This is the authors’ final peer reviewed (post print) version of the item published as:

Teychenne, Megan, Ball, Kylie and Salmon, Jo 2011, Perceived influences on and strategies to reduce sedentary behavior in disadvantaged women experiencing depressive symptoms: a qualitative study, Mental health and physical activity, vol. 4, no. 2, pp. 95-102.

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Perceived influences on and strategies to reduce sedentary behavior in disadvantaged women experiencing depressive symptoms: A qualitative study

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Keywords: depression, inactivity, television viewing, influences

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Abstract

Objective: Recent studies have found a link between sedentary behavior (e.g. Television viewing) and risk of depression. Socio-economically disadvantaged women comprise one group at high risk of sedentary behavior as well as depression; hence it is important to explore the influences on sedentary behavior amongst this target group. This study assessed the perceived influences on sedentary behavior (particularly television viewing) amongst women living in disadvantaged neighborhoods and experiencing depressive symptoms, as well as potential strategies to reduce sedentary behavior amongst this target group.

Methods: Eighteen women (aged 18-46) living in disadvantaged neighborhoods and experiencing depressive symptoms (assessed using the CES-D 10) participated in semi-structured telephone interviews which assessed the intra-personal, social and physical environmental influences on sedentary behavior. Women were also encouraged to suggest strategies that they believed may assist in reducing sedentary behavior. Thematic analyses were performed on transcribed interview data.

Results: The qualitative data revealed four key themes relating to influences on television viewing: depression, childhood television habits, weather, and the impact of children. Strategies which were suggested by women to reduce sedentary behavior included time management/multi-tasking and standing versus sitting.

Conclusions: These findings could inform targeted intervention strategies to reduce sedentary behavior for disadvantaged women with depressive symptoms.
Introduction

Research suggests that sedentary behavior, in particular television viewing, is associated with an increased risk of several chronic health conditions including obesity (Cameron et al., 2003, Hu et al., 2003), cardiovascular disease (Kronenberg et al., 2000) and type 2 diabetes (Dunstan et al., 2007, Hu et al., 2003). Furthermore, a recent review has concluded that TV viewing or sitting at the computer may be associated with a greater risk of depression (Teychenne, Ball, & Salmon, 2010). Globally, depression is the third leading cause of disability amongst adults as well as the leading cause of disease burden amongst women (World Health Organisation, 2008). Several population groups have been found to be at a greater risk of depression, including women (Wilhelm et al., 2003) and adults of low socio-economic position (Scarinci et al., 2002). Furthermore, socio-economically disadvantaged adults are at a greater risk of sedentary behavior, in particular television viewing (King et al., 2010, Stamatakis et al., 2009) and therefore are an important target group for research and health promotion interventions.

One mechanism suggested to explain the association between increasing sedentary behavior and increasing risk of depression relates to social withdrawal (Kraut et al., 1998, Lewinsohn, 1974), whereby the more frequently people watch television or use the computer, the further they remove themselves from social interaction, which may increase their risk of depression (Kraut et al., 1998, Lewinsohn, 1974). Alternatively, the relationship may be explained by the fact that fatigue/loss of energy is a symptom of depression (Beck & Steer, 1978, Radloff, 1977) which may cause depressed individuals to then engage in greater levels of sedentary behavior. However, few mechanisms explaining the positive association between sedentary behavior and risk of depression have been tested and currently little is known about the direction of the relationship between sedentary behavior and risk of depression.
In order to reduce engagement in sedentary behaviors amongst women, it is important to identify the influences on these behaviors. Much like physical activity, the influences of sedentary behavior can be described in terms of intra-personal, social, and physical environmental factors (Walcott-McQuigg et al., 2001). However, very little research has examined the influences on sedentary behavior, particularly amongst women, with most studies to date only describing intra-personal influences on sedentary behavior among women such as employment status (Sidney et al., 1996, Sugiyama et al., 2007, Williams et al., 1999) and body weight (Martinez-Gonzalez et al., 1999, Varo et al., 2003). Further, no studies have identified the influences of sedentary behavior amongst socio-economically disadvantaged women, including those experiencing depressive symptoms.

A number of intervention studies have aimed to reduce the risk of depression through physical activity. Generally these studies have shown that that physical activity may reduce depression in women (Anderson et al., 1999, Asbury, Chandruangphen, & Collins, 2006, Berger & Owen, 1992, Brown et al., 1995, Brown et al., 2001a, Craft et al., 2007, Cramer, Nieman, & Lee, 1991, King, Taylor, & Haskell, 1993). However, to date, no intervention studies have been designed to reduce the risk of depression through reducing sedentary behavior (e.g. TV viewing). Hence, little is known about the most feasible or effective intervention strategies for reducing sedentary behavior in high-risk groups such as socio-economically disadvantaged women experiencing depressive symptoms.

The aim of this study was to gather in-depth information to provide insights into the perceived influences on sedentary behavior in women living in socio-economically disadvantaged neighborhoods and experiencing depressive symptoms. Furthermore, this study investigated potential strategies that women believe would help them to reduce
sedentary behavior. Since qualitative methods are useful for investigating areas in which little is known, the qualitative design of this study was chosen in order to provide valuable information for the development of strategies and future intervention studies designed to reduce sedentary behavior and in turn reduce the risk of depression in this target group.

**Methods**

The present study involved qualitative one-on-one telephone interviews with a sample of women experiencing depressive symptoms selected from a cohort of women participating in the Resilience for Eating and Activity Despite Inequality (READI) Study of 2007/2008 (aged 18-46).

**Participants**

Participants were recruited from the READI cohort, which comprised 4,349 randomly selected women from 80 Victorian suburbs (40 rural and 40 urban) of low socio-economic position (SEP), based on the Australian Bureau of Statistics SEIFA - Socioeconomic Index for Areas (Australian Bureau of Statistics, 2003). A total of 284 women were excluded from the sampling pool for the current study because they had reported being pregnant (or did not know whether they were) or had data missing on this variable in the READI study. Furthermore, only women who reported being “at risk” of depression in the READI study (as indicated by a CES-D 10 score of ≥10) were included in the eligible sampling pool for the present study (n=1540). Of those respondents, 1,129 indicated that they were willing to be contacted for further research. Since 423 had already been contacted regarding other qualitative research conducted within the READI study (Welch et al., 2009), those women were also excluded from being contacted for this study. From the remaining sample of 706 women, a random sample of 110 were initially contacted, 26 (24%) responded that they were
willing to participate. Of those who agreed, seven (6%) were excluded after screening on the basis that they were not currently experiencing depressive symptoms. One eligible woman was unable to be contacted again after screening. Recruitment continued until data saturation occurred i.e. the point at which no new information or themes were observed (Guest, Bunce, & Johnson, 2006) (n=18).

Reruitment

The study was approved by the Deakin University Human Research Ethics Committee. To recruit socio-economically disadvantaged women experiencing depressive symptoms, eligible women were initially sent a letter inviting them to take part in the qualitative study along with a reply-paid slip. Following the Dillman protocol (Dillman, 1978), non-respondents received a mailed reminder three weeks later. Interested participants were called and were screened again using the CES-D 10 to confirm the presence of depressive symptoms and eligibility. Eligible women arranged a time with the researcher for the one-on-one telephone interview and written consent was obtained.

Interview procedures

The interview schedule was piloted and refined with five participants, including women who were experiencing depressive symptoms and living in socio-economically disadvantaged neighborhoods. Since pilot interviews included women from non-READI neighborhoods, these did not contribute to the final analysis. Semi-structured one-on-one interviews with participants were conducted by a trained female researcher over the telephone and audio-taped with participant’s permission. Participants were provided with a $20 gift voucher as compensation for their time.
Measures

The semi-structured interview schedule was developed based on the social ecological framework, which is useful in guiding research into the intra-personal, social and environmental influences of physical activity and sedentary behavior (Stokols, 1996). A list of open ended-questions was included in the interview, assessing the intra-personal, social and physical environmental influences on sedentary behavior. Women were also encouraged to suggest strategies that they thought may assist them in reducing sedentary behaviors.

Depressive symptoms

When screening for depressive symptoms, the 10-item version of the Centre for Epidemiologic Studies Depression Scale (CES-D) was utilised. The CES-D is a well-validated measure of depression (Andersen et al., 1994, Radloff, 1977) and includes questions that relate to various symptoms of depression that may have been experienced in the past week, which indicate whether a woman is at risk of depression. Respondents rated themselves on a 4-point severity scale with scores of 10 or greater indicating that the participant was at risk of depression and therefore eligible to participate in the present study (Andersen et al., 1994).

Influences on sedentary behavior

Participants were asked how much time they spent in sedentary behaviors such as TV viewing, computer use and time spent driving in a car. A particular focus was on leisure-time sedentary behaviors.

Intra-personal influences on sedentary behavior, such as enjoyment of those behaviors and social stress, were assessed through questions including “What are the main reasons you
watch TV? Use the computer?” and “If you’re feeling stressed, does that impact on how much TV you watch? How?” Social influences on sedentary behavior, such as being discouraged/encouraged to watch TV or sit at the computer, and having children were assessed by questions such as “Do your friends/family influence you to watch TV? Use the computer? If so, how?” and “Does having children impact on the time you spend sitting? How?” Physical environmental influences on sedentary behavior, such as the number of televisions in the home and the weather, were assessed by questions such as “If the weather is nice, would that impact on the amount of time you spend watching television/sitting at the computer? How?”

**Strategies to reduce sedentary behavior**

In order to generate suggestions for potential strategies to reduce sedentary behavior, women were asked questions such as “What is the one thing that would most help you to not sit and watch TV/computer when you’re feeling down?” and “Do you have any other ideas on how we can help women to be active and reduce the time they spend sitting?” The feasibility of modifying the way in which one engages in TV viewing (e.g. standing up), was assessed through questions such as “How would standing up whilst watching TV impact on the time you spend watching TV?” and “How feasible would this be?”

**Data analysis**

Each interview was digitally recorded and then later transcribed in full. Participant identifiers were removed by the first author, before other members of the research team received the transcripts. After reviewing all transcripts, the qualitative data analysis program NVivo was used to organise data and perform thematic analyses following methods described by Braun & Clarke (2006) and adapted by Green et al (2007). Thematic analysis was selected as the
analytic approach in this study as it offers flexibility in offering a range of analytic options (e.g. essentialist versus constructivist methods) (Braun & Clarke, 2006), is not restricted to a specific theoretical framework (Liamputtong, 2009) and can generate unanticipated themes/insights (Braun & Clarke, 2006). Further, thematic analysis is an accessible tool for providing rich and detailed qualitative data efficiently (Braun & Clarke, 2006). It is, however, acknowledged that thematic analysis can be limited by its inability to demonstrate continuity and/or inconsistencies through following one individual's description/report (as seen in other methods such as narrative analysis), which may therefore limit important insights being identified within the data set (Braun & Clarke, 2006, Liamputtong, 2009).

The first step, immersion of the data, consisted of repeated reading of interview transcripts. Brief notes were made based on what initially appeared to be of particular importance/significance. Following this step, data were coded as descriptive labels and concurrently categorised by linking coded data together (Green et al., 2007). Thirdly, key themes and concepts were identified using an inductive approach [i.e. themes were linked directly to the data as coding was performed without using a pre-existing coding frame (Braun & Clarke, 2006)]. Hence analysis was not restricted to anticipated themes, with emergent themes also considered. The ‘keyness’ of themes was defined by the prevalence of participants who spoke about a theme. Following this step, themes were reviewed/refined (e.g. collapsing multiple and related themes into one) ensuring each theme accurately reflected the coded extracts, as well as accurately represented the data set as a whole (Braun & Clarke, 2006). This was done by re-reading through the entire data set. Finally, themes were clearly defined/named and linked to direct quotes which captured the sense of the theme. In order to ensure standardization and consistency of data coding, researcher triangulation was employed (Denzin, 1978), whereby one author coded all transcripts then a
random subset of three transcripts was independently cross-coded by a second author and third author. Once each author independently created a codebook for each transcript, the coders then met to discuss their interpretations. No discrepancies in coding or interpretation were observed. This process aims to test the robustness of researcher perception and analysis and ensure results are not subject to researcher bias. Illustrative quotes were selected to provide a concise summary of common themes and are presented with the age and assigned pseudonym of participants.

**Results**

Table 1 presents the socio-demographic characteristics of participants. There were no significant differences in demographic characteristics between those who participated and those who were contacted but did not respond. Women’s CES-D scores ranged from 10 to 27 (mean score= 15.83). The majority of women described spending about two hours a day watching television (range = 0.5 to 5 hours per day). Reasons for television viewing varied, with some women watching it for relaxation purposes and others watching it out of boredom. Even though women were asked about the influences on sedentary behavior generally, they often responded in terms of TV viewing specifically. Therefore, no clear themes emerged for other sedentary behaviors examined such as computer use and driving in a car. The qualitative data revealed four key themes relating to influences on sedentary behaviors. Expected themes were: the influence of depression, the impact of children and weather. An emergent (unprompted) theme was the influence of childhood TV habits. Most women interpreted sedentary behavior as an absence of physical activity, rather than a distinct mode of behavior. Therefore only two strategies were suggested by women to specifically reduce sedentary behavior. These included: time management/multi-tasking and standing versus sitting. Although not strictly targeting sedentary behavior, women suggested several
strategies to increase physical activity which may also be used to reduce time spent in sedentary behavior.

The influence of depression

A distinct theme that was clear from the interviews was the way women used television as a tool to ease depressive symptoms by distracting their negative thoughts. The concept of “switching on to switch off” was mentioned by several women as they described how watching television allowed them to remove themselves from their depressive frame of mind.

“It just makes me forget about what I’m dealing with sometimes. But obviously the stressors are still there as soon as you stop watching and start thinking again” (Amy, 30)

“...having the TV on distracts you from feeling low” (Danielle, 40)

In contrast, one woman described the act of sitting in front of the television as almost a diversion, using it as a place where she could pass time, particularly when feeling depressed.

“Look, if you’re feeling down, you just have the telly on and you’re not really even watching it half the time, you’re just sitting in front of it for the physical act of, you know, sitting there pretending you’re doing something I think” (Carrie, 41)

There was no indication from any women who were interviewed that they perceived television viewing increased their symptoms of depression.

The influence of childhood TV habits

It emerged that childhood television habits had a strong influence on habits in adulthood. Women mentioned that having their television viewing restricted by their parents as a child influenced them in adulthood to watch less television.
“I didn’t get to watch TV much as a kid. Probably an hour I think, after school and that was about it. So, maybe that’s why I don’t like the TV on all the time” (Catherine, 33)

Conversely, some women mentioned that having their television viewing restricted as a child had the opposite effect on their adult television habits.

“We weren’t allowed to watch a lot of TV. So when we became adults and we had our own TVs when we moved out of home, all I wanted to do was watch TV” (Jemma, 34)

However, one woman mentioned that she spent large amounts of time as a child watching television due to her parent’s excessive television viewing behaviors. Therefore, as an adult she tried to restrict her television viewing.

“my mum will turn on the television as soon as she comes home and it’s on in the background all the time, and I guess I’ve made a conscious effort not to ever do that because I used to hate that. So I try not to have it on unless I’m actually sitting watching it” (Carrie, 41)

The impact of children

Of those mothers who watched relatively less television, most attributed this to having young children. Reasons for this included having a lack of time to sit and watch television as well as wanting to demonstrate positive role modelling for their children.

“[Having kids makes a] big impact cos you never get to sit. It’s always ‘mum get me something’” (Sandra, 41)
“before you had the kids you’d sit and watch the telly more... You could waste a whole afternoon sitting watching telly, whereas [now] you don’t have time for that... you’re doing your housework or you’re doing something with the kids” (Anne, 35)

**Weather**

The only environmental factor mentioned by women as an influence on their sedentary behavior (in particular television viewing) was the weather. Most women suggested experiencing a sense of guilt for watching television on a warm or sunny day.

“if it’s sunny, I’ll definitely want to be outside. Watching TV would probably be the last thing I’d want to do” (Pia, 31)

“as soon as the sun is out...you think ‘okay, well I shouldn’t be [watching TV]’... you feel guiltier sitting inside watching television” (Carrie, 41)

However, there seemed to be no sense of guilt associated with watching television on days when it was raining or cold, with one woman describing her enjoyment of sitting and watching television when it is raining.

“you’re sitting in front of your lounge room, watching TV while it’s pouring outside, and it’s fantastic” (Edith, 51)

Although most women agreed that it would still be feasible for them to turn the television off even when it was raining outside, one woman suggested that the weather would make no difference to the amount of television she watched.
“I don’t turn the TV off. I leave the TV on [when] the weather is bad outside, and when it’s good” (Sonja, 34)

Potential strategies to reduce sedentary behavior

Most women interpreted the term ‘sedentary behavior’ as a lack of physical activity. Therefore, when asked about strategies to reduce time spent, for example, sitting and watching television, most women made suggestions for increasing physical activity such as increasing family and friend support to help them be physically active; childcare for physical activity sessions; women’s only physical activity classes; and awareness raising about the benefits of increasing physical activity. Only two additional (non-physical activity) strategies were mentioned by women that could be used to reduce sedentary behavior. These strategies were multi-tasking, and standing rather than sitting to watch television or use the computer.

Strategy 1: Time management and multi-tasking

Although women did not explicitly suggest ‘multi-tasking’ as a strategy to reduce sedentary behavior, discussions showed that many women already did this and felt it was a good strategy to reduce sedentary behavior. For example, women described how they reduced time spent sitting by simultaneously completing household chores (standing up) whilst watching television.

“I use the commercial breaks to run out and do stuff” (Melissa, 43)

“when I watch telly, I often iron as well” (Carrie, 41)
**Strategy 2: Standing versus sitting**

When women were asked if they would consider standing as opposed to sitting for activities such as television viewing and computer use, there was a mixed response, with some women perceiving it as a feasible option and others adamant that it was not feasible.

“I actually do stand a lot when I’m watching TV, only because of the fact that my back’s not very good...I’ve been given advice by my GP to do it...He does it himself, like he stands while he’s talking and yeah, it seems like a good option” (Pia, 31)

“I’m always standing up so I prefer to stand up” (Sharon, 36)

“I wouldn’t [stand up]. I’ve been on my feet all day, it’s the last thing I would want to do is stand up and watch TV or use the computer” (Rebecca, 46)

**Strategy 3: Friend and family support for physical activity**

Engaging more family and friend support for physical activity was by far the most frequently suggested intervention strategy to increase physical activity amongst women in this study. The majority of women suggested that when feeling down/depressed, the one thing that would help them be more physically active would be having someone else motivate them or exercise with them.

“I think someone would ... really push me, someone...who motivates me, says, “Come on, come for a walk” (Sonja, 34)

“probably personal contact with someone, to ring up or drop [in] on and go come on, let’s go and do something else” (Carrie, 41)
Strategy 4: Childcare

Most mothers of young children suggested that having affordable and short-term childcare in their local neighborhood would help increase their participation in physical activity.

“definitely temporary childcare is an issue in our area. We’ve really only got one childcare centre and that’s sort of like well you know you book them in for the whole day or not at all. So there’s no sort of just an hour or two type thing” (Liz, 43)

Similarly, one mother mentioned that having social support from family and friends to look after her children would help her become more physically active. This was seen to be a more affordable and convenient option than childcare.

“having someone to look after the kids. You know I guess just for it logistically to be easier. When you’re feeling down you can’t deal with all the organisational side of things as well so you just don’t do it.” (Liz, 43)

Strategy 5: Awareness raising

Another frequently mentioned strategy for increasing physical activity was awareness raising to educate women on the mental and physical health benefits of physical activity. Further, a number of women believed education sessions could be used to help women attain a positive frame of mind and learn how to overcome common barriers to physical activity. On inspection, it appeared that those women who suggested a awareness raising themselves had a reasonable knowledge of the benefits of physical activity. However, they attributed other women’s lack of physical activity to a lack of knowledge of the benefits associated with physical activity.
“I would maybe do perhaps a marketing campaign. And I’m thinking perhaps market it to women’s groups corporate, or professional groups... Or through the local gyms... an awareness campaign of how much more that they can get out of themselves if they’re physically active” (Melissa, 43)

“I guess it’s about education and women being able to appreciate the benefits” (Kim, 46)

**Strategy 6: Provision of information on available facilities**

Similarly, a handful of women suggested the provision of information regarding locally available exercise facilities and classes would help increase their physical activity. This was described as being useful in helping increase women’s knowledge and awareness of what is available to them in their immediate neighborhood.

“more information on community notice boards and leaflets in the mail... Just the fact that there are these recreational facilities in the neighborhood. I’m sure there are more that I’m not aware of, there’s not that much advertising” (Pia, 31)

“Probably more public awareness... about what’s out there... what’s available” (Wendy, 45)

**Strategy 7: Women’s only gyms/classes**

Alongside childcare, education and information on available facilities, an equally as popular suggestion was the provision of women’s only gyms/classes. Women suggested that having women’s only facilities would positively increase their use of gyms/clubs as several women perceived gyms as male-oriented which discouraged them from going.

“a women’s-only gym would be fantastic” (Rebecca, 46)
“if I was to go to a gym I’d probably go to just a female gym rather than [with males]”

(Lisa, 29)

Strategy 8: Greater access to facilities/longer opening hours

Having greater access to exercise facilities and classes such as Yoga and Pilates was mentioned by several women as a strategy to increase physical activity. Furthermore, three women highlighted the need for longer opening hours of existing facilities and activities in order to be able to schedule their physical activity around work and other commitments.

“There is a walking club...And that’s quite often during the day which now doesn’t suit me” (Wendy, 45)

“We have a community gym, but it’s only open limited hours... So it is a great facility, but yeah it’s just accessing it at the right time for me. And I think oh, if it was open [at] 7 o’clock in the morning then I could go up there before [my husband] goes to work and before the kids are at school” (Carrie, 41)

While the following strategies were only suggested once or twice, these ideas were strongly endorsed by the women who suggested them, providing further important information on the potential strategies that may be used to increase physical activity amongst disadvantaged women with depressive symptoms. Less frequently mentioned strategies included: mother’s physical activity groups; social recreation and support groups; and strategies aimed at time management/prioritising physical activity.
Discussion

The aim of the current study was to gain a better understanding of the influences on sedentary behavior in women living in socio-economically disadvantaged neighborhoods and experiencing depressive symptoms, as well as to identify potential strategies that women suggest may help reduce sedentary behavior.

Little is known about the influences on sedentary behavior in socio-economically disadvantaged women. Furthermore, there is a significant gap in research identifying intervention strategies aimed at reducing sedentary behavior in socio-economically disadvantaged women. This is particularly important amongst women experiencing depressive symptoms, for whom a reduction of sedentary behaviors/adoption of physical activity may offer substantiated mental health benefits. Finally, since qualitative methods are useful for investigating areas in which little is known, the qualitative design of this study was able to therefore provide valuable information and novel evidence regarding these important research gaps.

Influences on sedentary behavior

Women in the current study commonly expressed how they used television to ease depressive symptoms by distracting their negative thoughts. Television viewing has been identified in previous studies (Kleinke, 1988, Potts & Sanchez, 1994) as a coping strategy for depression as it is a means to ‘escape’ and avoid negative feelings (Potts & Sanchez, 1994). Defined as the distraction response style of depression (Nolen-Hoeksema, 1987), it has been found that engaging in ‘pleasant’ and/or ‘neutral’ activities as a form of distraction when experiencing a depressed mood was associated with a reduction in depressive symptoms when compared to other coping styles (Broderick, 2005, Nolen-Hoeksema & Morrow, 1993). Thus, in light of
the findings from the current study, it could be suggested that women engage in television viewing as a form of distraction from depressed emotions. However, it has been suggested that this coping response may lead to a deeper depression by leading depressed individuals to withdraw socially as well as from everyday activities (Veale, 2008). Therefore, further studies testing the mechanisms underlying the relationship between television viewing and depression are needed.

The influence of childhood television habits on adulthood habits emerged as a theme in the current study. However, whilst some women mentioned that being restricted by their parents as a child had influenced them as an adult to watch less television, for some women this had the opposite effect, leading them to watch more television as an adult. These mixed patterns are consistent with findings from a previous longitudinal study (Gordon-Larsen, Nelson, & Popkin, 2004), which tracked television viewing trends from adolescence to adulthood. That study found that 30 percent of females watched low levels of television as adolescents and continued to watch low levels as adults. However, 18 percent of females watched low levels of television as adolescents but increased their television viewing (>14 hours per week) as adults. The reasons that childhood television habits appear to affect adult habits differentially require further investigation.

Mothers in the current study suggested that having young children meant they watched less television. A perceived lack of time as well as the awareness of positive role modelling for their children were described as reasons for the lower levels of television viewing amongst mothers. One previous cross-sectional study examined the association between having children and sedentary behavior (using accelerometers) amongst socio-economically disadvantaged women (Sanchez et al., 2008). Consistent with our findings, that study found
that women with children were less likely to be sedentary when compared to women without children.

Women in this study reported enjoying watching television on cold/wet days, but felt guilty watching television on warm/sunny days. Although the weather is a non-modifiable factor, this finding suggests that strategies to reduce television viewing amongst women experiencing depressive symptoms might focus particularly on the winter months. Furthermore, during winter less time is generally spent outdoors. This increases the risk of depression, as spending time outdoors (in natural light) has been found to provide mental health benefits due to increased serotonin synthesis (Young, 2007).

**Strategies to increase reduce sedentary behavior and increase physical activity**

In the current study, women often misinterpreted the term ‘sedentary behavior’ as ‘lack of physical activity’. This may be due to women being less exposed to the concept since sedentary behavior has received significantly less social marketing and promotion than has physical activity. This highlights the importance of promoting and educating the public on the concept of sedentary behavior and the health risks that may be linked to spending long periods engaged in sedentary behaviors, independent of physical activity. In light of this, very few strategies were mentioned by women that could be used to reduce sedentary behavior.

The time management strategy of ‘multi-tasking’ was used by several women in order to increase their physical activity as well as reduce sedentary behavior. Multi-tasking, whereby a woman may be physically active at the same time as fulfilling a responsibility or household chore, was identified in a previous study of disadvantaged women as a practice used in order to deal with time pressure (Welch et al., 2009). It may be that with the increasing number of
mothers entering/re-entering the workforce (Australian Bureau of Statistics, 1997), ‘multi-tasking’ may become an important strategy for many women to increase physical activity and reduce sedentary behavior. Furthermore, although a perceived lack of time has been consistently reported as a barrier to women’s physical activity in previous studies (Ball et al., 2006, Brown et al., 2001b, Brownson et al., 2001), the findings of the current study illustrated how a lack of time may be a positive factor in reducing sedentary behavior amongst women. As many women did not believe watching television whilst standing up was feasible, it may be that encouraging women to reduce sedentary behavior by ‘multi-tasking’, rather than ‘standing as opposed to sitting’ could be a key strategy.

In addition, several potential intervention strategies to increase physical activity were suggested by women in the current study. Women emphasised the promotion of support from family and friends as a strategy to increase physical activity, with other social support strategies such as recreational and support groups also identified. Several intervention studies designed to reduce the risk of depression through increasing physical activity in women have included aspects of social support such as group exercise programs (Anderson et al., 1999, Nabkasorn et al., 2005), coaching/supervisors (Brown et al., 2001a, Craft et al., 2007) and/or supportive phone calls (Brown et al., 2001a, Craft et al., 2007). Although these studies did not specifically target socio-economically disadvantaged women, most interventions adopting those strategies were effective in reducing depressive symptoms.

One strategy that was frequently mentioned in the current study was awareness raising that aims to increase women’s knowledge of the mental, as well as physical health benefits of physical activity. Using educational sessions and materials is a strategy that has been used in previous intervention studies aimed at increasing physical activity and reducing depressive
symptoms amongst women (Brown et al., 2001a, Craft et al., 2007). Both interventions had relatively high adherence rates and were successful in reducing depressive symptoms (Brown et al., 2001a, Craft et al., 2007).

Other strategies mentioned by mothers in this study to increase physical activity included increasing the availability of short-term childcare facilities, support from friends and family to look after the children, as well as providing exercise classes for mothers (women and babies exercise groups). Previous research has found pram-walking exercise programs to be beneficial in improving physical fitness as well as reducing depressive symptoms in mothers suffering from postnatal depression (Armstrong & Edwards, 2003, 2004). Therefore, exercise classes for mothers with their babies may be a key strategy to increase physical activity and reduce the risk of depression in mothers with young children. Further, providing more facilities that are close to home, longer opening hours of facilities, as well as information on available facilities and classes were strategies that women discussed as potentially increasing their physical activity. One previous study that assessed the effectiveness of a physical activity intervention among mothers included the provision of print-based materials about physical activity opportunities in their neighborhood (Miller, Trost, & Brown, 2002). While the intervention was effective, other intervention strategies such as social support were used and therefore it is not known which component was most effective in increasing physical activity.

Several limitations of this study should be acknowledged. Firstly, during interviews there is the possibility of socially desirable responses (e.g. women describing lower than actual levels of sedentary behavior). Although interview questions were designed only to prompt responses from women, some interview questions may have been inadvertently leading,
which may have resulted in such biases. However, most women provided detailed
descriptions of their often high levels of sedentary behavior, and they were open to discussing
this, which suggests that socially desirable responses were minimal. Secondly, the use of
telephone interviews (rather than face-to-face interviews) may have resulted in some women
providing less detailed responses, with a limited number of interview questions possibly
restricting the scope of responses. However, since the interviews touched on sensitive issues
such as depression, it was anticipated that the use of telephone interviews would allow
women to talk more openly than may have been the case in a face-to-face situation (Dillman
& Frey, 1974). Further, although telephone interviews generally have lower response rates
than face-to-face interviews (Aday, 1996), telephone interviews have been shown to deliver
valid responses as well allowing participants more flexibility, thus enabling the recruitment
of those who may not be available for face-to-face interviews (Dillman & Frey, 1974).

Socio-economic position was defined using an area-based measure. Therefore, a number of
women were not considered to be socio-economically disadvantaged based on individual
level indicators such as income or education. Nevertheless, area-based indicators are often
used as proxy measures of socio-economic position and have been widely used in health
research (Galobardes et al., 2006). Furthermore, the current study managed to include a
reasonable proportion of women with low individual socio-economic position as well as low
area-based socio-economic position. Since we targeted a high risk and typically hard to reach
group (socio-economically disadvantaged women at risk of depression), it was not surprising
that the study had a low response rate (24%). However, our sample managed to include
women from a range of backgrounds, including working mothers and clinically depressed,
providing valuable insights relevant to this at-risk target group.
One strength of the current study was the qualitative design, which provided detailed insights not possible from quantitative approaches. Further, women from both rural and urban areas of socio-economic disadvantage were included in this study. These are important groups for this research given that socio-economically disadvantaged women are at risk of sedentary behavior (King et al., 2010, Stamatakis et al., 2009) and depression (Scarinci et al., 2002). Therefore this study was able to provide key insights into the influences and reduction of on sedentary behaviors, amongst an important target group.

Since depression is the world’s most incapacitating illness (Lopez & Murray, 1998) and has been linked to low physical activity levels (Teychenne, Ball, & Salmon, 2008) and greater time spent in sedentary behaviors (Sidney et al., 1996), research into strategies to promote healthy lifestyles in order to reduce the risk of depression is imperative. Strategies that may be further explored in intervention studies aimed at reducing sedentary behavior, particularly amongst women with depressive symptoms, include: the promotion of multi-tasking for reducing sedentary behavior, awareness raising on the potential health risks of sedentary behavior, providing greater accessibility of childcare facilities, family and friend support, providing information on available physical activity facilities, and women’s only gyms/classes. This study provided novel qualitative findings that could inform future intervention strategies to reduce sedentary behavior and increase physical activity for women living in socio-economically disadvantaged areas and experiencing depressive symptoms.
Funding:
This work was supported by an Australian National Health and Medical Research Council Strategic Award [ID 374241].

Acknowledgements:
MT is supported by a National Heart Foundation of Australia Postgraduate Public Health Scholarship (PP 07M 3388). KB is supported by a National Health and Medical Research Council Senior Research Fellowship (ID 479513). JS is supported by a National Heart Foundation of Australia Career Development Award and sanofi-aventis.
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