleep time was generated from a question of when the child typically went to sleep at

night and woke in the morning over the last 7 days. This approach was modified Australian Bureau of Statistics (ABS) (2013a), but has the advantage of capturing variability in child bedtimes. Parent support questions were similarly modified from the parent support for physical activity items (e.g., encouragement: 'In the last 7 days, how often have you encouraged your child to get a good night's sleep; e.g., go to bed on time, stay in bed, try to go straight to sleep?'; participation: 'In the last 7 days, how often have you participated in your child's bedtime routine; e.g., tucking child in, reading bedtime stories?').

Procedure

Prior to each day in the study period, upcoming appointments were reviewed to identify attending patients with 5–12-year-old children. On presentation to the Practice, potential participants were asked by reception staff (or the primary investigator) if they would be willing to complete a short survey on their child's physical activity, screen time and sleep time. Those expressing interest were given an information sheet and survey to review, and after consenting to participate, they completed the survey. Surveys were completed while waiting for their appointment to commence. Completed surveys, which were anonymous, were deposited in a secure box in the Practice. Completion of the survey was considered tacit consent for participation.

Plan for analysis

Before the formal analyses, data were explored to examine distributions and identify any extreme data points. Later the data were used to triangulate the current results' consistency with previous child studies in Australia (e.g., in the amounts of physical activity and screen time). This ensured that data were appropriate for analysis and flagged any issues with the collected data. For the first question, one-sample *t* tests were conducted to compare parents' beliefs of guideline levels with current guidelines. For the second research question, differences in the guideline-recommended levels of physical activity, screen time and sleep time and the parents' perceived ideal levels were evaluated using paired-samples *t* tests. For the third research question, correlations were run between parents' perceived ideal levels of these behaviors and levels of support they provided.

Results

Initial data exploration and evaluation

Initial analyses sought to explore the data to evaluate, descriptively, the extent to which parent-reported physical activity, screen time and sleep were consistent with prior findings using objective measurements, as a form of external validation of the current data. Descriptive statistics for all variables are presented in Table 1. Parents seemed to over-estimate children's physical activity, i.e., the mean level of 85.86 min of physical activity reported in the current study was similar to ABS findings of 91 min, but the 77.6% of children in the current study reported as meeting physical activity guidelines exceeds the 19% reported in the 2016 National Report Card (Australian Bureau of Statistics (ABS), 2013b; Tomkinson et al., 2016). Parents also may have underestimated children's screen time, i.e., $M = 90.70$ min in the current study vs. 136 min in the ABS survey; (Australian Bureau of Statistics (ABS), 2013a).

Table 1 Reported actual, guideline and support for PA, ST, SLT

	M (SD)	Range	% Aligned/meeting
Physical activity (PA)			60+ min
Reported avg. amt. (min)	85.86 (51.49)	10–240	77.6%
Perceived ideal amt. (min)	88.11 (49.67)	30–240	80.3%
Assumed guideline (min)	75.28 (52.03)	20–250	71.7%
Support			
Encourage to do	3.46 (1.47)	1–5	
Participate in	3.02 (1.41)	1–5	
Transportation	2.51 (1.19)	1–5	
Watch child doing	2.59 (1.09)	1–5	
Say benefits	3.00 (1.52)	1–5	
Screen time (ST)			< 120 min
Reported avg. amt. (min)	90.70 (54.75)	10–240	85.2%
Perceived ideal amt. (min)	60.17 (39.09)	0–180	98.3%
Assumed guideline (min)	54.11 (27.32)	0–120	100.0%
Support			
Encourage to limit	3.75 (1.43)	1–5	
Participate in limiting	3.15 (1.54)	1–5	
Provide support to limit	3.59 (1.44)	1–5	
Monitor & enforce	3.79 (1.47)	1–5	
Say benefits	3.58 (1.43)	1–5	
Sleep time (SLT)			9–11 h
Reported avg. amt. (h)	10.26 (0.84)	8–12	88.2%
Avg. start time (time)	20:25 (0:44)	19:00–22:00	
Perceived ideal amt. (h)	10.15 (1.16)	8–12	71.7%
Assumed guideline (h)	10.14 (1.31)	8–14	67.3%
Support			
Encourage to do	4.27 (1.09)	1–5	
Participate in routine	4.58 (0.93)	2–5	
Provide support	4.73 (0.66)	2–5	
Monitor & enforce	4.32 (1.21)	1–5	
Say benefits	3.98 (1.40)	1–5	
2+ guidelines			
Meeting guidelines			92.1%
Knows guidelines			92.3%
All 3 guidelines			
Meeting guidelines			60.3%
Knows guidelines			44.2%

Where parents reported ranges (e.g., 30–60 min of physical activity), the mean of that range was adopted. For '% Alignment', alignment was considered where reported perceived ideal or guideline levels were in line with government guidelines. '% Meeting' guidelines considers those who reported meeting or exceeding guideline levels

This suggests that parent reports may overestimate their child's physical activity, and underestimate their sedentary behaviors. However, there is less reason to believe this issue distorted parents' reported beliefs of ideal levels of these behaviors, their knowledge of guidelines, or the frequency of supports provided for these activities, given the survey's focus on personal perceptions and its anonymous nature. These items on

parent perceptions, knowledge and support are the focus of the research questions and analyses that follow.

Parents' knowledge of guidelines and alignment of perceived ideal amounts

Subsequent analyses sought to examine parents' knowledge of guidelines, beliefs of ideal levels of child behaviors and the supports they provided. A majority of parents were accurate (i.e., at or above minimum recommendations) in their knowledge of the guideline levels of physical activity (i.e., 71.7% indicated 60 min or above per day), screen time (i.e., 100% indicated 120 min or less per day) and sleep time (i.e., 67.3% indicated 9–11 h per night). In fact, 92.3% of parents correctly reported at least two guidelines, while 44.2% correctly reported all three guidelines. One-sample *t* tests showed parents' perceptions of ideal levels were significantly higher than (yet still within) guideline levels for physical activity, $t(60) = 4.42$, $p < 0.001$ ($M_{ideal} = 88.11$ min, SD = 49.67), and lower than (yet still within) guideline levels for screen time, $t(59) = -11.86$, $p < 0.001$ ($M_{ideal} = 60.17$ min, SD = 39.09). Parent perceptions of ideal sleep time did not significantly differ from guidelines, $t(59) = 1.01$, $p = 0.318$ ($M_{ideal} = 10.15$ h, SD = 1.16). These results are contrary to hypotheses that parents would underestimate suggested levels of physical activity and sleep time, and overestimate guideline levels of screen time (Table 2).

Associations between parent beliefs and parental support

The final set of analyses sought to evaluate associations of parent perceptions of ideal levels of physical activity, screen time and sleep with the levels of support they provided for these activities. Pearson correlations indicated a significant association of perceived ideal levels of physical activity with support provided, $r = 0.30$, $p = 0.019$, such that support levels tended to increase with increased perceptions of the ideal amount of physical activity (correlations with reported physical activity levels: $r = 0.49$, $p < 0.001$). These associations were not evident, however, for sleep time support, $r = 0.23$, $p = 0.080$ (correlations with reported sleep time: $r = 0.29$, $p = 0.024$), or support for limiting screen time, $r = -0.06$, $p = 0.631$ (correlations with reported screen time: $r = 0.04$, $p = 0.751$). These results partially support the hypothesis that levels of parent support would positively relate to perceived ideal levels of these activities. This outcome was found for physical activity, albeit modestly, whereas no associations were found between perceived ideal levels and support for screen time or sleep time.

Table 2 Correlations between parents' perceived ideal levels of, and support for, PA, ST, SLT

	1	2	3	4	5	6
1. Ideal levels of physical activity	–	0.02	0.03	0.30*	0.13	−0.17
2. Ideal levels of screen time		–	0.07	−0.14	−0.06	−0.10
3. Ideal levels of sleep time			–	0.02	0.23	0.23
4. Support for physical activity				–	0.60*	0.26*
5. Support for reducing screen time					–	0.17
6. Support for sleep time						–

* Indicates $p < .0.05$

Discussion

The current study sought to investigate whether parents had accurate knowledge of physical activity and sedentary behavior guidelines and whether parental perceptions of ideal physical activity, screen time, and sleep time for their child (5–12 years of age) differed from government guidelines; and whether these perceptions were associated with the level of parental support for these behaviors. Results indicated that most parents agreed with or exceeded minimum recommendations for each behavior. The parents' perceived ideal physical activity levels were significantly higher than the minimum recommended level, while screen time was considerably lower than the maximum daily guideline. Sleep time was consistent with the guidelines. The level of parental support for these behaviors is related only to perceived ideal levels of physical activity but not sleep or screen time. While parents' knowledge of physical activity and screen time guidelines did not specifically align with minimum recommendations for these behaviors (39.6% cited 60 min for physical activity and 8.9% cited 120 min for screen time), they indicated ideal levels that exceeded these minimum guideline recommendations. That parents' ideal levels were more ambitious than government guidelines is potentially beneficial, given that previous findings show a dose–response relationship for physical activity and screen time. That is, for physical activity, with higher levels of physical activity come higher levels of fitness (Poitras et al., 2016), academic performance and mental health (Okely et al., 2012). For screen time, longer durations are associated with increased adiposity, increased cardiometabolic risk, poorer behavioural conduct and prosocial behaviors, lower fitness and lower self-esteem (Carson et al., 2016). These results suggest that parents may be receptive to government authorities setting higher targets for daily physical activity and lower targets for daily screen which, if adhered to, would result in better outcomes for children.

Despite these favourable parental perceptions of ideal physical activity and screen time in the current study, low levels of adherence in previous studies suggest difficulties in achieving these targets (Department of Health, 2014; Roman-Vinas et al., 2016). Previous studies examining adherence of Australian children (5–12 years) to guidelines range from 33 to 55% for physical activity and 29% to 35% for screen time (Department of Health, 2014; Roman-Vinas et al., 2016). Whilst findings in the current study were 78% and 85% adherence, respectively, this is likely due to overestimations in parent-proxy surveys compared to, for example, direct measures such as accelerometry (Adamo et al., 2009; Centre for Physical Activity and Health (CPAH), 2004; Lubans et al., 2011). Previous research indicates that the reasons for children's non-adherence to these guidelines are multifactorial and complex. Identified factors include neighborhood safety, distance to school, time spent outdoors, social supports and parental involvement (Biddle et al., 2011).

Parental support and involvement, in particular, has been found to be positively associated with children's physical activity (Biddle et al., 2011; Trost & Loprinzi, 2011) and negatively associated with screen time (Spurrier et al., 2008). While parental support levels were reported as generally high in the current study, this was often unrelated to perceived ideal or reported actual levels of these behaviors in children. Parent support was significantly and positively associated with ideal and reported physical activity, but not for screen and sleep time. This may suggest that, in the case of sleep and screen time

in particular, some parents may be adopting ineffective strategies to support their child to meet government physical activity and sedentary behaviour guidelines. For example, low levels of support for limiting screen time may be effective in contexts where screen devices are less available, but less effective where screens are readily available and their use is regularly modeled. This possibility is supported by research demonstrating that multiple TVs in the home, a TV in children's bedrooms, and family TV viewing habits (i.e., watching TV while eating meals, TV utilized as family time) are all associated with higher levels of screen time (Granich et al., 2010). Research suggests that strategies for effectively limiting screen time include: reducing TVs and other electronic devices from children's bedrooms; school screen time intervention programs; promoting alternatives to TV viewing; TV allowance devices; family workshops; improving neighborhood safety; and encouraging time outdoors (Carver et al., 2008; Heath et al., 2012; Schmidt et al., 2012; Timperio et al., 2004). Thus, given the complexity of factors which contribute to physical activity levels and screen time in children, a multifaceted approach to improve the health and wellbeing of children is required.

Sleep had the highest reported adherence rate in the current study relative to international guidelines, and parents' knowledge of sleep time recommendations was highly accurate despite the lack of existing sleep guidelines in Australia (67.3% cited 9–11 h of sleep). Yet there were no associations between the parents' perceived ideal amounts of sleep and their levels of support. One possible explanation for these findings is that appropriate sleep time was well known by parents, and achieved by children, which limited the variability in parent reports on these items (as evidenced by comparatively low standard deviations relative to the mean). This constrains potential for association with other variables. Further, the data suggest that while most children were achieving a good night of sleep, children may vary in levels of support needed to achieve this amount of sleep. That is, children who go to bed easily may require lower levels of support than those who resist sleep, despite both children ultimately achieving similar amounts of sleep. As such, parents' greater knowledge of appropriate sleep times and apparently greater emphasis on sleep support (according to parents' ratings of the frequency of support for sleep) means that children achieved high levels of adherence despite the types and levels of support potentially varying across parents and children.

Limitations

These results must be considered in light of some limitations to the current study's methodology. First, parent-proxy data are notorious for biased estimates of children's actual behaviors (compared to direct measures; e.g., accelerometer). This appeared to be the case in the current study for children's actual physical activity and screen time, which differed from previous studies' estimates. However, parental data were more appropriate for the current study's key variables of: children's actual sleep time (which was consistent with previous studies like the one by Roman-Vinas et al. (2016); parental perceptions of ideal levels of physical activity, screen time and sleep time daily; parental knowledge of existing guidelines; and parental support behaviors. While it is noted that response bias may also exist for these question types (e.g., socially desirable responding), this was at least partially mitigated by the anonymous nature of the survey. Second, the sample in the current study was constrained in size and geographic location, which hinders broad

generalizability. Further research is thus needed to investigate these associations using more objective measures (where available) and with more diverse samples.

Conclusions

The current study contributes meaningful findings that parents' ideal levels for their child's physical activity and sedentary behaviors are already more ambitious than government recommendations. Yet, the general lack of association of parental support with ideal and actual levels of these behaviors also suggests that ineffective parent strategies are a factor in non-adherence. While further research is desired to extend these findings, adherence can be improved by intervention and education programs that target evidence-based strategies to promote physical activity and reduce screen time—rather than implementing campaigns focused on increasing awareness of government guidelines. Examples include government initiatives such as family workshops, school interventions, and community campaigns to remove television sets from children's bedrooms. These are just a few evidence-based suggestions for increasing physical activity and decreasing screen time to improve children's health and well-being and warrant further study.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40723-024-00129-8.

Supplementary Material 1.

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Dr Maree Howard played main role in conceptualization of the project, data collection and putting an initial draft. Dr Shahid Akhund helped in data analysis and putting the final draft of the manuscript for publication.

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Declarations

Competing interests
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References

Adamo, K. B., Prince, S. A., Tricco, A. C., Connor-Gorber, S., & Tremblay, M. (2009). A comparison of indirect versus direct measures for assessing physical activity in the pediatric population: A systematic review. *International Journal of Pediatric Obesity, 4*(1), 2–27. https://doi.org/10.1080/17477160802315010

Australian Bureau of Statistics (ABS). (2013a). *Australian Health Survey: Updated results, Key Findings*. Canberra Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4364.0.55.003Chapter12011-2012

Australian Bureau of Statistics (ABS). (2013b). *Australian Health Survey: Users' guide, 2011–13, National Nutrition and Physical Activity Questionnaire*. Retrieved from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4363.0.55.0012011-13?OpenDocument

Biddle, S. J. H., Atkin, A. J., Cavill, N., & Foster, C. (2011). Correlates of physical activity in youth: A review of quantitative systematic reviews. *International Review of Sport and Exercise Psychology, 4*(1), 25–49. https://doi.org/10.1080/1750984x.2010.548528

Bleakley, A., Jordan, A. B., & Hennessy, M. (2013). The relationship between parents' and children's television viewing. *Pediatrics, 132*(2), E364–E371. https://doi.org/10.1542/peds.2012-3415

Brindova, D., Pavelka, J., Sevcikova, A., Zezula, I., van Dijk, J. P., Reijneveld, S. A., & Geckova, A. M. (2014). How parents can affect excessive spending of time on screen-based activities. *BMC Public Health*. https://doi.org/10.1186/1471-2458-14-1261

Carson, V., Hunter, S., Kuzik, N., Gray, C. E., Poitras, V. J., Chaput, J. P., Saunders, T. J., Katzmarzyk, P. T., Okely, A. D., Gorber, S. C., Kho, M. E., Sampson, M., Lee, H., & Tremblay, M. S. (2016). Systematic review of sedentary behaviour and health indicators in school-aged children and youth: An update. *Applied Physiology Nutrition and Metabolism, 41*(6), S240–S265. https://doi.org/10.1139/apnm-2015-0630

Carver, A., Timperio, A., & Crawford, D. (2008). Playing it safe: The influence of neighborhood safety on children's physical activity—a review. *Health & Place, 14*(2), 217–227. https://doi.org/10.1016/j.healthplace.2007.06.004

Centre for Physical Activity and Health (CPAH). (2004). *Physical activity measurement in children by parental self report*. Retrieved from University of NSW.

Chaput, J. P., Gray, C. E., Poitras, V. J., Carson, V., Gruber, R., Olds, T., Weiss, S. K., Gorber, S. C., Kho, M. E., Sampson, M., Belanger, K., Eryuzlu, S., Callender, L., & Tremblay, M. S. (2016). Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. *Applied Physiology Nutrition and Metabolism, 41*(6), S266–S282. https://doi.org/10.1139/apnm-2015-0627

Department of Heath and Aged care, A. G. (2021). Physical acrtivity and excercise for all Australian. Retrieved from https://www.health.gov.au/health-topics/physical-activity-and-exercise/physical-activity-and-exercise-guidelines-for-all-australians/for-children-and-young-people-5-to-17-years

Department of Health, G. o. A. (2014). Research and statistics. Retrieved from http://www.health.gov.au/internet/main/publishing.nsf/content/health-pubhlth-strateg-active-evidence.htm

Garriguet, D., Colley, R., & Bushnik, T. (2017). Parent-Child association in physical activity and sedentary behaviour. *Health Reports, 28*(6), 3–11.

Gibson, E. L., Wardle, J., & Watts, C. J. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite, 31*(2), 205–228. https://doi.org/10.1006/appe.1998.0180

Granich, J., Rosenberg, M., Knuiman, M., & Timperio, A. (2010). Understanding children's sedentary behaviour: A qualitative study of the family home environment. *Health Education Research, 25*(2), 199–210. https://doi.org/10.1093/her/cyn025

Heath, G. W., Parra, D. C., Sarmiento, O. L., Andersen, L. B., Owen, N., Goenka, S., Montes, F., Brownson, R. C., Lancet Physical Activity Series Working, G. (2012). Evidence-based intervention in physical activity: Lessons from around the world. *Lancet, 380*(9838), 272–281. https://doi.org/10.1016/S0140-6736(12)60816-2

Hinkley, T., Salmon, J., Okely, A. D., Crawford, D., & Hesketh, K. (2012). The HAPPY Study: Development and reliability of a parent survey to assess correlates of preschool children's physical activity. *Journal of Science and Medicine in Sport, 15*(5), 407–417. https://doi.org/10.1016/j.jsams.2011.12.009

Janssen, I., Roberts, K. C., & Thompson, W. (2017). Is adherence to the Canadian 24-hour movement behaviour guidelines for school-aged children and youth associated with improved indicators of physical, mental, and social health? *Applied Physiology, Nutrition and Metabolism, 42*, 725–731.

Lubans, D. R., Hesketh, K., Cliff, D. P., Barnett, L. M., Salmon, J., Dollman, J., Morgan, P. J., Hills, A. P., & Hardy, L. L. (2011). A systematic review of the validity and reliability of sedentary behaviour measures used with children and adolescents. *Obesity Reviews, 12*(10), 781–799. https://doi.org/10.1111/j.1467-789X.2011.00896.x

Okely, T., Salmon, J., Vella, S., Cliff, D., Timperio, A., Tremblay, M., Trost, S., Shilton, T., Hinkley, T., Ridgers, N., Phillipson, L., Hesketh, K., Parrish, A., Janssen, X., Brown, M., Emmel, J. & Marino, N. (2012). A systematic review to update the Australian physical activity guidelines for children and young people. Canberra, Australia: Commonwealth of Australia.

Peetoom, K. K. B., Smits, J. J. M., Ploum, L. J. L., Verbakel, J. Y., Dinant, G. J., & Cals, J. W. L. (2017). Does well-child care education improve consultations and medication management for childhood fever and common infections? A systematic review. *Archives of Disease in Childhood, 102*(3), 261–267. https://doi.org/10.1136/archdischild-2016-311042

Poitras, V. J., Gray, C. E., Borghese, M. M., Carson, V., Chaput, J. P., Janssen, I., Katzmarzyk, P. T., Pate, R. R., Gorber, S. C., & Kho, M. E. (2016). Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. *Applied Physiology, Nutrition, and Metabolism, 41*(6), S197–S239.

Pugliese, J., & Tinsley, B. (2007). Parental Socialization of child and adolescent physical activity: A meta-analysis. *Journal of Family Psychology, 21*(3), 331–343. https://doi.org/10.1037/0893-3200.21.3.331

Pyper, E., Harrington, D., & Manson, H. (2016). The impact of different types of parental support behaviors on child physical activity, healthy eating, and screen time: a cross-sectional study. *BMC Public Health*. https://doi.org/10.1186/s12889-016-3245-0

Pyper, E., Harrington, D., & Manson, H. (2017). Do parents' support behaviors predict whether or not their children get sufficient sleep? A cross-sectional study. *BMC Public Health, 17*(1), 432.

Roman-Vinas, B., Chaput, J. P., Katzmarzyk, P. T., Fogelholm, M., Lambert, E. V., Maher, C., Maia, J., Olds, T., Onywera, V., Sarmiento, O. L., Standage, M., Tudor-Locke, C., Tremblay, M. S., ISCOLE Research Group. (2016). Proportion of children meeting recommendations for 24-hour movement guidelines and associations with adiposity in a 12-country study. *International Journal of Behavioral Nutrition and Physical Activity, 13*(1), 123. https://doi.org/10.1186/s12966-016-0449-8

Schmidt, M. E., Haines, J., O'Brien, A., McDonald, J., Price, S., Sherry, B., & Taveras, E. M. (2012). Systematic review of effective strategies for reducing screen time among young children. *Obesity, 20*(7), 1338–1354. https://doi.org/10.1038/oby.2011.348

Spurrier, N. J., Magarey, A. A., Golley, R., Curnow, F., & Sawyer, M. G. (2008). Relationships between the home environment and physical activity and dietary patterns of preschool children: a cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity*. https://doi.org/10.1186/1479-5868-5-31

Switzler, M. (2022). *Encouraging an active start: A workshop for early childhood educators about physical education in preschool*. California State University.

Timperio, A., Salmon, J., & Ball, K. (2004). Evidence-based strategies to promote physical activity among children, adolescents and young adults: Review and update. *Journal of Science and Medicine in Sport, 7*(1), 20–29.

Tomkinson, G., Schranz, N., Olds, T., Boyd, R., Evans, J., Gomersall, S., . . . Ridgers, N. (2016). *Physical Literacy: Do Our Kids Have All the Tools? The 2016 Active Healthy Kids Australia Report Card on Physical Activity for Children and Young People*. Retrieved from https://find.library.unisa.edu.au/primo-explore/fulldisplay?id=9916078606601831&vid=ROR&sortby=rank&lang=en_US

Tremblay, M. S., Carson, V., Chaput, J. P., Connor Gorber, S., Dinh, T., Duggan, M., Faulkner, G., Gray, C. E., Gruber, R., Janson, K., Janssen, I., Katzmarzyk, P. T., Kho, M. E., Latimer-Cheung, A. E., Le Blanc, C., Okely, A. D., Olds, T., Pate, R. R., Phillips, A., … Zehr, L. (2016). Canadian 24-hour movement guidelines for children and youth: An integration of physical activity, sedentary behaviour, and sleep. *Applied Physiology, Nutrition and Metabolism, 41*(6 Suppl 3), S311-327. https://doi.org/10.1139/apnm-2016-0151

Trost, S. G., & Loprinzi, P. D. (2011). Parental influences on physical activity behavior in children and adolescents: A brief review. *American Journal of Lifestyle Medicine, 5*(2), 171–181. https://doi.org/10.1177/1559827610387236

Trost, S. G., Sallis, J. F., Pate, R. R., Freedson, P. S., Taylor, W. C., & Dowda, M. (2003). Evaluating a model of parental influence on youth physical activity. *American Journal of Preventive Medicine, 25*(4), 277–282. https://doi.org/10.1016/S0749-3797(03)00217-4

Yao, C. A., & Rhodes, R. E. (2015). Parental correlates in child and adolescent physical activity: A meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 12*(1), 10.

Zarnowiecki, D., Sinn, N., Petkov, J., & Dollman, J. (2012). Parental nutrition knowledge and attitudes as predictors of 5–6-year-old children's healthy food knowledge. *Public Health Nutrition, 15*(7), 1284–1290.

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