

Association between home environment and preschool children's sedentary time moderated by parental educational level in a cross-sectional survey

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Abstract

Background Childhood obesity is a major public health concern, especially in low socioeconomic status (SES) groups. Sedentary time (SED) is one important predictor of obesity. To be able to diminish SED it is important to find modifiable predictors of sedentary behavior. The home environment associated with children's SED may vary by parental SES. This study aims to clarify the association between parental educational level (PEL) and the home environment of 3–6-year-old children, and to examine how home environment associates with children's SED, and whether PEL modifies these associations.

Methods A cross-sectional Increased health and wellbeing in preschools (DAGIS) study was conducted in 2015–2016 in Finland. The parents (n=809) filled in questionnaires assessing PEL, and the home physical and social environment related to children's SED. Children's SED was measured with accelerometers, which the children (n=758) wore for one week.

Results High PEL was associated with a home environment restraining sedentary behaviour compared with low PEL. Several sedentary behavior home environment factors, such as social norms, role models and rules concerning screen time were associated with children's SED. Some of the associations with sedentary home environment factors and SED were moderated by PEL. Limits for child's TV time was associated with children's SED only among high PEL group and being pleased with own child's ST was negatively associated with children's SED only among the low PEL group.

Conclusions Future interventions aiming to decrease SED should pay attention to relevant factors in children's sedentary behaviour home environment. It is important to acknowledge the possible PEL differences in these factors.

Background

The prevention of unhealthy weight gain during childhood is a priority worldwide because of an increase in the prevalence of overweight and obesity among preschool-aged children (World Health Organization 2016). Fortunately, many interventions that have concentrated on changing energy balance-related behaviours (EBRBs) among pre-schoolers and school children have shown a positive effect on the healthy weight status of children (Brown et al. 2019; Waters et al. 2011).

Physical activity (PA), sedentary behaviour, eating behaviour and occasionally sleep are components characterizing EBRBs (Kremers et al. 2006), of which sedentary behaviour might be the one least studied. Sedentary behaviour refers to all waking activities expending less than 1.5 metabolic equivalents (METs) that are conducted in a sitting, reclining or lying posture (Tremblay et al. 2017). Although sedentary behaviour is the opposite of PA when viewed from an energy expenditure angle, the two do not exclude each other, since the same child can both meet the PA recommendations of moderate-to-vigorous PA and have excessive sedentary time (SED) per day.

It is important to influence EBRBs, including sedentary behaviour, already at an early age, since EBRBs adopted during childhood track into adulthood (Craigie et al. 2011). A review by Jones et al. (2013) identified moderate to large tracking of sedentary behaviours during the preschool age and from preschool into later childhood. This indicates the need to modify the associates of sedentary behaviour in children as early in life as possible.

The younger the child, the more central role the parents play in forming their sedentary behaviour by providing opportunities and by restricting them. For example, stricter family rules concerning safety have been associated with more SED in 6–11-year-olds, whereas stricter rules concerning media use have been associated with less SED at home (Tandon et al. 2014). Moreover, a favourable social (i.e. rules on TV use) and physical (i.e. limited number of media devices in a child's bedroom) family environment had an interactive association with lower SED (Tandon et al. 2014). These findings indicate that several components affecting children's sedentary behaviour need to be considered simultaneously.

Certain differences in the home environment favouring sedentary behaviour have been attributed to parental education or income level. An Australian study (Dumuid et al. 2016) reported high-income families to have more equipment facilitating PA available to their school-aged children, although no differences were found in the educational level regarding the possession of such equipment. Nevertheless, relatively little research has been conducted among children under school age on socioeconomic status (SES) differences in the home environment that promote less sedentary behaviour (Salmon et al. 2011; Biddle et al. 2014; Altenburg et al. 2016).

A recent study using accelerometers found that Finnish 5–6-year-olds spend half of their waking hours sedentary (Matarma et al. 2016). The same study noted that children's SED was not related to SES. Similar results, i.e. no socioeconomic differences in SED among 3–6-year-old preschool children, have been found in our Increased health and wellbeing in preschools (DAGIS) study in Finland (Määttä et al. 2017a). Even if results from previous studies do not show socioeconomic differences in SED, SES may influence the association of home environment on SED. The environmental factors might differ depending on SES, but also the association may differ between factors in home environment and children's behaviours. Only a few studies have examined whether associates of sedentary behaviour differ according to parental SES. A Finnish study revealed that the SED of highly educated fathers was associated with children's lower SED, whereas that of lower-educated fathers showed no association (Matarma et al. 2016). A study from the USA did not find a moderating effect of educational level on the association between home environment and sedentary time (Östbye et al. 2013). In case the associations between environmental factors and children's SED differ by SES, this knowledge could help to address relevant determinants among children with varying backgrounds.

The objective of our present study was to examine differences in parental SES in the modifiable home sedentary behaviour environments. With the term home sedentary behaviour environment, we refer to the social and physical factors at home that may affect children's sedentary behaviours. In addition, we

examined how the home sedentary behaviour environment are associated with children's objectively measured SED, and whether these associations are moderated by SES.

Methods

Participants

DAGIS (www.dagis.fi) is a study examining children's EBRBs and aiming to diminish their socioeconomic differences. The cross-sectional data included in the present study were collected during autumn 2015 and spring 2016 in municipalities with socioeconomically diverse populations located in either southern or central Finland. We described the study design and recruitment process in more detail in Määttä et al. (2015) and Lehto et al. (2018), respectively. Eight of the eleven recruited municipalities agreed to participate in the study. We recruited 154 preschools in a randomised order, sixteen of which were later excluded due to unsuitability (Lehto et al. 2018). Of the eligible preschools, 86 (56%) agreed to participate in the study. All parents with 3–6-year-old children in these preschools were invited to participate in the study and received information letters with consent forms. Parents were asked to return the consent forms to the preschools if they agreed to allow their child to take part in the study. In total, 27% of the parents agreed to participate (n = 983). However, we excluded preschools (n = 20) in which less than 30% of the children participated in the study because of convenience reasons. This means that 90 parents who had given their written consent were excluded from the study. We received no data from 28 children due to them e.g. being ill, on vacation or otherwise absent during the study week, and these children were therefore excluded from the study. Overall, 66 preschools participated (43%) in the study and we received data for 864 children (29% of invited from participating schools).

Measures

Questionnaires assessing the children's EBRBs and home sedentary behaviour environments were sent home to the parents. Parents could choose whether they wanted to fill out a paper or electronic version of the questionnaire. Parents also kept a handwritten diary concerning their children's SED. Research assistants placed an accelerometer around each child's waist in the preschools. Both questionnaires and the accelerometers were returned to the preschools.

Sedentary time (SED)

SED was measured using Actigraph wGT3X-BT accelerometers (Actigraph, LLC, Pensacola, Florida, USA). Each child wore the accelerometers for seven days, 24 hours per day. In addition to the accelerometers, parents used a diary to track the hours their children had spent at preschool, possible hours spent not wearing the accelerometers and the times the child went to sleep in the evening and woke in the morning. We used an epoch length of 15 seconds when downloading data from the accelerometers and set non-wearing time to 10 minutes or more consecutive zeros. To form the SED variable, we used cut-off points of 0–25 counts/15 seconds developed by Evenson et al. (2008), since these have been reported to classify SED accurately in 5–15-year-old children (Troost et al. 2011).

A child's SED outside preschool was examined separately for weekdays and weekends. To be eligible for inclusion in the weekday SED variable, the child had to be present at preschool for at least two days during the study week and had to attend for at least 360 minutes per day. The weekday SED variable was formed by excluding the preschool hours from the total measurement time. The weekend SED variable was formed if we had a dataset of at least 600 minutes per day for both weekend days. Both weekday and weekend SED were divided by the time that the child wore the accelerometer and multiplied by 60 minutes to obtain the average SED per hour. We excluded data from the days when parents reported that their child was sick or absent from preschool. We also excluded night time sleeping hours but not any possible daytime nap times. We received valid accelerometer data from 758 children. Since there were no relevant differences in the association between home environment and children's SED during the weekdays and weekends, we decided to combine the data into one total children's SED, without division into weekdays and the weekend. The total SED variable was calculated with the following formula; $(5 \times \text{SED during weekdays} + 2 \times \text{SED during the weekend})/7$.

Socioeconomic status (SES)

We used parental educational level (PEL) as an indicator of SES. The educational level of the parent, who filled out the survey questionnaire assessing the home PA and home sedentary behaviour environments, serves as an indicator of PEL. The parent who provided consent reported the highest educational level for both themselves and the other parent. The response categories were 1) comprehensive school, 2) vocational school, 3) high school, 4) bachelor's degree or college, 5) master's degree and 6) licentiate/doctorate. Answers were categorized as 1) low educational level (including categories 1–3), 2) middle educational level (category 4) and 3) high educational level (including categories 5 and 6). In the questionnaire, the respondent parent indicated whether they were the child's mother, stepmother, father, stepfather or other guardian. None of the respondents was a stepmother or stepfather. Other guardians ($n = 4$) were excluded from the analyses. We then combined educational level information in the consent form with the parental status from the questionnaire and formed a variable indicating PEL.

Home sedentary behaviour environment

We conducted focus group interviews as part of the DAGIS study (Määttä et al. 2016; Ray et al. 2016) and reviewed existing literature to help in the development of the home environment questionnaire for parents. We aimed to assess those aspects of the home environment that are proposed to associate with pre-schooler's EBRBs. Questions adapted from international scientific literature describing previous studies (Carson and Janssen 2012; Crawford et al. 2012; Gonzalez-Gil et al. 2014; Jacobson et al. 2011; Lampard et al. 2013; O'Connor et al. 2014; Pinard et al. 2014) were translated into Finnish according to a translation and back-translation protocol. In addition, certain questions were modified to better suit the Finnish context. Prior to the survey, the questions were tested in a pilot study (results not published). We included questions on the social home environment elicited parental opinions about suitable amount of screen time for 3–6-year-old children per day, satisfaction with the children's screen time, role modelling screen use and rules covering screen time. In addition, we used following constructs indicating home

sedentary behaviour environment: psychological control, using screen as babysitter and promoting inactivity. Included questions, their items and the constructs formed are presented in Table 1.

Table 1.

Descriptive table of Constructs indicating home sedentary behaviour environment, items included, scale means and Cronbach's α .

Constructs indicating home sedentary behaviour environment	Items	Scale	Mean (SD)	Cronbach's α
Psychological control ¹	How often: Do you stop your child from playing actively for fear of him/her getting dirty?	1–5 (never-always)	1.53 (0.74)	0.53
	Do you tell your child he/she will get hurt if he/she plays actively?		2.21 (0.86)	
	Do you discipline your child for playing too actively? (e.g. insisting on "time out")?		1.56 (0.70)	
	Do you reward your child for being still?		1.51 (0.76)	
Using screens as babysitters*	My child uses electronic devices because: It gives me the opportunity to get things done on my own. ² (modified)	1–5 (strongly disagree – strongly agree)	3.46 (1.12)	0.67
	It allows me to recover from a day at work/daily activities. ² (modified)		2.61 (1.28)	
	It focuses my child's attention. ⁴ (modified)		2.44 (1.24)	
Promoting inactivity ²	How often do you: Carry your child if he/she does not want to walk?	1–5 (never-always)	1.97 (0.82)	0.28
	Push your child in a stroller instead of allowing him/her to walk?		1.33 (0.67)	
	Drive your child when it is easy to walk?		2.29 (0.91)	
*formed based on factor analysis				
¹ Construct formed according to O'Connor et al. (2014), except one item dropped				
² statements adapted from Carson & Janssen (2012)				

Covariates

We included child age, gender and research time as covariates in the analyses because of the study design and based on earlier literature concerning the possible covariates. Parents reported their child's age and gender in the questionnaire. Age was categorized into 3, 4, 5 and 6-year-olds. Research time was

divided into three categories, whether the participant filled out the questionnaires in September–October, November–December or January–February.

Statistical analyses

Descriptive statistics such as means, standard deviations and percentages are reported according to PEL. We ran factor analyses of the questions and items assessing parental attitudes and practices to form constructs that describe social home environment associated with sedentary behaviour. The items that loaded on the same factor were added together and divided by the number of items. All items and constructs together with Cronbach's alphas are presented in Table 1. We tested PEL differences of the constructs by means of chi-square tests and analyses of variance. The associations between home environment factors and children's SED were examined using moderation analyses with PEL as a moderator. These analyses were conducted with the PROCESS macro tool, version 3 (Hayes, A.F. 2017), using bootstrapping at the level of 5000. The level for statistical significance was set at $p < .05$, except for the moderation analyses, where the significance level was set at $p < .10$. We examined the data with the IBM statistical programme Statistics SPSS 23.0.

Results

The sample characteristics are presented in Table 2. A total of 809 parents (94% of all participants) filled out the questionnaire assessing the home PA and home sedentary behaviour environments. Most respondents to the parental questionnaire were mothers, and nearly one-third had at least a master's degree.

Table 2
Parental educational level (PEL) and other background variables

	Percentage (N = 809)
PEL	
Low (high school, vocational school or less)	29%
Medium (bachelor's degree or equivalent)	41%
High (master's degree or higher)	29%
Which adults does the child live with?	
Both parents	90%
Other	10%
Respondent of the parental questionnaire	
Mother	88%
Father	12%
Other (e.g. foster parent)	1%

PEL differences in the home sedentary behaviour environment are presented in Table 3 and Table 4. Psychological control was the only construct formed for environment that differed by PEL. High PEL was associated with parent's lower levels of psychological control concerning children's activities (Table 3). Children had access to an average of five screen devices in their home regardless of PEL (Table 4). Higher-educated parents more often believed that limiting their children's screen time was important and more commonly limited children's screen time to a maximum of one hour per day. Parents with a higher educational level spent less time at their screens in the presence of their children than their less-educated counterparts, during both weekdays and weekends.

Table 3

Constructs indicating home sedentary behaviour environment in total and by parental educational level.
(analysis of variance)

	Parental educational level				p-value
	Total	Low	Medium	High	
Construct, scale 1–5, (n)	Mean (SD)				
Psychological control (n = 786)	1.7 (0.5)	1.72 (0.5)	1.73 (0.5)	1.62 (0.4)	0.03
Using screens as babysitters (n = 793)	2.8 (1.5)	2.79 (1.0)	2.89 (1.0)	2.80 (0.9)	0.38
Promoting inactivity (n = 797)	1.9 (0.5)	1.91 (0.5)	1.82 (0.5)	1.87 (0.5)	0.09

Table 4

Home sedentary behaviour environment according to parental educational level (Chi-square test, p-value)

	Parental educational level				p-value
	Mean (SD)/%				
	Total	Low	Medium	High	
Physical home sedentary behaviour environment					
Number of screens in the household accessible to the child	5.0 (1.1)	5.0 (1.2)	5.0 (1.1)	5.0 (1.1)	0.80
Social home sedentary behaviour environment					
Satisfaction					
The guardian is satisfied with the child's screen time (agree somewhat or strongly) ^{1*}	69%	70%	69%	69%	0.98
Importance					
It is important for the guardian to limit the child's screen time (agree somewhat or strongly) ²	86%	82%	86%	91%	0.01
Guardian's opinion about 'suitable screen time' (Social norm for screen time)					
Suitable screen time per day for 3–6-year-old children: a maximum of 1 hour	42%	41%	38%	50%	0.02
Role modelling for screen time					
Parental screen use in the presence of the child during weekends ¹					
Less than 30 min	16%	15%	15%	19%	
30–60 min	32%	27%	31%	40%	
More than 60 min	52%	59%	54%	42%	0.003

SD = standard deviation

¹ Gonzalez-Gil et al. (2014) (modified, except the item marked with *)² Lambard et al. (2013) (modified)³ Pinard et al. (2014) (modified, except the item marked with *)

	Parental educational level				
Parental screen use in the presence of the child during weekdays ¹					
Less than 30 min	38%	35%	34%	45%	
30–60 min	36%	33%	38%	37%	
More than 60 min	26%	32%	28%	18%	0.02
Rules					
Guardian has rules limiting the child's TV time (applies to families with a TV at home) ³	75%	73%	77%	76%	0.57
Guardian has rules for limiting child's other screen time (applies to families with other screens besides TVs) ³	79%	80%	78%	79%	0.91
SD = standard deviation					
¹ Gonzalez-Gil et al. (2014) (modified, except the item marked with *)					
² Lambard et al. (2013) (modified)					
³ Pinard et al. (2014) (modified, except the item marked with *)					

Table 5 presents the results of regression analyses examining the association between home sedentary behaviour environment and SED. More favourable social norm for screen time and higher parental screen use in front of the child associated with a child's higher objectively measured SED. A child's SED was lower, on the contrary, if the parent considered it important to limit a child's screen time or was satisfied with a child's screen time.

Table 5

Unstandardized regression coefficients and 95% confidence intervals for the association between home sedentary behaviour environment with sedentary time (SED) in the total sample and, if the associations were moderated by parental educational level (PEL), separately for each PEL category (n = 728–752).

	PEL			
	Total B (CI 95%)	Low B (CI 95%)	Middle B (CI 95%)	High B (CI 95%)
Psychological control (n = 738)	-0.20 (-0.82- 0.42)	0.81 (-0.20- 1.81) A+, B*	-0.42 (-1.41- 0.58)	-1.21 (-2.54- 0.11)
Promoting inactivity (n = 750)	0.00 (-0.53- 0.53)	-0.87 (-1.78- 0.04) A+, B*	0.16 (-0.68- 1.00)	0.63 (-0.21- 1.47)
Social norm for screen time (n = 745)	0.73* (0.12- 1.22)	-	-	-
Using screen as babysitter (n = 750)	0.33 (-0.04- 0.70)	-	-	-
Number of screens in the household accessible to the child (n = 752)	-0.26 (-0.53- 0.01)	-	-	-
Time limits for TV (n = 728)	-0.43 (-1.13- 0.27)	-0.11 (-1.47- 1.25) B*, C**	0.49 (-0.71- 1.69)	-1.99**(-3.21- 0.77)
Time limits for other screens (n = 733)	-0.08 (-0.82- 0.66)	-	-	-
Important for the guardian to limit the child's screen time (n = 746)	-0.48** (-0.84- -0.13)	-	-	-
Parental screen use in the presence of the child (n = 748)	0.37* (0.02- 0.71)	-	-	-
The guardian is satisfied with the child's screen time (n = 747)	-0.49** (-0.78- -0.20)	-0.79** (-1.28-0.30) B+	-0.54* (-1.05- 0.03)	-0.11 (-0.60- 0.38)

Statistical difference between educational level groups: A = low and middle; B = low and high; C = middle and high

+ P < .10; *P < .05; **P < .01; ***P < .001, Adjusted for a child's gender and age and research time

In the association to a child's SED, interactions existed for PEL and psychological control, promoting inactivity, limiting TV viewing and being satisfied with a child's screen time. Table 5 presents associations stratified by PEL for these home sedentary behaviour environmental factors. When separately analysing the associations between home environment factors with children's SED in different PEL groups, we found that limiting TV viewing was negatively associated with children's SED only in the highest PEL group. Both among low and middle PEL groups being satisfied with a child's SED was negatively associated with a child's SED.

Discussion

The present study examined PEL differences in home sedentary behaviour environment among 3–6-year-old children. Furthermore, we studied how home sedentary behaviour environment associate with children's SED and whether these associations are moderated by PEL. High PEL was associated with a home environment promoting less sedentary behaviour compared with low PEL. Several home environment factors were associated with children's SED. Some of the associations with home environment factors and SED were moderated by PEL.

We found several PEL differences in home sedentary behaviour environment among preschool-aged children. Higher-educated parents were more likely to emphasize importance on limiting children's screen time, spent less time looking at screens when their children were present and expressed opinions corresponding with official recommendations about the suitable amounts screen time more often than less-educated parents. They also performed less psychological control to limit their children's active playing compared to less-educated parents. Parental use of screen devices in the presence of their children was quite low, but we did observe PEL differences: the less-educated reported spending more time watching television or using other screens in their children's presence, both on weekdays and during weekends. This supports the findings reported by Tandon et al. (2012) in the Australian context that lower-SES parents watch more TV/DVDs with their under school-aged children than higher-SES parents do. Studies of school-aged children have also showed that lower-SES children have access to more screens in general, and tend to have more screens in their bedrooms than higher-SES children (Tandon et al. 2012; Dumuid et al. 2016). Contrary to these findings, however, we found no differences in the number of accessible screen devices among pre-schoolers according to PEL.

Previous studies have shown that parental screen use/television viewing (Tandon et al. 2012; De Decker et al. 2015), the number of screen devices in the household and, especially, having a television or other screens in their bedroom (Tandon et al. 2012; Dumuid et al. 2016) are linked to higher screen time among children. Similar results concerning the importance of children's home environment for sedentary behaviour have also been found in other countries. An Australian study (Dumuid et al. 2016) found that having video game consoles at home was associated with school children's higher SED. We found a similar association with objectively measured SED, i.e. parental screen time in the presence of the child, parent's limits and attitudes to screen time were associated with a child's SED. However, in our study, the number of accessible screens was not associated with SED.

Very few studies have examined the moderating effect of parental SES on the association between home environment and sedentary behavior among young children. Östbye et al. (2013) did not find a moderating effect of educational level on the association between home environment (accessibility of PA equipment, role modelling of PA, parental policies in support of PA) and SED. We examined other factors in the home environment, which may explain why we found a moderating effect on the associations of certain factors in the home environment with SED. As in the study by Östbye, we did not find a moderating effect of PEL on the association between role model and childrens' SED. This result contrasts a previous Finnish study (Matarma et al. 2016) in which SED of highly educated fathers was associated with children's lower SED, whereas that of lower-educated fathers showed no association. We can only hypothesize, whether the differences in the results are due to, for example, the younger age of the children in the present study: parental role model could be more important determinant for children's SED among older children, then also enabling more variation based on PEL to be found. Since we used the PEL and role model of the parent who answered the questionnaire, we were not able to examine the role model of the mother or father separately.

The inclusion of a wide range of sedentary behaviour related home physical and social environmental factors when examining preschool children's sedentary behaviour and PEL was a strength of our present study. Due to the extensive nature of the data collection for the DAGIS study, we had to ensure that participation in the study did not become too burdensome. Thus, we could only include a limited number of potential determinants of SED. The present study brings new insights on the home environment associations of SED and PEL differences among an age group that has received only moderate attention, since previous studies have mainly concentrated on school-aged children.

A major weakness of the present study is the low participation rate of the families (27%). This means that the results have to be interpreted with caution, since we cannot rule out the possibility of SES-dependent or less health-conscious non-participation, which would bias our results. Therefore, our results may present the EBRB-related home physical and social environments in a more positive light than in reality. The participants do not represent the whole population, but we have placed great emphasis in including participants from different regions with a variety of several SES indicators in both urban and rural areas. Although many of the questions assessing the home environment were adapted from previous studies in Western countries, they were not applicable in the Finnish context and had to be modified. The benefit of these adjustments is that the questions have been easier for the parents to answer, but comparing the results with other studies is not straightforward. This also applies to the constructs: only some were formed in accordance with previous research, whereas most were based on factor loadings in the current sample. Even with adjustments to the Finnish context, some showed low internal consistency.

A previous study of the DAGIS survey showed no PEL differences in the SED of children (Määttä et al. 2017a). This is rather surprising in light of our current study results, since the home environment for children with high PEL seems to be more favourable compared to low PEL families. Screen time was higher among children with low PEL compared to high PEL (Lehto et al. 2018). Moreover, the impact of PEL on children's screen time is reportedly mediated by descriptive norms for children's screen time,

parental screen use in front of their children, parental opinions on the importance of limiting children's screen time and the societal pressures felt by parents for letting children use electronic devices (Määttä et al. 2017b). This is more in line with our results. One reason behind the contradictory result regarding no PEL differences in SED may be that the questions on home environment sedentary behaviour mainly focused on screen time and not on other sedentary behaviours among children such as drawing, listening to reading, etc. The absence of questions related to these behaviours can be seen as a weakness of our study.

Conclusions

High PEL was associated with a home environment restraining sedentary behaviour compared with low PEL. Several of the examined home environment factors related to sedentary behaviour and screen time were associated with the objectively measured SED. PEL acted as a moderator for certain factors associated with SED. Our results are in accordance with studies conducted among school-children. Various SES groups should be given tailored support in modifying the home environment to restraining sedentary behaviour from an early age.

List Of Abbreviations

SES Socioeconomic status

SED Sedentary time

PEL Parental educational level

EBRB Energy balance-related behaviour

PA Physical activity

Declarations

Ethical approval and consent to participate and consent for publication:

The adolescents' participation in the study was voluntary and based on informed consent. Consent for publication was also obtained. In addition, each preschools headmaster independently decided whether to participate in the study.

University of Helsinki Ethical Review Board in the Humanities and Social and Behavioural Sciences approved our study on 24th February 2015 (#6/2015).

Availability of data and materials

The data sets used during the current study are available from the corresponding author on reasonable request.

Competing interests

Authors declare that they have no conflict of interest.

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Authors contributions

EL and RL analysed the data, EL, RL and ER were major contributors in writing the manuscript. All authors read and approved the final manuscript.

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