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Mandatory Naptimes in Childcare and Children's Nighttime Sleep

Running Head: Naptime in Childcare and Children's Nighttime Sleep

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ABSTRACT

Objectives: To examine the relationship between mandatory naptimes in childcare and children's nighttime sleep duration, both concurrently and 12 months later once in school.

Methods: A sample of 168 children (50-72 months; 55% males) attending licensed childcare centres were observed across their morning and throughout their scheduled naptime. Mandatory naptime was determined as the period in which children were not permitted any alternative activity except lying on their bed. Teachers reported each child's napping in childcare. Nighttime and total sleep duration was reported by parents at two time points, in childcare and in the second semester of their first school year. General linear models were used to examine group differences in sleep duration between children experiencing 0-60 minutes and >60 minutes of mandatory naptime, adjusting for key confounders. Path analysis was conducted to test a mediation model in which mandatory naptime is associated with nighttime sleep duration through increased napping in childcare.

Results: Children who experienced >60 minutes of mandatory naptime in childcare had significantly less nighttime sleep than those with 0-60 minutes of mandatory naptime. This difference persisted at 12-month follow-up, once children were in school. Napping in childcare mediated the relationship between mandatory naptime and duration of nighttime sleep.

Conclusions: Exposure to mandatory naptimes of >60 minutes in childcare is associated with decreased duration of nighttime sleep that endures beyond childcare attendance. Given the large number of children who attend childcare, sleep practices within these settings present an important focus for child health.

Key Words: nap, sleep, childcare, preschool, children

Insufficient nighttime sleep in young children significantly increases the risk of adverse health and developmental outcomes, most notably increased behavioural difficulties,[1] poorer cognitive functioning,[2] increased injury,[3] and increased paediatric obesity.[4] Napping has been proposed as a potentially modifiable component of children's sleep, and one that may ameliorate the effects of reduced nighttime sleep.[5,6] Studies of the effects of napping in early childhood do not consistently report positive effects,[7-9] however, and raise questions about the value of napping promotion.[10] Restricting the napping of children who would normally nap has been shown to have adverse effects on their emotional regulation[11] and cognitive performance.[12,13] In contrast, Lam et al. in a study conducted in childcare settings where naptime is a part of the daily routine, report napping to be associated with poorer cognitive functioning.[8] A key feature distinguishing these conflicting findings is the age and biological sleep drive of the children studied. While napping restriction studies have sampled younger children (<3 years) because they habitually nap,[11-13] Lam et al. focused on preschoolers (3-5 years) who were required to nap when many no longer have the biological drive to do so.[8] The conflicting findings direct attention to the changing developmental value of napping as children transition from infancy through to the preschool years.

Among preschoolers, napping is consistently associated with shorter duration of nighttime sleep[6,14-18] and likely reflects normative developmental changes in sleep drive.[19] Normative studies indicate that by age 3 approximately half of all children will have ceased regular napping, with the proportion napping dropping to less than a quarter by age 4.[20-22] Despite the normative pattern of consolidation of sleep into the night period, a common practice in childcare programs internationally is the scheduling of a *mandatory naptime* throughout the childcare years, during which time all children are required to lie on their bed and are not permitted to engage in alternative activity.[17,23] The impact of such environmental exposures are likely meaningful. Environmental, and not biogenetic factors, account for

almost 80% of the variance in napping duration by age 4-years.[5,7,24] Such environmental influence has already been demonstrated in the association between parent's attitudes toward napping, and the duration of napping in preschool aged children.[6] Whether such effects are also seen in the context of childcare, where napping is actively promoted, has not been determined.

Across developed nations more than two-thirds (77%) of children aged 3-5 years attend childcare programs,[25] yet there remains little understanding of the impacts of attendance on children's sleep patterns. Current evidence derives from two Japanese studies that compared two forms of childcare provision, one in which napping is optional and the other in which a mandatory naptime of 1.5 hours is legislated.[15,16] Both studies report exposure to legislated mandatory naptimes to be associated with reduced nighttime sleep duration and increased sleep problems; an effect found at the time of attendance[16] and up to 4 years later, when the children had entered school and exposure to childcare had ceased.[15] While these studies suggest that mandatory naptimes may disrupt nighttime sleep, their design was limited to simple comparison between program types. They did not include direct observation of naptime practices and could not exclude other childcare, child or family characteristics that may have explained this finding. In the current study we address these limitations. On the basis of the prior citations we hypothesise that children in childcare settings with longer mandatory naptimes would have reduced duration of nighttime sleep, and that this difference would continue, at 12 month follow-up, once children had entered school. Further, we hypothesised that how regularly a child napped in childcare would mediate the relationship between mandatory naptime and the duration of their nighttime sleep.

METHODS

Study Design and Participants

Data were collected as part of the Effective Early Education Experiences (E4Kids) study. The E4Kids study includes children across a representative sample of early childhood program provision in Australia.[23] Observations of sleep practices were conducted in 130 centre-based childcare rooms located within both long day care (*n=75)* and kindergarten (*n=55)* programs. Long day care in Australia is equivalent to Childcare in the USA, while kindergarten is equivalent to preschool in the USA. The rooms were located in Brisbane (metropolitan; *n*=121 rooms) and Mt Isa (rural; *n=9 rooms*), Queensland, Australia. Observations were conducted during 2011. At this time, a total of 239 of the E4Kids cohort were attending childcare programs. The analyses presented are based on data collected from direct observations within childcare rooms, teacher report of the child's napping at childcare and parent report of their child's sleep at two time point; concurrent with the observational data whilst in childcare (T1) and at 12-month follow-up when the same children had entered school (T2). Of the initial 239 children for which observation and teacher report data was collected, 70 (29%) did not have parent report data available at T1, and were subsequently excluded from analyses. As the primary interest was preschool aged children, one child outside the preschool age range (>6 years) at T1 was excluded. The final sample included 168 children at T1, with 130 of these children available for follow-up at T2.

Measures

Mandatory naptime. Mandatory naptime in each child's childcare setting was measured at T1 by trained researchers via direct observation. Researchers used a standard protocol to record the time in which different activities were permitted during designated sleep periods.[26] Duration of mandatory naptime was defined as the length of time (minutes) within a childcare room in which all children were required to lie on beds, without any

alternate activity permitted (e.g. drawing or reading). Inter-rater reliability was determined via independent observation by two researchers across eight study rooms and was deemed excellent (*ICC*=.996). Although Australian legislation requires that all childcare services provide for each child's individual sleep and rest needs, [27] there are currently no specific guidelines regarding how children's sleep needs should be met. Consequently, decisions regarding the duration and mandating of naptimes for preschool children are made at organisational level and, in response to complex organisational and staffing constraints, are almost universally scheduled as a routine group activity once per day.[26,28]

Napping at childcare. How regularly each child napped at childcare was reported at T1 by teachers via a single-item "Does this child usually sleep during sleep/rest time?" with a 5-point Likert scale (0=never, 1=rarely, 2=sometimes, 3=mostly, 4=always). Teacher reports of how regularly children napped were examined against direct observation of napping duration in childcare settings on a single day (r= 0.6, p<.001) using a modified version of the nap observation protocol described by Ward et al.[18] This method of sleep observation codes child behaviours at 10-minute intervals into one of five categories (*asleep, potentially asleep, awake, away from bed, disruptive/distressed*). Duration was derived by summing the number of continuous counts during the naptime in which an individual child was coded as asleep. Details of the nap observation schedule used in this study has been previously published.[26] This observation method has good reliability against ambulatory assessment of sleep/wake patterns using actigraphy.[18,29] Although both teacher report and a single day direct observation of napping were available, in the current study teacher report was used as the key measure of napping for analyses to capture generalised patterns of napping in childcare.

Nighttime and total sleep duration. Parent report of each child's nighttime and total sleep duration was obtained at T1 and T2 via the following items: 1) "on a typical night, when does the study child go to bed?"; 2) "on a typical morning, when does the study child

wake up?"; 3) "does the study child ever nap (sleep during the day)?", (4) "in a typical week, on how many does the study child usually nap?" and (5) "on days when the study child naps, how long do they usually nap for?". Bed-times and wake-times were indicated in 30 minute increments. The difference between typical bed-time and wake-time was used to calculate nighttime sleep duration. Typical duration of napping was calculated as per the method used by Miller et al.,[30] whereby the reported nap duration is multiplied by the number of days a child napped and divided by 7. Parents source of information for these reports were based on direct observation in the home environment and daily reporting in childcare records. Where parents identified children as not napping, a score of 0 was applied. Total sleep duration was calculated by summing a child's parent reported typical napping duration and nighttime sleep.

Child and family characteristics. Child gender, age and temperament, parental education, and total family income were collected at T1 and were reported by the primary care-giver via structured survey. Child temperament was measured using the *Short Temperament Scale for Children* (STSC).[31] In the current study, scores across 12 items encompassing three domains (sociability, persistence and inflexibility) of the STSC were averaged to provide a single Easy-Difficult Temperament Score, in which higher scores reflect a more easy temperament style (scale 0-5; Cronbach's $\alpha = .76$). Parental education was derived in response to two items (1) "what is the highest level of education you have completed" and (2) "what is the highest level of education your partner has completed?" Reponses were scored on an 8 point-scale (0=no schooling or did not complete primary school; 1=primary school or equivalent; 2=year 10 or equivalent; 3=year 12 or equivalent; 4=tertiary certificate or equivalent; 5=diploma or equivalent; 6=university bachelor degree or equivalent; 7=postgraduate university degree). The average across both items was subsequently used to calculate a mean parental education score. Total family income was

reported in response to the following item "Before tax is taken out what was your family's total income for last year?" Total family income was indicated on a 13-point scale from 0=$0-24,999 thru to 12=$300,000+ (AUD).

Childcare characteristics. Each childcare environment was measured at T1 and included measures of childcare quality, child's days of attendance, and program type. Childcare quality was measured using a standard observation measure; The Classroom Assessment Scoring System (CLASS Pre-K).[32] CLASS codes the quality of teacher-child interactions via multiple intensive observations of emotional, organisational and instructional quality with score ranging from 1 (low) through 7 (high). In the current study, the average total score for the CLASS Pre-K was used. Days of attendance in centre-based childcare was reported by parents and measured via two items (1) "In 2011, on how many days in a typical week did the study child attend a child-care centre" and (2) "In, 2011, on how many days in a typical week did the study child attend a stand-alone kindergarten". Program type (long day care or kindergarten) was derived from licensing details collected from childcare centre directors. *Long Day Care* is equivalent to '*child care*' centers in the USA and are run by both commercial and community based not-for profit organisations. These programs cater for children from birth to school entry (age 5-6 years) with children attending on a full or part-time basis. Children within these programs are typically separated into rooms based on age range, with "Preschool" room (the target rooms in the E4Kids study) catering for children from 3- to 5-years. *Kindergartens* are akin to USA *'preschool'* programs and are typically state funded, though programs are also run through long day care and private schools. These programs are provided by a qualified teacher and are targeted to children in the years prior to school (3-5 years). In Queensland, the minimum standard for kindergarten programs is 15 hours per week, although these programs can be run up to full-time. All Long Day Care and Kindergarten programs in Australia are subject to a National Quality Standards and external

evaluation by Australian Children's Education and Care Quality Authority.[33] A recent comparison of observed quality of Australian Long Day Care and Kindergarten programs with equivalent program types in the UK and USA, indicate they are of similar quality.[23]

Procedures

Full ethical approval was received from the Human Research Ethics Committee of the author's affiliated institution. Informed consent was received from parents and childcare staff. For each childcare program a trained researcher conducted standard observations on a single day in the second semester of the education year (Aug-Nov). Data regarding napping were collected on the same day. In line with the standard procedures for the CLASS Pre-K,[32] observations of classroom activities were conducted in 15-20 minute blocks with 10 minutes of coding time. A minimum of 4 and a maximum of 6 observations were conducted in each room. Full reliability procedures have been previously published.[23] Observations of naptime began once the first child was on their bed and ceased once the last child was up off their bed.

Statistical Analysis

Data were analysed using SPSS Version 21[34] and AMOS 21[35] software. Missing data (<5% of study values; Little's MCAR test, $p>.05$) were estimated and replaced using the expectation-maximisation (EM) method. Parametric and non-parametric analyses (independent samples t, Mann-Whitney U and Chi-squared tests) were conducted to examine group differences in child, family, childcare and napping characteristics across mandatory naptime groups; and between children with and without parent report data at T1 and T2. Primary analyses focused on group differences in night and total sleep duration whilst in childcare and, 12-months later, once children were in school in relation to mandatory naptimes at childcare. To support clinical interpretation of the data mandatory naptime was divided into two groups based on central distribution; 0-60 minutes and >60 minutes. Analyses of variance tests were conducted using general linear models to examine differences

in nighttime and total sleep duration at T1 and T2 across mandatory naptime groups. Analyses were conducted both unadjusted and adjusted for potential confounding variables of age, gender, child temperament, family income, parental education, days/week in childcare, childcare quality and program type. In all cases significance and direction of findings remained for both adjusted and unadjusted models and as such adjusted models are presented throughout. Follow-up analyses were conducted to examine if napping in childcare mediates the relationship between mandatory naptime and duration of nighttime sleep. In these analyses mandatory naptime was treated as a continuous variable. Path analysis was conducted using AMOS to examine a mediation model in which mandatory naptime is related to duration of nighttime sleep, through napping in childcare. Baron and Kenny's[36] four step approach was used to assess the presence of a mediation pathway. The significance of the indirect effect was determined using bootstrapping techniques with effects generated after resampling from the observed cases 2000 times; bias corrected 95% confidence intervals (CI) are reported in text.

RESULTS

Missing Data Analysis

No significant differences in age, gender, mandatory naptime duration, napping in childcare and childcare quality were found between children with and without parent report data at T1. More children attending kindergarten programs participated in the study at both T1 (p=.02) and T2 (p=.002). Additionally, children remaining in the sample at T2 had experienced significantly less mandatory naptime at T1 (p=.005). No other significant differences between children with and without T2 data were found.

Sample Characteristics

Characteristics of the study samples are shown in Table 1. At T1 the average age of the children in the study was 58.89 months (SD=3.88) with a range of 50-72 months, 55%

males. All children were attending licensed long day care (57%) or kindergarten (43%) programs, with an average attendance rate of three days per week (M=3.19, SD=0.97). Mandatory naptimes experienced by the children within their childcare setting ranged from 0 to 145 minutes (M=56.24, SD=39.96, median=54 minutes). As seen in the table, children in the >60 minutes of mandatory sleep time group were more likely to be attending long day care programs and lower quality programs than those exposed to <60 minutes of mandatory naptime. At T2 approximately 97% of the study children were attending school. The children (n=5) who remained in childcare in T2 were excluded from analyses at this time point.

Mandatory Naptime and Napping

At T1, children exposed to >60 minutes of mandatory naptime napped more often in childcare (U=4972.5, p<.001, r=.37) and had longer parent reported napping duration (U=4973.5, p<.001, r=.39) than children exposed to 0-60 minutes of mandatory naptime (Table 1). Only a small number of children continued to nap at T2 (N=19; 15%), with all children napping 2 days per week or less. Whilst no significant difference in presence of napping across groups at T2 was observed, children exposed to >60 minutes of mandatory naptime continued to have significantly longer typical napping duration once in school, U=2114.5, p=.03, r=.44.

Mandatory Naptime and Duration of Nighttime Sleep in Childcare (T1)

Group differences in nighttime sleep and total sleep duration are shown in Figure 1. Results showed that children exposed to >60 minutes of mandatory naptime had, on average, 24 minutes less nighttime sleep whilst in childcare than children exposed to 0-60 minutes of mandatory naptime, $F(1,158) = 12.482$, p<.001, η_p^2=.073. There was no significant difference in total sleep duration between groups at T1 (p>.05).

Mandatory Naptime and Duration of Nighttime Sleep in School (T2)

At T2, at 12-month follow-up during the second semester of their first year of school, children who had previously been exposed to >60 minutes of mandatory naptime whilst in childcare continued to have, on average, 24 minutes less nighttime sleep than children exposed to 0-60 minute of mandatory naptime, $F(1,115) = 8.244$, $p=.005$, $\eta_p^2=.067$ (Figure 1). Additionally, once in school, children exposed to >60 minutes of mandatory naptime in childcare were also found to have, on average, 21 minutes less total sleep than children exposed to 0-60 minutes of mandatory naptime, $F(1,115) = 6.349$, $p=.01$, $\eta_p^2=.052$. To examine if these differences were explained by increased napping within the >60 minutes group, analyses were also conducted excluding all children ($n=19$) who were reported as still napping at this time. Results showed that amongst children who had ceased napping there remained a significant difference in the duration of nighttime sleep across groups, $F(1,96) =10.165$, $p=.002$, $\eta_p^2=.096$, with children in the >60 minute group reporting significantly less nighttime sleep (Mean difference=28 minutes).

Napping as a Mediator between Mandatory Naptime and Nighttime Sleep

Figure 2 depicts the relationship between mandatory naptime, napping in childcare and children's nighttime sleep at Time 1. As seen in the figure, the standard criteria for mediation were met; (1) mandatory naptime was significantly associated with duration of nighttime sleep (95% CI:-.31, -.001), (2) mandatory naptime was significantly associated with napping in childcare (95% CI: .08, .44), (3) napping in childcare was significantly associated with duration of nighttime sleep (95% CI: -.45, -.15) and (4) mandatory naptime was no longer significantly associated with duration of nighttime sleep once adjusted for napping in childcare (95% CI: -.23, .11). The indirect effect between mandatory naptime and duration of nighttime sleep was significant (95% CI:-.18 to -.02).

DISCUSSION

This study is the first to examine the relationship between observed duration of mandatory naptime in childcare and children's nighttime sleep. Preschool children who were exposed to >60 minutes of mandatory naptime within their childcare setting had shorter nighttime sleep duration than those exposed to 0-60 minutes of mandatory naptime. This difference was evident both at the time of childcare attendance and 12-months later, once children had entered school. In addition we found evidence of a mediation process in which increased napping explained the relationship between longer duration of mandatory naptime and decreased duration of night-time sleep after controlling for child, family and childcare characteristics. The most parsimonious explanation for these findings is that promotion of napping, through the allocation of extended mandatory naptimes, changes the 24hour distribution of children's sleep patterns. Our finding of increased napping amongst preschool aged children in childcare and an associated reduction in nighttime sleep is consistent with this explanation. The findings are consistent with prior studies that have shown a relationship between childcare sleep legislation and children's nighttime sleep[15,16,37] but provide, through direct observation, evidence of an association with sleep practice.

Explanatory mechanisms connecting mandatory naptimes and nighttime sleep relate to both social context and biological processes. While the social context provides the opportunity for sleep, the biological processes of circadian patterning and homeostatic sleep drive determines sleep occurrence. We found that increased duration of mandatory naptime was associated with an increased regularity of napping within childcare. That is, increased social opportunity to sleep in the daytime was associated with an increased likelihood of napping. The apparent cost, however, was an associated reduction in night sleep, likely resulting from reduced biological drive to sleep (homeostatic drive). Our findings are consistent with other studies showing that napping does not serve to increase total sleep

duration but rather to redistribute sleep.[10] Further, the finding is consistent with evidence regarding the environmental entrainment of children's napping patterns.[5,6] Behavioural genetic studies suggest that across the first 5 years of life there is an increasing influence of environmental factors on children's napping patterns[5,7] such that by the fourth year of life these are the dominant influence.[5] While parenting provides one social context that may influence napping patterns,[6] our study directs attention to that of non-parental care settings, a common social context experienced by increasing number of children. [25]

Biological responses to social environmental change in sleep opportunity may not be immediate. We found that once children had entered school, and mandatory napping had ceased, those who had experienced extended periods of mandatory naptime while in childcare continued to have shorter duration of nighttime sleep compared with children exposed to shorter mandatory naptimes. Commensurately, these children had a 21-minute reduction in total sleep duration. This reduction was likely accounted for by the loss of daytime sleep at entry of school. Once in school, children who had been exposed to >60 minutes of naptime had a total sleep duration that fell below the recommended average for children aged 3-5 years set out by the National Sleep Foundation (11-13 hours). Cairns et al.[38] report similar findings in their study of children's sleep patterns across the transition to school. These findings, and our own, suggest that the abrupt reduction of sleep opportunity is not immediately compensated by an increase nighttime sleep. This may be particularly the case for children who were previously exposed to long daytime naps. Social constraints such as family dictated bed- and wake times may also limit opportunity for compensation. Our findings raise important questions regarding the most appropriate timing and approach for transitioning away from naptimes in young children.

The clinical implications of this study are placed in perspective by the substantial body of evidence showing a positive association between health outcomes and duration of

young children's nighttime sleep.[1-4] While our study did not measure health outcomes, the findings raise important research questions about the immediate and on-going implications of extended mandatory naptimes for children's health. For example, although prior studies have not consistently identified an association between napping and obesity,[10] there is evidence that an average of 30 minutes reduction in night sleep distinguishes children who are and are not classified as obese.[39] Future studies are needed to examine the implications of sleep practices in childcare for children's health and development.

Our study has a number of strengths including the use of detailed observations of sleep practices in childcare settings, multiple data sources (observation, parent and teacher) and measurement of nighttime sleep data beyond the time of attendance at childcare. There are however a number of limitations that should be considered in interpreting the results. First our findings relate specifically to children aged 3-6 years and cannot be generalised outside this age range. Daytime sleep may serve different developmental functions relative to the age and child's location in the transition from polyphasic to monophasic sleep.[10] Studies of younger children and those that account for longitudinal changes in sleep patterns would provide greater understanding of the relationship between childcare sleep practices and children's sleep patterns. Second while we have controlled for a comprehensive range of potentially confounding variables, causality cannot be inferred. While it is unlikely that individual children's sleep patterns dictated duration of mandatory naptimes in the childcare setting it is possible that family circumstance and factors determining choice of centre provide an underlying explanation. This being the case we cannot disentangle the direction of association between daytime napping and nighttime sleep in this study. Prior studies of the association of day and night sleep suggest napping disrupts night sleep rather than being a response.[16,17,37] The use of objective measurement of naptime and sequential analyses of naptime and nighttime sleep duration across a number of days in future studies of napping in

childcare would provide a stronger indication of directionality. Finally, the measurement of children's sleep duration in the current study was reported by parents in 30-minute units. For this reason the accuracy of estimates of duration of night-time and total sleep should be interpreted with caution.

In conclusion, this study for the first time shows a relationship between observed naptime practices in childcare settings and children's nighttime sleep. Our findings draw attention to the importance of the social context in which children's sleep occurs and raises critical questions regarding the impact of variation in childcare sleep practices on children's immediate and ongoing sleep patterns. Given the number of young children who attend childcare and the relationship of nighttime sleep with multiple health outcomes, childcare sleep practices represent a potentially important focus for child health.

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Table 1. Child, Family, Childcare and Napping Characteristics Across Mandatory Naptime Groups.

Measures	Total Sample (*N*=168)	0-60 Minutes Mandatory Naptime (*n* = 91)	>60 Min Mandatory Naptime (*n* = 77)	*p*
Child, Family and Childcare Characteristics				
Age, months	58.89 ± 3.88	59.80 ± 3.31	57.81 ± 4.23*	.001[b]
Gender (female)	78 (46%)	44 (48%)	34 (44%)	.59[c]
Easy-difficult temperament, score	3.14 ± 0.70	3.25 ± 0.63	3.01 ± 0.75*	.03[b]
Family total income	5.06 ± 3.00	5.45 ± 3.20	4.60 ± 2.69	.10[d]
Parental education level	5.20 ± 1.27	5.44 ± 1.21	4.90 ± 1.30*	.004[d]
Childcare attendance, days/wk.	3.20 ± 0.95	3.10 ± 0.87	3.34 ± 1.03	.07[d]
Childcare quality, score	4.50 ± 0.56	4.75 ± 0.57	4.20 ± 0.40*	>.001[b]
Program type (kindergarten)	69 (41%)	63 (69%)	6 (8%)*	>.001[c]
Daytime Napping				
T1 napping at childcare, freq.	1.62 ± 1.31	1.17 ± 1.10	2.16 ± 1.35*	>.001[d]
T1 typical napping duration, min*days/7	0.25 ± 0.38	0.12 ± 0.23	0.40 ± 0.45*	>.001[d]
T2 napping (yes)[a]	19 (15%)	10 (14%)	9 (17%)	.58[c]
T2 typical napping duration, min*days/7[a]	0.03 ± 0.09	0.01 ± 0.04	0.05 ± 0.13*	.03[d]

Values shown are mean ± SD or *n* (%).*Significant at $p<.05$.

[a]*n*=125 with complete T2 data (0-60 minutes, *n*=73; >60 minutes, *n*=52); [b]Independent groups t-test; [c]Chi-squared test (χ^2); [d]Mann-Whitney U test.

Figure Legends

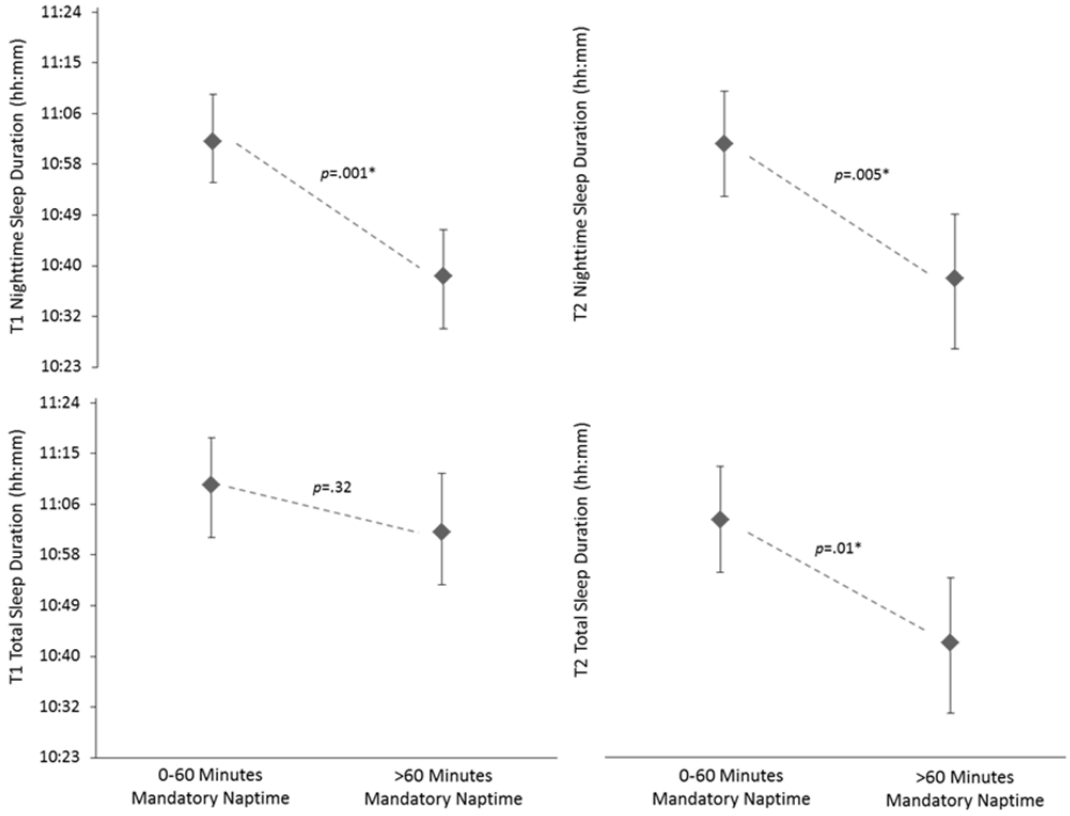

Figure 1. Mean nighttime and total sleep duration at T1 and T2 by mandatory naptime group. Error bars show 95% Confidence Intervals (CI). Models adjusted for age, gender, temperament, family income, parental education, days/week in childcare, childcare quality and program type. *Significant at $p < .05$.

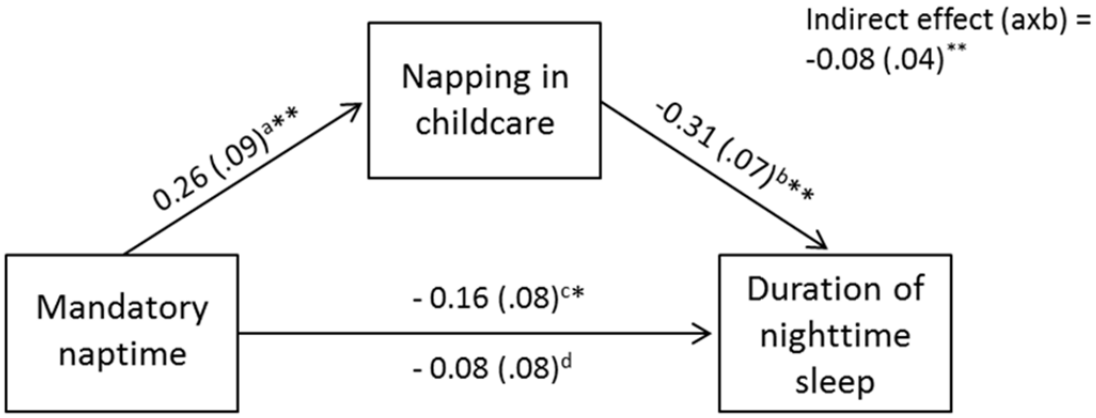

Figure 2. Napping in childcare mediates the relationship between mandatory naptime and nighttime sleep duration. Model adjusted for age, gender, temperament, family income, parental education, days/week childcare, childcare quality and program type. Values are standardised regression weights [β(SE)]. [a]Unadjusted; [b]Adjusted for mandatory naptime; [c]Unadjusted; [d]Adjusted for napping in childcare.*<.05 **<.01.

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