

## **RESEARCH ARTICLE**

### **Parents' perceptions of their children's sedentary behaviour**

#### **Abstract**

Sedentary behaviour is complex, occurring in different contexts and influenced by numerous factors. One such context is the home environment where the family setting can determine the type and amount of sedentary behaviour that occurs. There is limited evidence examining sedentary behaviours within a family setting, specifically in children aged 2-11 years, and qualitative studies are particularly absent. The purpose of this study was to explore parents' understanding of sedentary behaviour and parent's perceived influence on their children's sedentary behaviours at home using Granich and colleagues' conceptual model as an analytical schema. Nineteen parents (4M, 15F; mean age =  $37.3 \pm 4.4$  years) and their children (15M, 4F; mean age =  $6.6 \pm 3.7$  years) participated in either face-to-face or telephone interviews. Concurrent deductive and inductive content analysis was used to identify overall themes and the researchers employed several methods of trustworthiness during the data analysis process. Two overall themes and seven second-order themes emerged from the interviews in relation to sedentary behaviours within the family setting. Findings indicated that parents, particularly mothers, are the gatekeepers to the amount and types of sedentary behaviours that children engage in at home. Role modelling, reinforcement, rules and restrictions influence the type of sedentary activities of children, particularly electronic media use, within the home. Interventions to reduce sedentary behaviour in children should adopt a whole-family approach to modify the existing strategies already enforced by parents to ensure effectiveness.

#### **Keywords**

sedentary behaviour; children; parents; screen-time; home; electronic media

#### **Introduction**

It is now well established that sedentary behaviours are independent of physical activity levels in their associations with health and individuals can have high levels of both physical activity and sedentary behaviour (Owen *et al.* 2010, Bankoski *et al.* 2011, Maher *et al.* 2013). Recently sedentary behaviour has been labelled as the new smoking (Bounajm *et al.* 2014, Levine 2014), suggesting that sedentary behaviour is bad for individuals and needs to be significantly reduced in our daily activities. Yet it could be argued that the dominant discourse within the media that sedentary behaviour is 'bad' does not fully consider the complexities of sedentary behaviour and the social contexts where it occurs. Recently, the Sedentary behaviour International Taxonomy project (SIT; [www.sittonomy.net](http://www.sittonomy.net)) was developed to establish classification of sedentary behaviours by use of a formal consensus. Although still in progress, preliminary findings suggest there are nine complementary domains that classify sedentary behaviours (Chastin *et al.* 2013). These include: the purpose of the behaviour (e.g., work, education, transport); the physical environment (e.g., location of behaviours, indoor, outdoor); posture (e.g., lying, sitting); the social environment (e.g., alone, with others); the type of behaviour (e.g., screen-based, non-screen-based); time (e.g., time of day, time of year); associated behaviours (e.g., snacking, smoking); status (e.g., psychological status) and measurement of behaviour (e.g., self-report, objective). The development of a sedentary taxonomy will help provide further detail on the context of sedentary behaviours, rather than relying on a single measure of duration of sedentary behaviour. It could also help us contextualise sedentary behaviour and further understand cultural norms associated with sedentary behaviour. Currently there is an extensive body of evidence that has measured sedentary behaviour duration and bouts in different contexts (e.g., workplace, commute to work, home) and have linked these behaviours to health (Owen *et al.* 2011, Wilmot *et al.* 2012, Chastin *et al.* 2014). The conclusions from these quantitative studies suggest that sedentary behaviour is a universal behaviour yet there is high variability

in the behaviour. As outlined by the sedentary behaviour taxonomy, sedentary behaviours should be viewed in a context-specific manner and as researchers we need to go beyond the current understanding of how much sedentary behaviour individuals are engaging in.

Qualitative approaches are best placed to try and give a more in-depth understanding of behaviours yet currently there are few qualitative studies addressing this.

### ***Sedentary behaviour in children***

Sedentary behaviour has recently been defined as, 'any waking activity characterised by an energy expenditure  $\leq 1.5$  metabolic equivalents and a sitting or reclining posture (Sedentary Behaviour Research Network 2012). In general this means that any time a person is sitting or lying down, they are engaging in sedentary behaviour, for example TV viewing, computer usage and reading. Population data suggests that whilst physical activity levels in children and young people are below the recommended guidelines, they appear to have stabilised over the last 5 years (Bromley *et al.* 2012, Craig and Mindell 2012). With regards to sedentary behaviour, data from the Health Behaviour in School-aged Children Survey in 2010 (Currie *et al.* 2011) indicated that 65% of 11-15 year olds watch more than 2 hours of TV per day and these data are similar to TV viewing figures in 2006. Yet data on computer usage (gaming and non-gaming usage) has increased significantly since 2006 for both boys and girls. Overall computer usage for gaming for more than 2 hours per day was 47% and this behaviour is more prevalent in boys than girls. Computer usage for non-gaming activities (e.g., e-mailing, online chat) for more than 2 hours per day was 54% and was more prevalent in girls. Recent data on the communication market in the UK (Ofcom 2013) shows that the average household owns two TVs and this figure has remained consistent since 2003 yet over the last year, the number of UK households that own a tablet device has doubled from 11% in 2012, to 24% in 2013. Each household has an average of three different types of internet enabled devices, with 86% of households having at least one device. These data suggest that

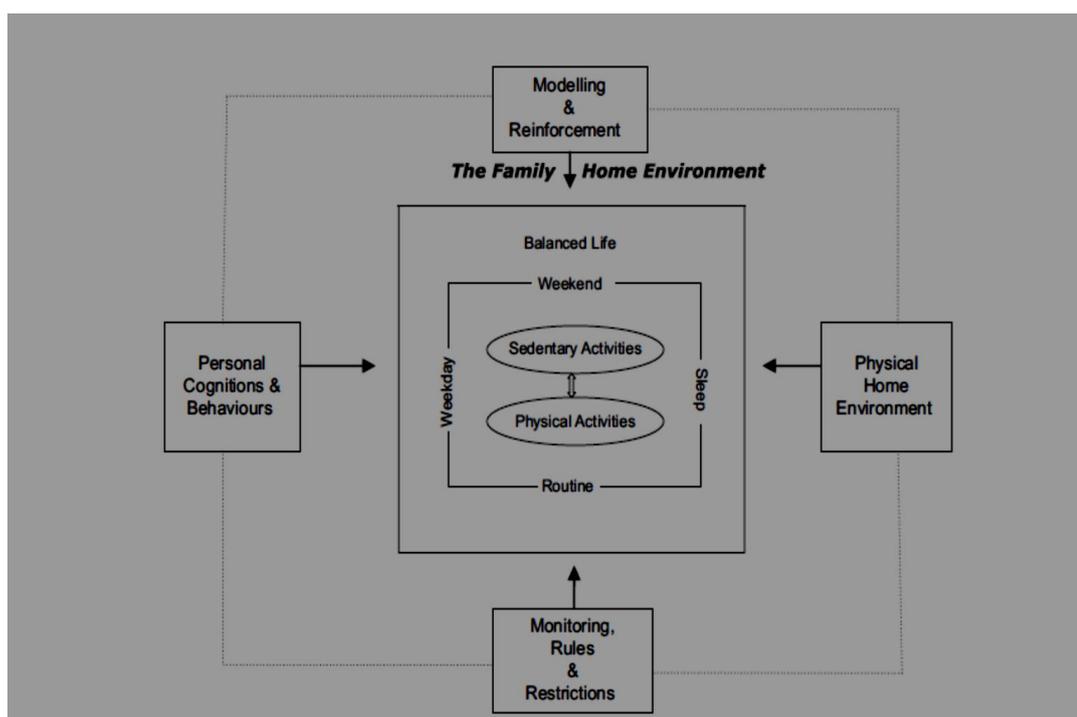
a large proportion of time spent engaged in screen-based activities occurs within the home environment and it has been suggested that the number of screen-based devices within the home environment could have a significant influence on children's TV viewing and use of EM (Granich *et al.* 2010). At present, it is also difficult to ascertain the level of media stacking that occurs within the home. Media stacking refers to conducting unrelated media tasks whilst watching TV (e.g., using your tablet device whilst watching the TV).

### ***Sedentary behaviour in the home***

The prevalence of EM within the home environment is increasing and this could have a potential influence on the amount of EM usage children participate in whilst at home. Within their social-cognitive model, Taylor *et al.* (1994) identified that parents can influence their children's behaviours by directly and indirectly influencing the physical, socio-economic, cultural and social-cognitive aspects of their environment. Parents are perceived as important role models for their children, with evidence to suggest that children often model their screen time within the home on their parents' use (Salmon *et al.* 2005, Granich *et al.*, 2010). Conversely, parents are viewed as the 'gatekeepers' of the time their children spend engaging in TV viewing, EM use, physical activity, homework and social pursuits. Rules and restrictions enforced by parents within the home can govern their children's screen time and this may be of increased importance as the average number of screens within a typical household continues to rise. Several reviews have shown that the number of screens within the home is related to increased TV viewing (Pate *et al.* 2011, Maitland *et al.* 2013) yet gaining an in-depth understanding of the context of TV viewing and other sedentary activities at home is lacking in the current literature and was recommended by Maitland and colleagues as a future area for research in their recent review.

### ***Framework for sedentary behaviour in the home***

Parents play a central role in shaping their children's sedentary behaviours in the home, in particular TV viewing and EM use, yet there is limited research examining parents' perceptions of sedentary behaviour within the home environment. A qualitative study conducted in Australia (Granich *et al.* 2010) examined how the family home environment influenced 11–12 year olds' EM use within the home. Parent and sibling modelling and reinforcement, the physical home environment (i.e. number of screens within the home) and household EM use rules and restrictions emerged as key influences on children's EM use. Based on the findings, Granich and colleagues proposed a conceptual schema representing children's incorporation of physical and sedentary leisure activities and the influences on electronic-based sedentary behaviour within the family home environment (Figure 1).



**Figure 1:** A conceptual schema representing children's incorporation of physical and sedentary leisure activities and the influences on electronic-based sedentary behaviour within the family home environment. Granich, et al. (2010). Understanding children's sedentary

behaviour: a qualitative study of the family home environment. *Health Educ Res*, 25(2), 199-210 by permission of Oxford University Press.

Within the model, there are four key contributors to sedentary behaviour at home and these are: personal cognitions and behaviours; modelling and reinforcement; monitoring rules and restrictions and the physical home environment. This model contextualises sedentary behaviour at home, based on both children and parents' perceptions, furthering understanding of cultural norms associated with sedentary behaviour. Yet this research was conducted in Australia and has not been explored in a UK context. To date, there are no known data available in the UK on parents' perceptions of sedentary behaviour within the home environment and no known data on the views of parents of younger children (aged 2-11 years) The aims of this qualitative study were to explore parents' understanding of sedentary behaviour and parent's perceived influence on their children's sedentary behaviours at home using Granich and colleagues' conceptual model as an analytical schema.

## **Methods**

### ***Participants***

The target groups in the study included parents with young children and primary school aged children. The criteria for each group included parents aged between 18 and 65 years; children between 2 and 5 years of age, not yet at school and able to walk unaided (young children); and children aged between 5 and 11 years and attending primary school (primary school children). Parents were recruited through posters and e-mail alerts within the University campus and word of mouth. Fifteen parents of primary school children (PSP) and four parents of young children (YCP) were recruited (mean age =  $37.3 \pm 4.4$  years). The sample included 5 fathers and 14 mothers of 4 girls and 15 boys (mean age =  $6.6 \pm 3.7$  years). All parents gave written informed consent and ethical approval was obtained for the study from the institution's Ethics Committee.

## ***Interviews***

### *Pilot work*

A semi-structured interview guide that allowed ease of comparison across the interviews whilst remaining flexible and sensitive to emergent issues was utilised. The content of the interview guide was developed based upon prior knowledge of research findings in the area of sedentary behaviours within the home environment. The interview guide was piloted independently with two parents (one mother and one father) outwith the main study. The pilot study led to changes in the sequencing of sentences and the use of more specific and direct probes in order to follow up areas of interest that emerged.

### *Interview questions*

As discussed earlier, there is a dominant discourse within the media that sedentary behaviour is 'bad'. The interviewer adopted a neutral perspective on sedentary behaviour throughout the interviews to ensure the valence of parental perceptions of sedentary behaviour were captured. The opening question in the interview was, 'Tell me what you understand by the term, sedentary behaviour?'. This allowed the parents to explore their own meaning of sedentary behaviour without any assumptions being created by the interviewer. The parents were then asked to provide examples of what they considered to be sedentary behaviour. A series of questions were then asked relating to sedentary behaviour within the home (see Appendix 1).

### *Interviewer*

While following the interview guide, the interviewer adopted a conversational and open-ended approach to build a rapport with the parents. Sparkes and Smith (2014) advocate that concerns over bias require the researcher to identify the perspectives they bring to their research, as either insiders or outsiders, and discuss how these perspectives may affect the collection, analysis and interpretation of the findings. In this study, the interviewer was male,

aged 23 years old and was not a parent themselves at the time the research was conducted. Consequently the interviewer had an understanding of the empirical and theoretical ideas relating to sedentary behaviour within the home yet had no biases related to parental perceptions of sedentary behaviour within the home.

### ***Procedures***

Interviews were conducted in January/February 2013 and November/December 2013. The two phase recruitment was due to logistical reasons based on researcher availability. At the onset of each interview, the participants were reminded of confidentiality and advised that they could ask to terminate the interview at any time. Face to face interviews took place in the participants' place of choice, most commonly their home, to allow them to feel comfortable in their environment. If the participant was not free to meet then an interview was conducted over the phone. There were fourteen face to face interviews and five telephone interviews. All interviews were tape recorded with the participants' permission. Phone calls were recorded using an iPhone 4S software application called 'SuperNote' (Clear Sky Apps LTD, 2013), which were then uploaded to a computer and transcribed. Face-to-face interviews were also conducted in the same way; the conversation recorded using the 'SuperNote' application. Due to the flexible nature of the process and the individual responses of the participants, interviews varied in length with an average interview lasting 21 minutes. After each interview, the participants also completed a short demographic questionnaire that included questions on how many EM devices were available within the household (e.g. TVs, PCs, laptops, games consoles and tablets).

### ***Analysis***

One of the central aims of the study was to use Granich and colleagues' conceptual schema as an analytical framework for understanding parental perceptions of sedentary behaviour at home. As such, the researchers used concurrent deductive and inductive content analysis

throughout. The deductive analysis was used to identify influences on sedentary behaviour within the family home environment aligned with Granich and colleagues' conceptual schema. Alongside this, inductive content analysis was used to explore themes that were not accounted for in the schema. Sparkes and Smith (2014) refer to this blend of deductive and inductive reasoning as abductive reasoning, which is further detailed and utilised in a recent study by Ryba *et al.* (2012) examining the acute cultural adaptation of elite female swimmers. The concurrent content analysis was conducted by the primary researcher across all 19 transcripts using a three step process. Firstly, the researcher read through all transcripts several times in order to be fully immersed in the data. Secondly, meaning units (Graneheim and Lundman 2004) that included words, sentences or paragraphs relating to the research aims were identified within each transcript. These meaning units were grouped together based on similar meanings and labelled as first-order themes. Relationships between these first-order themes were then identified and themes with similar meaning were clustered together to form second-order themes. Finally, these second-order themes were grouped by meaning and resulted in several overall themes relating to the research question.

### ***Establishing trustworthiness***

Based on the concept of trustworthiness (Lincoln and Guba 1985), several methods were employed by the researcher to ensure quality in their analysis (Sparkes and Smith, 2014). Credibility was enhanced by independent categorisation of meaning units and ordered themes of three selected transcripts by two researchers (primary researcher and first author) during the concurrent inductive/deductive content analysis process. During multiple-analyst triangulation, categorisation was discussed with inter-rater agreement ranging between 81% and 94%. In instances where disagreements on any of the categorisation occurred, discussions continued until full inter-rater agreement was reached. To demonstrate confirmability the researcher adopted a constant-checking approach whereby at each stage of the analysis,

referral back to the original transcripts was employed to ensure all subsequent thematic connections were appropriate. To enhance this reflexive, self-aware process, a ‘critical friend’ was utilised to provide feedback on the process of the analysis. Sparkes and Smith (2014) describe the role of a critical friend as, ‘to provide a theoretical sounding board to encourage reflection upon, and exploration of, alternative explanations and interpretations of events in the field and the analysis of the data as it is generated’ (p. 181). In addition, quotations from the original transcripts are used throughout the presentation of the findings to demonstrate that the findings did emerge from the data and enhance confirmability.

## **Results**

Concurrent deductive and inductive content analysis revealed 24 first-order themes; seven second-order themes and two overall themes. Descriptive statistics for the participants and the mean number of EM devices within each household are shown in Table 1.

### **Insert Table 1 Here**

#### ***Personal cognitions and behaviours***

This overall theme comprised of three second-order themes: understanding of the term sedentary behaviour; perceived benefits and consequences associated with sedentary behaviour and sedentary activities within the home.

##### *Understanding of the term sedentary behaviour*

The majority of the parents had a good understanding of the term sedentary behaviour. Most parents described sedentary behaviour as, ‘non-active behaviour’ or ‘sitting around doing nothing’. Several parents conceptualised sedentary behaviour as the opposite of participating in sport and/or physical activity, ‘For me, sedentary behaviour is when they’re not playing outside or running around the house chasing each other’ (mother, boys aged 7 and 9 years). Similarly, one mother stated:

When I think about sedentary behaviour I think about all the activities we do that doesn't involve being out of breath or getting sweaty. It is when you are sat down and relaxed as opposed to being on your feet and moving about (mother, boy aged 5 years)

There was one parent (father, boy aged 8 years) who was unfamiliar with the term. The interviewer provided him with the SBRN (2012) definition of sedentary behaviour along with examples of sedentary behaviour (sitting at a desk, reading a book) to clarify the term for the remainder of the interview.

*Perceived benefits and consequences associated with sedentary behaviour*

Parents viewed sedentary behaviour to have both benefits and consequences, these consequences were discussed specifically in relation to excessive sedentary behaviour. In relation to the perceived benefits of sedentary behaviour, one parent felt that not all sedentary behaviour can be classified as bad and that some sedentary activities were necessary, 'Aye, I guess all sedentary behaviour is not bad it could be doing homework or something' (mother, boy aged 8 years). One parent described it as beneficial, 'I think they need rest time at home, particularly in the evening. They can't be active all the time' (father, boy aged 9 years). Others suggested that the amount of sedentary behaviour occurring within the home should be in moderation, with reference to both the benefits of sedentary behaviour and the health consequences of excessive sedentary behaviour:

Some sedentary behaviour is good as the kids require down time and yet it can also be bad for you because too much time sitting around can lead to certain health problems.

It's good to get a balance I think (mother, boy aged 5 years).

As highlighted here, the majority of parents commented on an excessive time spent being sedentary as a bad, for example, 'I think too much time spent sitting down is not good for any of us. Me, the kids or anyone' (mother, boys aged 7 and 9 years). One parent referred to

the perceived health consequences of excessive sedentary behaviour, 'I think if we spend too much time sitting around the house indoors we go a bit crazy. It can't be good for you in my opinion' (father, boy aged 9 years).

*Sedentary activities within the home*

All of the parents reported that the most common sedentary behaviour within the home involved screen use, particularly watching TV, playing computer games and using an iPad, 'When he is at home he spends far too much time playing the PlayStation' (mother, boy aged 10 years) and 'She would sit and watch TV when she comes home from nursery and I'm busy making the dinner' (mother, girl aged 3 years). Parents also commented on the popularity of social media (e.g., Facebook, Twitter, Snapchat), with the majority of the parents indicating that it was influential on the amount of EM use their children engaged with at home. Several of the parents suggested that EM use had an addictive nature and the many forms of EM that children engage in further increases this addiction. One parent commented, 'If he got away with it he would definitely spend like hours on end on the computer or playing the Xbox...he would definitely be addicted to all these things and would go from one thing to another' (father, boy aged 9 years). The prevalence of sedentary behaviours within the home differed depending on the age of the child. Older children spent more time using EM than the younger children and this was recognised by some parents, 'He would definitely spend more time on computer games since he has got older' (mother, boy aged 10 years). Other sedentary behaviours that occurred within the home environment included doing homework, reading, doing artwork, writing, or playing games with friends or siblings. The majority of parents felt that these types of activities were less common than EM use, however two of the parents indicated that their children participated in very limited screen use, 'Half of the time at home is spent engaged in other kinds of activities like getting ready, having breakfast, having a bath then if it's not those it would mostly be drawing and writing' (father, girl aged 6 years).

***Influences on sedentary behaviour within the environment***

This overall theme comprised of four second-order themes: modelling and reinforcement by parents; modelling and reinforcement by siblings and peers; rules and restrictions on sedentary behaviours and other influences on sedentary behaviours.

*Modelling and reinforcement by parents*

Parental modelling and reinforcement emerged as a key influence on sedentary behaviour of children within the home environment. The majority of parents reported that they influenced their children's sedentary behaviour in the home through their own behaviours and the term 'role model' was used frequently by the majority of parents, for example, 'Parents act as a role model for their children, especially when they are younger' (mother, girl aged 7 years). Similarly, 'As a parent you set the example, so if your lifestyle isn't very energetic, then it will definitely pass on to your children. They tend to copy you' (mother, girl aged 7 years). Yet two of the pre-school parents thought they had a limited influence on their children's sedentary behaviours, 'I don't think necessarily that my sedentary behaviour does really influence them, because it's different times when they're not actually seeing me' (mother, boy aged 3 years). One of the parents suggested that the child minder or nursery were more influential, perhaps highlighting age-related differences in the influence of parents on their children's sedentary behaviour, 'I'd probably say her biggest influence is, at the moment is her child minder and is her nursery with what she's doing' (mother, girl aged 3 years). Several parents suggested that their own lack of TV viewing directly reduced the amount of TV watched within the home, 'The fact that we don't sit down and watch TV I think has an influence. I think that has rubbed off on him because he hardly ever watches TV either' (mother, boy aged 8 years). Interestingly one parent felt that watching TV together as a family was better for their child than them watching TV alone:

## *Qualitative Research in Sport, Health and Exercise*

As a family, we will sometimes watch TV together. I think the kids prefer that and I have heard that is better if you are going to watch TV, it is a more engaging activity if the parent does it too (mother, girl aged 3 years)

### *Modelling and reinforcement by siblings and peers*

Siblings and peers appeared to have a strong influence on sedentary behaviours within the home, particularly in relation to EM use. Several parents who had more than one child commented on the influence of siblings on children's sedentary activities at home, particularly in same-sex male siblings who engage in screen use competitively. This is evident in the following quotation:

They both encourage each other to play on the Playstation most evenings. I think it's become quite competitive between them. Whilst one is playing, the other one watches and vice versa. This could go on for hours and hours if I let it (mother, boys aged 7 and 9 years).

Significant, yet indirect influences on children's sedentary behaviour at home discussed by parents were their peers. The majority of parents indicated that their child engaged with EM partly due to peer pressure at school and it being a cultural norm. One of the parents stated:

Well I think he feels the peer pressure of having the latest game or app, they all talk about games at school and they are all on Instagram now. Definitely there is a feature of that on how much he is on his games console and iPad at home (mother, boy aged 10 years)

Another parent reported that the influence of remote peer interaction via social media dictated how sedentary their child is in the evenings, 'There is a lot of social media interaction between him and his classmates in the evenings which means he's never off his iPhone' (father, boy aged 9 years).

### *Rules and restrictions on sedentary behaviours*

Parental influence on children's sedentary behaviour within the home appeared to be governed by rules and restrictions on the amount of time they engaged in screen-based activities and the access to EM within the home environment:

I guess as parents we are an influence on his sedentary behaviour at home because we monitor the amounts of time he is on it... none of the kids have ever been allowed TVs or computers in their bedroom because it's difficult to monitor and drives us nuts (mother, boys aged 7 and 9 years).

Limiting screen time was a common method used to restrict the contribution of TV viewing and EM use, to reduce levels of sedentary behaviour at home. Parental strategies included turning the TV off, 'Being aware if they've had an hour in front of the telly then you've just got to turn the telly off' (father, girl aged 6 years) and removing the electronic device from the physical environment, 'I often threaten to take the PlayStation away, that usually works' (mother, boy aged 10 years). Conversely, one parent used EM as a reward, 'We have limits and rules. They have to earn minutes by accumulating good behaviour' (mother, girl aged 7 years). Encouraging physical activity participation was another strategy to reduce sedentary behaviour at home, discussed by several parents, 'I try and get them exercising, things like that just to keep them on the go' (mother, girl aged 7 years) and 'We try and make more of an effort to be more active in the evenings and weekends' (father, boy aged 8 years). Lack of rules and restrictions on screen use were also evident. Three of the parents also highlighted that they often use EM as a means of keeping their child busy while they did the housework or to keep them entertained, 'It could be just lazy parenting, just sticking them in front of the TV because you can't think of anything else to do (father, boy aged 10 years)'. Similarly, 'To be honest, it's sometimes just much easier if they're sitting down watching the television, and not causing chaos throughout the house (mother, girl aged 5 years)'.

*Other influences on sedentary behaviours*

Several influential factors on sedentary behaviour, outside of the family, were discussed by parents. One of the most common factors that determined their child's levels of sedentary behaviour at home was the weather and time of year, 'Quite often if the weather is miserable and wet, we tend to stay indoors more and watch movies' (father, boy aged 9 years) and 'In the summer months he hardly ever plays the Xbox actually... When it gets dark early then he is obviously in earlier and has more time to hang about' (mother, boy aged 6 years). The school holidays, particularly when the weather is bad, were perceived as a time where excessive EM use occurred at home, highlighted by the following extract:

Over Christmas the weather has been so bad and we've had to stay indoors a lot.

There are so many mums saying they can't wait for them to get back to school tomorrow because all they are doing is just sitting on their Xbox or PlayStation (mother, boy aged 10 years).

## **Discussion**

The findings provide detailed insight into parents' understanding of sedentary behaviour and parent's perceived influence on their children's sedentary behaviours at home. Our findings also provide support for Granich and colleagues' conceptual schema as an analytical framework to understand sedentary behaviour within the home environment. Within their model, there are four key contributors to sedentary behaviour at home: personal cognitions and behaviours; modelling and reinforcement; monitoring rules and restrictions and the physical home environment. Providing support for personal cognitions and behaviours as a key contributor to sedentary behaviour at home, parents in this study had a clear understanding of the term 'sedentary behaviour', discussed the perceived benefits of engaging in moderate levels of sedentary behaviour and the negative consequences of excessive sedentary behaviour. It is encouraging that parents in this study appeared educated on the risks of sedentary behaviour despite there not being a recommended amount of

sedentary behaviour children should be restricted to in the current UK guidelines. However, some parents felt that EM was beneficial for their children in allowing them some 'down-time' and also allowed parents to undertake household tasks whilst the children were entertained using EM.

The prevalence and types of sedentary activities that occurred within the home reported by the parents were consistent with previous research in this area (Carlson *et al.* 2010, Granich *et al.* 2010, Berge *et al.* 2012, Granich *et al.* 2011). Use of electronic media was the most common sedentary activity occurring within the home and there was some evidence to suggest that this increased with age, where older siblings engaged in more TV viewing and EM use than their younger siblings. This provides support for survey data highlighting that sedentary behaviour and screen use is more prevalent in older children aged 11-16 years than younger children aged 5-11 years (Bromley *et al.* 2012, Craig and Mindell 2012). A possible explanation for the age-related differences in EM use could be linked to the socio-cultural norms amongst peer groups of older children. Social media via EM is the main form of communication amongst peers in today's society and ensuring children are up to date with the latest social media app could impact on the prevalence of EM use at home during evenings and weekends when they are outside the school environment. Parents of the older children in the sample commented that the remote peer interaction via social media influenced their children's sedentary behaviour in the evenings at home. Further research is needed to explore the link between socio-cultural norms related to social media communication via EM and the prevalence of EM use. A novel finding that emerged from the study was parental concerns relating to the addictive nature of EM use, particularly gaming, moving from one device to another without a break. The addictive nature of games consoles in children and adolescents has been explored in previous research linking excess use with behavioural, social and developmental issues (Yau *et al.* 2012, Rehbein and Baier 2013).

However, there is limited research examining the impact of addiction to EM use on levels of sedentary behaviour in children and adolescents. Furthermore, there is a need to examine how the increasing prevalence of EM devices and multiple use of EM devices (i.e. media stacking) within the home influences sedentary behaviours both within and outside of the home environment.

The second overall theme that was consistent with Granich and colleagues' conceptual schema of contributory factors to sedentary behaviour at home related to several influences on sedentary behaviour within the home environment. These included modelling and reinforcement by parents; modelling and reinforcement by siblings and peers and rules and restrictions on sedentary behaviour. Modelling of sedentary behaviours within the home environment and reinforcement of these behaviours through rules and restrictions was discussed by all of the parents interviewed. Parents were aware that their own TV viewing and EM use can have both a positive and negative influence on their children's screen-based activities. This is in line with Bandura's (1986) Social Cognitive Theory suggesting that parents act as role models to their children when learning behaviours. Similar findings were evident in a study conducted by Granich *et al.* (2011) comparing 'heavy' vs. 'light' EM users aged 11-12 years. Co-viewing of the TV with the mother was independently associated with heavy EM use within the home yet role modelling and reinforcement of EM use by other family members were not significant predictors. In the present study, the majority of the parents interviewed were mothers and all described themselves as role models with one mother placing perceived importance of co-viewing of the TV on her child's level of engagement. Conversely, some mothers stated that their level of EM use within the home was minimal which they perceived had a positive influence on modifying their children's EM use. Based on the findings, a potential strategy for parents to reduce screen-time and EM use of

their children at home is to be aware of how much time they spend engaging in TV viewing and EM use and consider reducing this.

It was also evident that parents acted as the ‘gatekeepers’ to the amount of access their children had to EM within the home and how often they were allowed to engage with EM. Using family-based focus groups, Granich *et al.* (2010) identified mothers as the main gatekeepers within the home environment. They found that mothers were more likely to closely monitor homework completion, social activity and physical activity and to regularly enforce household EM rules and restrictions. In the present study it was not possible to identify the main gatekeeper within the home environment as we conducted one-to-one interviews as opposed to family focus groups. Yet it is apparent that targeting parents, particularly mothers, in interventions to modify sedentary behaviour could be central in creating boundaries for children and monitoring their TV viewing and EM use at home.

Enforcing rules and restrictions on sedentary activities within the home has been shown to be a key strategy that parents use to modify the sedentary behaviour of their children (Carlson *et al.* 2010, Granich *et al.* 2010, 2011) and is a key contributor to sedentary behaviour at home in Granich and colleagues’ conceptual schema. In the present study, turning the TV off after a certain amount of time, setting time limits for games consoles, laptops and iPads and encouraging non-sedentary activities (e.g., physical activity), were strategies used by parents to reduce sedentary behaviour within the home. Yet several parents did report that a certain amount of sedentary behaviour in the home was considered to be acceptable. It provided children with ‘down-time’ and kept them entertained, allowing them to undertake household tasks. Overall most parents felt there is a balance between the prevalence and type of sedentary behaviour at home that is considered acceptable or not. In line with these strategies, Carlson *et al.* (2010) found that for parents who set appropriate limits on TV viewing, in line with recommended guidelines, it was more likely that their

children adhered to these limits and reduced their TV viewing at home. Similarly, Granich *et al.* (2011) found that home rules preventing late night TV viewing and time limits on personal computer games were independently associated with reduced EM use. It is evident that parents are willing to enforce rules and restrictions of sedentary activities within the home and this appears to result in reduced EM use. Therefore, future interventions to reduce sedentary behaviours in children should acknowledge the important role that parents play in modifying this behaviour and that several strategies are usually already in place within the home. Practitioners and parents could work alongside one another to modify and tailor these strategies appropriately to increase the likelihood of their effectiveness.

The inclusion of siblings in family-based interventions to decrease sedentary behaviour within the home is also of importance based on the current findings of the study. Parents of families with more than one child readily discussed the interactive nature of EM use amongst siblings, particularly boys. This is in line with previous qualitative findings by Granich *et al.* (2010) who reported that children who had an older sibling who spent considerable amounts of time playing computer games were also influenced to do the same and is a key contributor to sedentary behaviour at home in their conceptual schema. This concept is referred to by Taylor *et al.* (1994) as familial aggregation and is where family members can influence each other's behaviours in a reciprocal manner. This has important consequences for intervention design based within the home environment. Siblings have the ability to influence each other's behaviours, particularly older siblings, and influence the type of behaviours engaged in at home. Therefore, using older siblings as role models to reinforce non-sedentary activities within the home (e.g., physical activity) and modify sedentary activities (e.g., EM use) could be a valuable avenue for future intervention research. Our findings also indicated that the weather had a substantial influence on the amount of sedentary behaviour engaged in at home. All parents in the study reside in Scotland where the

weather for the majority of the year is cold and often wet. Furthermore, the interview data were collected during the winter months. This could explain why the weather and time of year were highlighted as key influences on the amount of sedentary behaviour that occurred within the home. Seasonal and weather effects did not emerge as central themes in the qualitative study examining sedentary behaviour within Australian families by Granich *et al.* (2010). This highlights that interventions targeting sedentary behaviours in children need to be contextually and culturally specific. Exploring the possibility of replacing EM-related sedentary behaviours with alternative sedentary behaviours (e.g., reading, arts and crafts) could reduce the negative impact of seasonal and weather effects of EM use within the home environment.

### **Limitations**

The number of mothers within the sample of parents could be considered a limitation as fewer fathers volunteered for the study, limiting our ability to gain an insight into their perceptions of sedentary behaviour at home. Yet we would argue that, based on the present findings and previous research, it appears that mothers are the gatekeepers to the types of activities that children participate in at home and could therefore be a more valuable social agent in shaping their children's behaviours through role modelling, established routines, reinforcement, rules and restrictions. In addition to this, there was also a bias towards parents of boys as opposed to girls, particularly the mother-son dyad, which could have influenced parents' perceptions of sedentary behaviours within the home environment. Previous research and survey data has highlighted that boys tend to engage in more EM use than girls and there are gender differences in the types of EM devices that boys and girls prefer to use. In the present study it was difficult to establish age- or gender-related differences in parental perceptions of sedentary behaviour at home. This was due to the population sample bias towards boys and limited evidence of age-related differences in the perceptions of parents of

children aged 2-11 years. The participants were based in urban areas of Edinburgh and Glasgow with relatively high levels of socio-economic status (SES) and were also recruited from a University campus, potentially resulting in participants with higher levels of education and SES. Recent research by Tandon *et al.* (2012) established a link between increased EM use and EM access in children's bedrooms and parental TV viewing in households of low SES. Exploring parental perceptions of sedentary behaviour in households of low SES needs to be addressed to further understand the complex interactions of family sedentary behaviour within the home environment.

### **Future research and conclusion**

Our findings provided support for Granich and colleagues' conceptual schema representing children's incorporation of physical and sedentary leisure activities and the influences on electronic-based sedentary behaviour within the family home environment. The key themes that emerged from our findings that are also identified as key contributors to sedentary behaviour in the schema were personal cognitions and behaviours, modelling and reinforcement by parents, siblings and peers and rules and restrictions on sedentary behaviour. Overall our findings indicated that parents and siblings shape the sedentary behaviours that occur within the home environment in a reciprocal manner. It was encouraging to note that parents had a clear understanding of the term 'sedentary' and were aware of both the benefits of moderate sedentary behaviour at home and the negative consequences of excessive sedentary behaviour, in particular EM use. Future research should explore parental perceptions in low SES groups to establish if this awareness is extended across all households. It was apparent that EM devices are now commonplace within households and could be linked to negative behaviours, such as gaming addiction. Several parents reported concerns regarding excessive EM use by their children, likening it to being addicted to EM. This is an area that warrants further research with respect to the impact on

overall levels of sedentary behaviour at home. Mothers are a salient influence on the routine and rules and restrictions on activities within the home and are central to intervention design targeting reduced sedentary behaviour in children. Several strategies are already used by parents within the home to limit the amount of TV viewing and EM use. Future research should address mothers' perceived barriers and facilitators to decreasing TV viewing and EM use within the home to tailor established strategies already implemented. A final consideration is for practitioners to adopt a whole-family approach to interventions. Familial aggregation of sedentary behaviours occurred, particularly between siblings, and appeared to dictate the type, duration and frequency of sedentary activities engaged in at home. Educating older siblings on the benefits of engaging in non-sedentary activities at home and modifying existing sedentary activities could have a positive effect on younger siblings within the family setting.

## **References**

American Academy of Pediatrics, 2011. Policy statement: media use by children younger than 2 years. *Pediatrics*, 128,1040-45.

Bandura, A., 1986. *Social foundations of thought and action: A social cognitive theory* Englewood Cliffs, NJ: Prentice-Hall.

Bankoski, A., Harris, T.B., McClain, J.J., Brychta, R.J., Caserotti, P., Chen, K.Y. and Koster, A., 2011. Sedentary activity associated with metabolic syndrome independent of physical activity. *Diabetes care*, 34 (2), 497-503.

Berge, J.M., Arikian, A., Doherty, W.J. and Neumark-Sztainer, D., 2012. Healthful eating and physical activity in the home environment: results from multifamily focus groups. *Journal of nutrition education & behaviour*, 44 (2), 123-131.

Bounajm, F., Dinh, T. and Theriault, L. 2014. *Moving ahead: The economic impact of reducing physical inactivity and sedentary behaviour*. The Conference Board of Canada.

Bromley, C., Dowling, S., Gray, L., Hinchcliffe, S., Hughes, T., Leyland, A. and Wardle, H., 2012. *Scottish health survey: Main report*. Edinburgh: Crown Copyright.

Carlson, S.A., Fulton, J.E., Lee, S.M., Foley, J.T., Heitzler, C. and Huhman, M., 2010. Influence of limit-setting and participation in physical activity on youth screen time. *Pediatrics*, 126 (1), e89-e96.

Chastin, S.F.M., Schwarz, U. and Skelton, D.A., 2013. Development of a consensus taxonomy of sedentary behaviors (SIT): Report of Delphi round 1. *PloS one*, 8 (12), e82313.

Chastin, S.F.M., Culhane, B. and Dall, P.M. 2014. Comparison of self-reported measure of sitting time (IPAQ) with objective measurement (activPAL). *Physiological Measurement*, 35, 2319. doi.org/10.1088/0967-3334/35/11/2319.

Craig, R. and Mindell, J., 2012. *Health survey for England*. London.

Currie, C., Levin, K.A., Kirby, J.L. M., Currie, D.B., van der Sluijs, W. and Inchley, J.C., 2011. Health Behaviour in School-aged Children : World Health Organization collaborative cross-national study (HBSC): findings from the 2010 HBSC survey in Scotland. HBSC Scotland National Report, no. 2011. Edinburgh: Child and Adolescent Health Research Unit (CAHRU).

De Jong, E., Visscher, T., HiraSing, R., Heymans, M., Seidell, J. and Renders, C., 2013. Association between TV viewing, computer use and overweight, determinants and competing activities of screen time in 4-to 13-year-old children. *International journal of obesity (London)*, 37 (1), 47-53.

Department of Health, 2011. *Start Active, Stay Active. A report on physical activity for health from the four home countries' Chief Medical Officers*.

Department of Health and Aging, 2010. Move and play every day: National physical activity recommendations for children 0-5 years. Commonwealth of Australia, Canberra, pp. Physical activity recommendations for 0-5year olds.

Edwardson, C.L., Gorely, T., Davies, M.J., Gray, L.J., Khunti, K., Wilmot, E.G., Yates, T. and Biddle, S.J., 2012. Association of sedentary behaviour with metabolic syndrome: a meta-analysis. *PloS one*, 7(4), e34916.

Graneheim, U. H. and Lundman, B., 2004. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse education today*, 24 (2), 105-112.

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

Granich, J., Rosenberg, M., Knuiman, M.W. and Timperio, A., 2011. Individual, social, and physical environment factors associated with electronic media use among children: sedentary behavior at home. *Journal of physical activity and health*, 8 (5), 613-625.

Levine, J. 2014. *Get up! Why your chair is killing you and what you can do about it*. St Martins Press: Palgrave MacMillan Trade.

Lincoln, Y.S. and Guba, E.G., 1985. *Naturalistic inquiry*. Newbury Park, CA: Sage.

Maher, C.A., Mire, E., Harrington, D.M., Staiano, A.E. and Katzmarzyk, P.T., 2013. The independent and combined associations of physical activity and sedentary behavior with obesity in adults: NHANES 2003-06. *Obesity (Silver Spring)*, 21 (12), E730-E737.

Ofcom, 2013. *Communications market report*. UK.

Owen, N., Healy, G.N., Matthews, C.E. and Dunstan, D.W., 2010. Too much sitting: The population-health science of sedentary behavior. *Exercise & sport science review*, 38 (3), 105.

Owen, N., Sugiyama, T., Eakin, E.E., Gardiner, P.A., Tremblay, M.S. and Sallis, J.F., 2011. Adults' sedentary behavior: determinants and interventions. *American journal of preventive medicine*, 41(2), 189-196.

Pate, R.R., Mitchell, J.A., Byun, W. and Dowda, M. (2011). Sedentary behaviour in youth. *British Journal of Sports Medicine*, 45(11), 906-913.

Rehbein, F. and Baier, D., 2013. Family-, Media-, and School-Related Risk Factors of Video Game Addiction. *Journal of media psychology: Theories, methods, and applications*, 25 (3), 118-128.

Ryba, T., Haapanen, S., Mosek, S. and Ng, K. 2012. Toward a conceptual understanding of acute cultural adaptation: A preliminary examination of aca in female swimming. *Qualitative research in sport, exercise and health*, 4, 80-97.

Salmon, J., Timperio, A., Telford, A., Carver, A. and Crawford, D., 2005. Association of family environment with children's television viewing and with low level of physical activity. *Obesity research*, 13 (11), 1939-1951.

Sedentary Behaviour Research Network, 2012. Standardized use of the terms “sedentary” and “sedentary behaviours”. *Applied physiology, nutrition and metabolism*, 37, 540-542.

Sparkes, A. and Smith, B., 2014. *Qualitative research in sport, exercise and health*. Abingdon, Oxon: Routledge.

Tandon, P.S., Zhou, C., Sallis, J.F., Cain, K.L., Frank, L.D. and Saelens, B.E., 2012. Home environment relationships with children’s physical activity, sedentary time, and screen time by socioeconomic status. *International journal of behavioural nutrition and physical activity*, 9, 88.

Taylor, W.C., Baranowski, T. and Sallis, J.F., 1994. Family determinants of childhood physical activity: A social-cognitive model. In R. K. Dishman (Ed.), *Advances in exercise adherence* (pp. 319-342). Champaign, IL, England: Human Kinetics

Thomas, D.R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American journal of evaluation*, 27 (2), 237-246.

Tremblay, M.S., LeBlanc, A.G., Kho, M.E., Saunders, T.J., Larouche, R., Colley, R.C., and Gorber, S.C., 2011. Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International journal of behavioural nutrition and physical activity*, 8 (1), 98.

Tremblay, M.S., Leblanc, A.G., Carson, V., Choquette, L., Connor Gorber, S., Dillman, C., Duggan, M., Gordon, M.J., Hicks, A., et al., 2012. Canadian Sedentary Behaviour Guidelines for the Early Years (aged 0-4 years). *Applied physiology, nutrition and metabolism*, 37,370-80.

Yau, Y.H., Crowley, M.J., Mayes, L.C. and Potenza, M.N., 2012. Are Internet use and video-game-playing addictive behaviors? Biological, clinical and public health implications for youths and adults. *Minerva psichiatrica*, 53 (3), 153.

### **Appendix 1: Initial Interview Questions**

- Tell me what you understand by the term, ‘sedentary behaviour’?
- Can you give me some examples of sedentary behaviour
- Can you discuss your own sedentary behaviour?
- Can you discuss your children’s sedentary behaviour?
- Can you tell me about sedentary behaviour within your home?
- Can you tell me what influences any sedentary behaviour that occurs at home?

**Table 1:** Descriptive statistics for parents of young children (YCP) and parents of primary school children (PSP). Mean  $\pm$  S. D. values reported where appropriate.

	Age (years)	Age of children (years)	Number of children per household	EM devices per household				
				TVs	PCs	Laptops	Games consoles	Tablets
YCP (n=4)	35.5 $\pm$ 7.5	4.0 $\pm$ 0.5	1	2	0.8	1.4	0.6	1.4
PSP (n=15)	38.2 $\pm$ 1.3	7.9 $\pm$ 3.2	2	2.6	1.2	1.6	2.2	2.8