Perceived barriers & facilitators for bedtime routines in families with young children living in economically deprived areas

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Abstract
Background: Bedtime routines are a highly recurrent family activity with important health, social and behavioural consequences. Despite their importance, information regarding formation, establishment and maintenance of bedtime routines remains limited. This study examined perceived barriers to, and facilitators of, formulating, establishing and maintaining optimal bedtime routines in families with young children from deprived socio-economic areas.

Methods: A total of 12 parents participated in the study. Most participants (N=11) were females, had between 1 and 2 children (N=10), were white (N=9) and stay at home parents (N=6). They completed a semi-structured interview based on the Theoretical Domains Framework (TDF). Analysis followed a deductive, theory-informed mapping approach.

Results: Key barriers included lack of appropriate knowledge and sources of information, problematic skills development, social influences, cognitive overload, lack of self-monitoring, lack of motivation and negative emotions. Facilitators included social role/identity, environment/access to resources, positive intentions, beliefs about consequences and reinforcement. In particular, optimal bedtime routines were less likely to be enacted when parents were tired/fatigued and there was a strong effect of habit, with suboptimal routines maintained over time due to past experiences and a lack of awareness about the contents and importance of a good bedtime routine.

Conclusions: Several theory-based, and potentially modifiable, determinants of optimal bedtime routines were identified in this study, providing important information for future interventions. Several of the key determinants identified were transient (tiredness) and/or non-conscious (habit), suggesting that future interventions may need to be deployed in real time, and should extend beyond conventional techniques.

Background
Bedtime routines are one of the most frequently performed family activities encompassing a series of actions undertaken by families with young children in the hour before bedtime (1). Most families start implementing their bedtime routines with their children from an early age (2). Optimal routines should: (a) be consistent throughout the week and weekend following the recommended sleep times


for each age group, (b) include tooth brushing, (c) avoid drinks (such as bottle feeding) and snacks the hour before bed, (d) minimise the use of electronic devices and television around and during bedtimes and (e) finally, include book reading and book sharing activities before sleep (3-6). Past studies have demonstrated the importance of bedtime routines for both child-specific (quality of sleep, dental health(7), school performance and school readiness(5,8), BMI(9), psycho-social and emotional development(10)) as well as parent/family-specific outcomes (overall family functioning and parental socio-emotional wellbeing). Moreover, intervention studies have shown that it is possible to intervene and moderate these routines with subsequent benefits for children and parents alike (2).

Despite their importance, available information on bedtime routines is limited. Most previous studies were conducted with homogenous samples from the upper end of the socioeconomic spectrum. Consequently, little information is available on the characteristics of bedtime routines in deprived populations where health, social and behavioural outcomes are often poorer (2). Sociodemographic and economic characteristics are particularly important determinants for health especially within the content of sleep and child development (11). Also, there is a lack of available information regarding the mechanisms which lead to the formation, establishment and maintenance of bedtime routines in general (2). Recent studies on bedtime routines and parental perspectives highlighted the occurrence of similar barriers when it comes to bedtime routine but additional work is essential to uncover the full extend and mechanisms of those barriers (12). Finally, there is little to no research examining parental perspectives of bedtime routines despite bedtime routines being a recurrent behaviour “enacted” by parents and “received” by children.

In order to gain a better understanding on bedtime routines and enhance our ability to develop evidence-based interventions, the present study utilised a theoretical framework (the Theoretical Domains Framework; TDF). This evidence-based framework was used to explore the barriers and facilitators that parents from economically deprived households face when developing and maintaining bedtime routines for their children. The TDF is a framework which summarises 84
possible determinants of behaviour into 14 overarching “theoretical domains” allowing for a comprehensive exploration of all possible determinants of bedtime routines in families with young children (13). The TDF has been extensively used in healthcare and behavioural research and it is linked to other models like the Behaviour Change Wheel (BCW) (13). Through the use of the TDF, possible barriers and facilitators regarding bedtime routines can be systematically explored leading to greater understanding on this complex and highly recurrent behaviour and helping to identify potentially modifiable determinants of optimal and suboptimal bedtime routines.

**Objective**

This study uses the Theoretical Domains Framework (TDF) to explore perceived barriers and facilitators of the formation, establishment and maintenance of bedtime routines in families with young children from economically deprived households.

**Methods**

**Participants & Recruitment**

A total of 12 parents with young children between the ages of 3 to 7 years old were recruited for this study. Parents were recruited from an on-going cross-sectional study on bedtime routine characteristics and effects of bedtime routines in child wellbeing. All participants enrolled in the larger, cross-sectional study were invited to participate in the interviews. Inclusion criteria included: (a) ability to speak and comprehend English and (b) having a child between the ages of 3 and 7 years old. Participants were compensated for their time in the form of £10 vouchers for online shopping.

**Data collection**

Interviews were completed either in person or via telephone depending on participants’ preference. Telephone interviews were included as they required less time commitment and so were more acceptable to some participants. All interviews were completed between May and September 2018. In total, 8 participants completed an in-person interview with 4 opting for a telephone interview. In each interview, a detailed semi-structured interview schedule based on the 14 TDF domains was used (Appendix A). Each TDF domain was explored with a combination of different
questions designed to prompt different perspectives. At the end of the interview, participants were encouraged to make additional comments and statements about elements of their own experience not covered by the interview schedule. Interviews lasted between on average 24 minutes and were all completed by the same interviewer.

Data analysis

Each audio recording was transcribed verbatim using a transcription service. Two independent coders used a deductive approach to map each statement to one of the TDF domains (or code as outside of the TDF). Any disagreements in coding were resolved through discussion. Remaining disagreements were resolved by a third independent coder. Barriers and facilitators were identified based on participants’ responses. Overarching themes were also identified and summarized while frequency counts were used to determine the most commonly endorsed domains and specific component constructs.

Results

Behavioural diagnosis based on the Behaviour Change Wheel

Since this project was based on the stages and practices described in the Behaviour Change Wheel(14), the first necessary step was to define the problem in behavioural terms, select and specify the target behaviour before using the TDF to explore barriers and facilitators and what needs to change. Table 1 below summarises these necessary steps.

[Insert table 1 here]

Sample characteristics

In total, 12 individuals (11 females & 1 male, aged 35 (SD=3) participated in the study. The majority of the participants were white (n=9) with 3 participants of Asian/British-Asian ethnicity. In terms of educational level, participants were equally distributed in terms of University education (n=4), college graduates (A-levels (n=4) and high school graduates (GSCE) (n=4). Most participants were British (n=11) with only 1 participant from a different nationality (Saudi). The majority of
participants had either 1 or 2 children (n=5 for both states) with only 2 participants having 3 children. Most participants were stay at home parents (N=6), with four participants working part-time, one participant working full-time and two participants studying at University. Finally, in terms of deprivation as calculated by the Index of Multiple Deprivation (IMD) most participants (n=10) were on the 5th quintile (most deprived) with only 2 on the 3rd quintile. Average IMD score was 36.4 (SD=4.1) classifying as “most deprived”. The IMD is a frequently used metric of social deprivation in England (National Perinatal Epidemiology Unit, University of Oxford) and it provides data based on participants’ postcodes.

All 12 participants had implemented a bedtime routine over a weekly period when data collection was completed. Information on their bedtime routines was provided from data relating to the larger, cross-sectional study. In the larger study, a 0-5 scale to characterise bedtime routines (0=sub-optimal, 5=optimal) was used with average scores across a 7-night period. Based on the larger study, the 12 participants showed scores ranging from 2.5 to 4 (M=3, SD=0.5).

**Inter-rater reliability**

Cohen’s kappa (κ) was calculated in order to examine inter-rater reliability between the two independent coders. A total of 289 statements were examined and mapped into relevant TDF domains. Based on the results of the analysis and following guideline outlined by Landis and Koch (1977) there was substantial agreement between the two coders (κ=.891, p<.005).

**Overview of data saturation**

Data saturation where no new themes emerged from one interview to the next was achieved and therefore data collection ceased after the twelfth interview. All domains of the TDF were covered by participants’ replies. In total, 3 participants provided replies that mapped to every TDF domains while on average participants provided replies that mapped to at least 12 out of the 14 domains. An overview of data saturation is shown on table 2.
Barriers and Facilitators by TDF domain

Knowledge
In general, all parents reported awareness of the importance of bedtime routines. Most parents were able to describe what a good bedtime routine should look like with some of them (n=3) able to identify all of the vital elements of a good bedtime routine that have been highlighted in the scientific literature. Use of electronics before bed was the most common activity that parents did not mention when describing a good bedtime routine. Table 3 summarises participants’ views on what constitutes an optimal routine. The vast majority (n=10) of parents reported that they had never been offered advice on bedtime routines when their children were born.

“It should include brushing teeth, no sugar before bed and read a story too.” (QI012)

“Reading that the school asks us to do. Spellings and settling them down in a relaxed environment before bedtime and teaching them that it’s healthy to look after their teeth and that is one of the bedtime routines that, as they get older, that they should be doing.” (QI011)

“No. It would have been good to get some advice, but no one really said anything about routines when the children were born” (QI012)

Some parents (n=2) knew about official recommendations or were given some advice when their children were younger but they could not recall exactly what they were told or who provided them with that information. The majority of parents (n=7) expressed a positive view about how useful an official system or point of contact where they could seek advice on bedtime routines would have been.
“If somebody could have told me how to get my kids to sleep that probably would have been really, really helpful” (QI005)

[Insert table 3 here]

**Skills**

In terms of skills development, most parents reported using the same sort of routines with their own children as they had when they were children. While some parents mentioned external factors that influenced the development of their bedtime routines and most parents were able to identify a variety of skills and techniques they use as part of their bedtime routines.

“I think it's just something like what we did when we were children, so it's just like you sort of know. I come from a really big family and it's what our mother used to make us do, so that's what I just did with my children as well.” (QI009)

“Our routines are just something I did from what I was used to do as a child you know. No help whatsoever about them” (QI012)

“Probably reading material that I’d picked up, with it being my first child, and choosing what I felt would work within our family, a new family routine.” (QI011)

“So when they’re doing their teeth, we have, like, one of their favourite songs will play and obviously I will say brush your teeth for three and a half minutes, so they’ll find a song that’s three and a half minutes long, so they’ve got to brush their teeth while that song is playing, so they’ll dance while they’re brushing their teeth and then once that songs finished, their teeth are done.” (QI004)
Social/professional role/identity

Parents viewed themselves as an important role model for their children and felt a huge level of responsibility for the overall wellbeing and development of their children. Some parents, brought their overall, non-parental, roles and identities as professionals in the context of their responsibility towards their children.

“I feel like this is the job as a parent to my child and I've done it” (QI003)
“I suppose what I’m doing as a parent is trying to set them up in good habits for the rest of their lives, because the stuff that they do before they go to bed is the stuff that I do before I go to bed” (QI005)

Beliefs about capabilities

For some parents (n=7), their bedtime routines were generally not perceived to be difficult or challenging. However, parents identified some occasions when routines were perceived as more challenging, for example over the weekend. A few parents (n=4) felt that their bedtime routines are difficult and challenging in general.

“Difficult but it’s something that we’re all used to, and they’ve done since they were younger and it’s something, like I say, that I’ve always been consistent with but yes, it is difficult.” (QI011)

Optimism

The majority of parents appeared confident and optimistic about how things will unfold in the future regarding their bedtime routines.

“I don’t feel anxious about it really, I think... I haven’t really thought about it really. I don’t know.” (QI005)

Intentions

The majority of parents stated clear intentions to try actively to achieve and maintain good bedtime routines for their children in the short and long-term future.
“Yes, I mean 100 per cent, 101 per cent really and in terms of that, it's maintaining and being consistent and that can get tiring but that's the length that I personally am happy to go to for them” (QI011)

Beliefs about consequences

Most parents mentioned specific outcome expectations associated with problematic bedtime routines. While others reported their overall beliefs about the future of their children and the importance of having a good bedtime routine.

“If you're brushing your teeth so this will give you a future with nothing a problem with your teeth and everything. But if you do brush correctly, in the correct way” (QI003)

“I hope that as they get older they understand that going to bed at a sensible hour when they have school the following day is important and they need the sleep. We'll have to see what they think when it comes to it.” (QI008)

Reinforcement

Reinforcement was analyzed in 2 contexts: (a) reinforcement used towards the children as part of the bedtime routine or general parenting and (b) reinforcement experienced by the parents at the end of the night and after the children were off to bed. In terms of reinforcement techniques used with the children, most parents were able to list several techniques covering both positive (reward) and negative (punishment) reinforcement. When considering reinforcement at the end of the night and after children have been put to sleep, parents were asked to consider 2 possible outcomes: one where the routine has gone smoothly and the children were off to bed with no problems and one where the parent faced resistance and a tantrum before the children went to bed. When considering the non-problematic routine, parents reported feeling relaxed and able to rest and enjoy their free time. On
the contrary, when the routine was problematic, parents reported negative reinforcement.

“Oh, I feel relieved now, that's a bit of me time, a bit of quietness now, the house is nice and quiet at that point. That’s my time now with my cup of tea downstairs” (QI009)

“It is a nice feeling, if it’s all smooth and everybody goes to bed happy and so on and you don't feel like you’re on your last nerve, then, yes, of course it’s a nice feeling, because then you look at these two sleeping angels and think that’s lovely” (QI005)

**Goals**

For the majority of parents (n=7) bedtime routines are more than just getting the children to bed, it’s about spending good, quality time together and building long-lasting memories. Also, parents gave examples of goal priorities shifting when dealing with changing circumstances in their houses during their bedtime routines.

“You’re all busy during the day, the children are at school, you’re at work, so that is a really nice time to talk to the children and find out what’s been going on in their day and yes, they play with each other, it’s their time as well to have a bit of fun with each other” (QI011)

“Oh the weekend they sleep later, especially if we’ve got things planned, if we’re going out. If we’re at home and we’re not really doing anything we do try and put them to bed a little earlier, which is not as early as a week day, so nine o’clock at the latest if we’re home. On odd occasions if we have things on it will probably be a bit later” (QI007)

**Emotions**

Parents reported a mixed emotional reaction to bedtime routines with some reporting negative emotional reactions towards them.
“Calm, quite fine, like I say because we’ve stuck to the same routine. It’s not a chore; it’s a pleasurable thing to do” (QI008)

**Memory, Attention & Decision process**

All parents reported a high level of automation (memory) when it comes to their bedtime routines with little to no thought on what to do and how to do it. However, when tired (cognitive overload), parents reported difficulties in complying with their normal routine as well as issues around forgetting what they need to do.

“When you’re a bit tired, that’s when we probably skip reading” (QI002)

“God, yes, it’s hard, well it can be just because I work full time and by the end of the day I’m shattered so, yeah, because they’re busy and they’re five and three” (QI005)

**Environment & Resources**

Houses and the immediate environmental context did not present as an issue for the majority of parents (n=10) with only a few (n=2) reporting some problems. All parents reported adequate access to all required resources (i.e. books, tooth brushes, tooth paste etc.) for achieving a good bedtime routine.

“Well the children have to share a room which makes things more difficult. It would have been nice to be able to have separate rooms for them but that’s not a possibility unfortunately” (QI012)

**Social influences**

Peer support (social support) was important for some parents (n=5) especially due to lack of any
other available source of information. Some parents (n=3) compared their routines to their peers (social comparisons) with some of them expressing beliefs on whose routine is better and why. For the purpose of this analysis, families were considered as one unit with 2 groups within it: the parents who are implementing the bedtime routine and the children who are the recipients of the routine. As the 2 groups interact, conflicts might arise (intergroup conflict).

“My sister had my nephew, there’s just nine weeks difference between my nephew and my eldest daughter. Yes, we used to talk quite frequently” (QI011)

“Yeah, they were pretty similar. It is just dependent, especially when they’re babies, your family life and what fits in best.” (QI008)

“Yes, they always resist, every night they resist at bedtime and obviously at the weekends, I’m a little bit more lenient but no I think they enjoy the bedtime routine” (QI011)

**Behavioural regulation**

In terms of self-monitoring, some parents (n=4) reported not using any type of self-monitoring with regards to their bedtime routines reflecting the automated, habitual nature of the routines. However, others (n=4) reported using specific self-monitoring techniques. Some parents reported specific habit breaking events that led to a significant change of behaviour in the past.

“Just in my head and keeping track of how it works well for the children and varying it upon that.” (QI007)

“Yes, probably when they younger, yes that would come up quite often in terms of when they were smaller children, babies and toddlers” (QI011)

**Overarching themes**
Across the whole dataset, overarching themes, or factors that emerged as most important in relation to bedtime routines included: (a) lack of provision of information from respected sources, especially when children were younger and routines were being developed, (b) skills development and social support through peers, (c) parents’ beliefs that looking after their children’s bedtime routines is part of their parental role, their responsibility, (d) parents’ self-confidence and the emotional reactions associated with bedtime routines, (e) optimism about the future with clearly defined intentions to achieve and maintain good routines for their children, (f) positive reinforcement from good bedtime routines and negative reinforcement from bad bedtime routines and (g) the level of automation and self-monitoring during bedtime routines.

**Barriers & Facilitators**

The key barriers and facilitators identified regarding formation, establishment and maintenance of optimal bedtime routines are summarised in table 4 below.

[insert Table 4 here]

**Discussion**

This study examined perceived barriers to, and facilitators of, the formation, establishment and maintenance of bedtime routines in economically deprived families with young children using the TDF. In line with recent studies in this area (12) it is evident that many of the important ingredients required to establish and maintain optimal bedtime routines are in place: (a) parents are aware of why they need optimal bedtime routines, (b) they know what they have to do as part of an optimal routine, (c) they have the resources required, (d) they recognize the benefits of achieving good routines for themselves as well as for their children, (e) hold intentions to achieve them and (f) feel that it is their responsibility as parents to provide consistent and beneficial routines to their children. In contrast, problems in achieving optimal bedtime routines arise when: (a) parents are tired, (b) children present with more challenging behaviours bringing social comparisons and conflicts into the family unit, (c) parents seek but are unable to find information on how to change (or establish) their
bedtime routines due to the lack of clearly marked, official sources of information, (d) parents heavily rely on suboptimal past experiences (what their parents used to do), (e) parents feel that routines are a habit that they cannot or would not even consider changing and (f) parents feel unmotivated. Figure 1 provides a visual schema for the key outcomes.

Past actions are a strong predictor of future behaviours and, people tend to stick with their behaviours unless they prove to be problematic early on (15–18). Habitual behaviours in stable contexts (like bedtime routines) have higher likelihood of being reflecting past behaviours and experiences (18,19). This likelihood increases even further when little to no consideration, reflection or self-monitoring is in place to appraise critically past experiences and behaviours and their influence on current behaviours(15). Biased scanning theory and self-perception(20) theory suggest that when people engage in a particular behaviour (for example, when establishing their routines) they often conduct “a biased search of memory for previously acquired knowledge that confirms the legitimacy of their actions” with “with little if any conscious deliberation, simply reasoning that if they have performed the behaviour voluntarily, they must consider it to be desirable”(21). In the context of bedtime routines, parents might behave in a certain way that in their own opinion reflects an optimal bedtime routine based on their past experiences (heuristic behaviour) with little reflection (self-perception theory) and a biased justification for their actions (biased scanning theory). In this study, lack of appropriate provision and sources of information available to parents (especially first-time parents), appears to lead to a heavy reliance on past experiences for information about what constitutes an appropriate bedtime routine. This is then habituated with little self-monitoring and may hinder parents’ ability to formulate and maintain optimal routines.

Parental tiredness/fatigue and cognitive overload acted as additional barriers to systematically and consistently achieving optimal bedtime routines even when parents knew what they needed to do and how to do it. In general, parental tiredness is a nearly universal experience (22). Multiple child and non-child related factors contribute to parental fatigue (23). The demands of infant and toddler care
combined with domestic and professional workload as well as other responsibilities result in significant levels of tiredness and fatigue for parents (22). Fatigue is closely associated with parental wellbeing, parental self-efficacy, parental anxiety, parental mood, low warmth and irritability during parent-child interactions resulting in suboptimal parenting with less engagement in shared parent-child activities (22,24). In turn, these parental difficulties and problematic parent-child interactions can result in a range of child emotional and behavioural difficulties later in life (25). Bedtime routines due to their highly recurrent nature and the particular time of the day that they need to be implemented are particularly vulnerable to the effects of tiredness and fatigue. Addressing the effects of parental tiredness and fatigue during bedtime routines is not an easy task especially since parental fatigue is caused by a combination of factors. Existing attempts to explore interventions to reduce fatigue outside the immediate post-partum year remain limited with more studies required (22).

Finally, lack of motivation, negative emotions and automation of routines are another set of barriers identified in this study. These barriers can be grouped under the term “behavioural inertia” (26). Behavioural inertia is a term commonly used in behavioural economics and it is associated with inaction and a tendency to remain with the status quo (26). When faced with a decision, individuals tend to prefer the status quo since it provides them with comfort and a sense of familiarity (27). This preference for the status quo fuels a lack of motivation which in return maintains the status. Fear of change and fear of the unknown, of the possible alternatives if pursuing a different pathway is another important factor that fuels the status quo bias and behavioural inertia (28). Behavioural inertia and status quo bias in the right context can be useful in maintaining optimal behaviours however, in cases where change would be beneficial they transform to detrimental factors perpetuating problematic behaviours (27). For bedtime routines, behavioural inertia is manifested in the lack of motivation and automation of routines from the parent’s perspective. Routines develop when children are in their infancy but fairly quickly, bedtime routines show signs of stability with most activities in place. If a family is lacking an optimal routine at this early stage, then the automated, highly recurrent and repetitive nature of bedtime routines overtakes the need or sense of urgency for
altering and improving them. The end result, is a self-perpetuating cycle where change is not considered as a realistic prospect. Figure 2 provides an overview of the way these factors could potentially contribute to the formulation and maintenance of sub-optimal bedtime routines.

Lack of optimal bedtime routines can in return affect a series of child wellbeing and development areas starting from quality of sleep where direct causal effect has been found between quality of bedtime routines and a series of sleep-related outcomes (i.e. sleep duration, sleep onset, night waking etc.) (2). Sleep is a vital part of health and wellbeing with multiple and wide ranging implications for child development and wellbeing (2). Sleep plays a major role for children’s development with poor sleep hygiene and sleeping habits associated with a series of problematic outcomes across physical health (29), neurocognitive development (30), socio-emotional development (31) and family functioning (32). The importance of bedtime routines for sleep has been recently highlighted by a recommendation by the American Academy of Pediatrics (AAP) which issued a series of sleep health recommendation including the need of a consistent bedtime routine and childhood routines in general (2). Apart from quality of sleep, sub-optimal bedtime routines could affect a series of other areas including dental health (6), school readiness and school performance (5,8) and BMI (33).

**Limitations**

The development of the interview schedule to reflect and capture all TDF domains might have resulted in a more rigid and structured rather than fluid and natural discussion. However, this particular possible limitation was managed through the establishment of prior good rapport that allowed for participants to feel more comfortable and express themselves in their own way. Participants were also given the freedom to discuss anything outside of the topic guide that they felt was relevant to any aspect of bedtime routines. Moreover, the size of the study sample (n=12) might be considered a limitation however, recruitment followed data collection in parallel with the former concluding only when data saturation was reached. Also, the disproportionate number of female participants, while problematic for generalisation of results, it is not surprising given this particular
area of research and the context of the recruitment (i.e. dental practices where mostly mothers brought their children for their appointments). A wider, larger sample could have provided more easily generalisable findings and therefore, the current sample size is an additional limitation that will need to be addressed in subsequent studies. Finally, the demographic composition of the sample is in accordance with the overall demographics of the areas where recruitment took place. As for the dominance of participants from economically deprived areas, while a barrier for overall generalisation of findings, is an important asset of the study due to the focus and inclusion of a population that occasionally fails to be considered and included in research studies (34).

**Implications for practice & further research**

Despite some key limitations around this study, the examination of barriers and facilitators around bedtime routines can lead to an increased understanding on possible routes for future interventions and for clinical practice. Using an evidence-based approach (TDF, BCW) there is a possibility to map identified barriers and facilitators into existing literature and evidence around behaviour change and techniques. Those techniques could either maintain and promote facilitators (i.e. motivation to achieve optimal routines, knowledge around importance of routines etc.) while removing barriers (i.e. tiredness and cognitive overload through simple and easy to remember and implement techniques, provision of information when necessary etc.). Further qualitative work can expand our understanding on this behaviour (step 1 under the BCW) while leading the way to the identification of intervention options, content and implementation (mode of delivery) options (14). With some crucial barriers clearly identified, future work and clinical practice will need to focus on how to address those rather than simply providing information about bedtime routines with little consideration of the wider picture. This study has provided only the first yet necessary step into this journey by approaching a usually difficult to reach population and by uncovering some key results on barriers and facilitators.

**Conclusions**
Parents of young children face a series of barriers to achieving optimal bedtime routines ranging from lack of appropriate knowledge to lack of motivation and tiredness. These barriers can prove detrimental for bedtime routines with possible health, behavioural and social consequences for parents and children. Gaining a better understanding of the determinants of optimal and suboptimal bedtime routines, is an important first step for future more in-depth examinations and potentially intervention studies. Further research is vital for this important yet under-researched area.

Declarations

**Ethical approval & Consent to participate**

The study in its entirety including consent forms and all study materials was previously approved by the Health Research Authority (Integrated Research Application System (IRAS) ID: 238552). All participants accepted anonymised use of their data for further analyses and subsequent publication during consent. Written consent was taken during recruitment.

**Consent for publication**

Consent was obtained during recruitment and consent process.

**Availability of data & material**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

**Competing interests**

The authors have no competing interests.

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Author contributions

Regarding individual contributions, GK conceptualised and designed the study, organised and completed all recruitment and data collection processes, wrote and submitted the manuscript. MG, JA, MPK and IAP contributed to the conceptualisation and design of the study, assisted during recruitment and data collection, were actively involved in data coding and analysis in accordance to their research expertise and were involved in the drafting and critical review of the manuscript while offering invaluable continuous support throughout the process. GK, MG, JA, MPK and IAP signify that they have seen and approved the submission of the manuscript. They also signify that they are accountable for all aspects of the work presented in the manuscript.

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Tables

Table 1. Behavioural diagnosis
| Targeted behaviour      | Bedtime routines                                      |
|------------------------|-------------------------------------------------------|
| Where does the behaviour occur? | In households                                         |
| When does the behaviour occur? | Around bedtime, normally the hour before children go to bed |
| Who is performing the behaviour? | Parents (enforcing behaviour) and children (receive and follow behavioural cues from parents) |
| What does the behaviour entail? | A series of activities ranging from brushing teeth to reading a book before bed |
| How often does the behaviour occur? | Every night                                           |
| With whom does the behaviour occur? | Parents and children (caretakers, grandparents, guardians or extended family might also be involved) |

Table 2. Overview of saturation per TDF domain.

Table 3. “In your opinion, what should a good bedtime routine include?”
| ID   | Knowledge | Skills | Social professional role | Beliefs about capabilities | Optimism | Beliefs about consequences | Reinforcement |
|------|-----------|--------|--------------------------|---------------------------|----------|---------------------------|---------------|
| QI001| x         | x      |                          | x                         | x        | x                         | x             |
| QI002| x         | x      |                          |                           | x        | x                         | x             |
| QI003| x         | x      |                          | x                         | x        | x                         | x             |
| QI004| x         |        |                          |                           | x        | x                         | x             |
| QI005| x         | x      |                          |                           | x        | x                         | x             |
| QI006| x         |        |                          |                           | x        | x                         | x             |
| QI007| x         | x      |                          |                           | x        | x                         | x             |
| QI008| x         |        |                          |                           | x        | x                         | x             |
| QI009| x         | x      |                          |                           | x        | x                         | x             |
| QI010| x         | x      |                          |                           | x        | x                         | x             |
| QI011| x         | x      |                          |                           | x        | x                         | x             |
| QI012| x         | x      |                          |                           | x        | x                         | x             |
| ID  | Consistency | Tooth brushing | Avoiding snacks/food before bed | Use of electronics before bed | Reading before bed | Winding children down/relaxing |
|-----|-------------|----------------|---------------------------------|-------------------------------|-------------------|-------------------------------|
| QI001 |             | X              | X                               | X                             | X                 | X                             |
| QI002 |             | X              | X                               | X                             | X                 | X                             |
| QI003 |             |                | X                               | X                             |                   |                               |
| QI004 |             |                |                                 |                               |                   |                               |
| QI005 |             | X              | X                               | X                             |                   |                               |
| QI006 |             | X              | X                               | X                             |                   |                               |
| QI007 |             |                | X                               | X                             |                   |                               |
| QI008 |             |                | X                               | X                             |                   |                               |
| QI009 |             |                |                                  |                               |                   |                               |
| QI010 |             |                |                                  |                               |                   |                               |
| QI011 |             |                |                                  |                               |                   |                               |
| QI012 |             |                |                                  |                               |                   |                               |
Table 4. Key barriers & facilitators identified

| Barrier                                                                 | Facilitator                                                                 |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Knowledge & Skills development were two of the most important barriers identified: | Beliefs about consequences have a long-term effect and are important facilitators. |
| (a) The majority of parents relied primarily on what their own parents used to do when they were children. If a parent had a bad bedtime routine as a child and with no alternative information on bedtime routines available some parents were left unable to recognize what is right and what is wrong with regards to bedtime routines and most importantly, how to change their routines in a meaningful way. | Awareness of consequences about the parental role help parents to achieve optimal routines. |
| (b) Seeking information online or relying on peer support was a mechanism that some parents deployed however, for some that was not possible and the quality and trustworthiness of information might not be consistent and appropriate for all cases. | |
| (c) Parents seemed unaware of where/who to approach should any issues with their bedtime routine arise or when their children are first born leaving them exposed to a potentially problematic start with their bedtime routines. | |

Social influences and intergroup conflicts - Within the family unit the interactions between parents and children were another important barrier for implementing good bedtime routines. The older the children, the more exposed to peer pressure and outside points of view resulting in higher frequency of arguments and conflicts within the family unit and at bedtime.

Tiredness or “cognitive overload” was a significant barrier for achieving good bedtime routines especially in families with more than one child or families where the mother, as the one who’s primarily involved in bedtime routines, was working full-time.

Habituation & lack of self-monitoring of routines can act as barrier. Most parents reported just doing their bedtime routines as a habit with little thought. Habits are not by definition bad. It depends on what exactly the habit entails. Habits may serve to maintain and perpetuate good routines over time. However, if the bedtime routines of a family are sub-optimal, habituation of that routine with no self-reflection or time to actively think about the routine can result in a vicious cycle with the same, unhelpful and potentially harmful behaviours repeated every night.

Lack of motivation and negative emotions associated with bedtime routines are an important barrier that contribute to parents feeling incapable of achieving optimal routines in a consistent manner or making positive changes to their bedtime routines where required.

Social role was an important facilitator for the best chances in life strong beliefs about the future wellbeing.

Environment and access to resources maintaining optimal bedtime routines: an issue. Also, all families are growing older.

Intention is an important facilitator for achieving, and especially for maintaining, good bedtime routines.
In theory

Parents know why it is important
Parents know what to do
Parents have resources
Parents feel it's their responsibility
Parents have all the best intentions

But in reality

Parents don’t know where to find information and support when needed
Parents don’t know how to establish, maintain or change their bedtime routines
Parents face bedtime challenges and conflicts especially as children grow older
Bedtime routines are habitual leading to a perpetuation of suboptimal routines

The result
Lack of optimal & consistent bedtime routines

Figure 1
Schematic representation of key barriers and facilitators based on TDF Flowchart presenting key barriers and facilitators identified by the study leading to the creation of sub-optimal bedtime routines.
A proposed mechanism for the initial creation and later maintenance of sub-optimal bedtime routines based on TDF results on barriers and facilitators when considering key barriers and facilitators as well as the wider context and known literature in the field this scheme provides an explanatory mechanism for the formation and maintenance of sub-optimal bedtime routines.

Supplementary Files
This is a list of supplementary files associated with this preprint. Click to download.
Additional file A.docx