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Sedentary behaviour counselling': the next step in lifestyle counselling in primary care; pilot findings from the Rapid Assessment Disuse Index (RADI) study

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Abstract

Background—Accumulating evidence emphasises a relationship between prolonged sitting and increased risk for cardiometabolic disorders and premature death irrespective of the protective

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Competing interests None.

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Data sharing statement This pilot study utilises data collected from the RADI study. While this study aims to describe sedentary behaviour and physical activity counselling in primary care; the RADI study aims to establish the reliability and validity of a lifestyle counselling tool for primary care.

effects of physical activity. Primary care physicians have the potential to play a key role in modifying patients' sedentary behaviour alongside physical activity.

Methods—A pilot study examining sedentary behaviour and physical activity counselling in a primary care clinic. A total of 157 patients completed a detailed survey related to lifestyle counselling received from their primary care physician. We analysed these responses to describe counselling practices within the 5A framework, and to examine correlates (ie, patients' demographics, sedentary behaviour and physical activity and clinical variables) related to receiving counselling.

Results—A total of 10% received general advice to decrease sitting time, in comparison with 53% receiving general physical activity counselling. None, however, received a written plan pertaining to sedentary behaviour whereas 14% received a written physical activity prescription. Only 2% were provided with specific strategies for sedentary behaviour change in comparison with 10% for physical activity change. Multivariable analysis revealed that patients who were obese were more likely to receive counselling to decrease sitting (OR=7.0; 95% CI 1.4 to 35.2). In comparison, higher odds for receiving physical activity counselling were associated with being younger, aged 40–59 years (OR=2.4; 95% CI 1.1 to 5.4); and being a non-smoker (OR=6.1; 95% CI 1.3 to 28.4).

Conclusions—This study is the first to assess sedentary behaviour counselling practices in primary care and such practices appear to be infrequent. Future research should attempt to establish a 'knowledge base' to inform development of sedentary behaviour interventions, which should be followed by testing feasibility, efficacy, and subsequent effectiveness of these programmes in a clinical setting.

INTRODUCTION

Numerous population-based studies have demonstrated the relationship between increased sedentary behaviour (ie, activities during waking hours in a reclining or sitting posture that do not increase energy expenditure above 1.5 metabolic equivalents) to increased risk of obesity, dyslipidemia, diabetes and premature mortality, irrespective of the protective effects of moderate-to-vigorous intensity physical activity (MVPA).^{1–9} For example, van der Ploeg *et al*¹ in a prospective examination of 222 497 Australian adults aged 45 found that those sitting 11 h/day were at 40% increased risk for all-cause mortality in comparison with those sitting less than 4 h, while adjusting for physical activity. Grøntved and Hu¹⁰ in a meta-analysis determined that prolonged TV viewing increased risk for type 2 diabetes, cardiovascular disease and all-cause mortality. This evidence suggests that sedentary behaviour should be considered a specific class of behaviour and thus the need to promote the reduction of sedentary time alongside physical activity promotion.^{2,6,11}

Primary care physicians have the potential to play a key role in modifying their patients' lifestyle activity, since their advice is often respected, and they have the ability to motivate their patients to change unhealthy behaviours.¹² However, many physicians do not provide physical activity counselling due to numerous barriers (eg, lack of time and reimbursement), and therefore shift attention to more readily achievable preventive measures, such as cancer screening.^{12–15} Thus, it may be a more achievable goal to promote reduction in sedentary

time than an increase in physical activity since it requires smaller changes in energy expenditure and entails less of a lifestyle change for inactive individuals. In this study, we assessed sedentary behaviour counselling practices alongside physical activity counselling in a primary care clinic. We aimed to examine these counselling practices within the 5A framework,¹⁶ as well as correlates associated with the counselling received. To our knowledge this is the first study to explore sedentary behaviour counselling practices in primary care.

METHODS

Study Design

Study participants were part of the Rapid Assessment Disuse Index (RADI) study, aimed at examining the reliability and validity of a brief sedentary assessment tool tailored for primary care. This study, nested within the RADI, aimed to assess primary care providers' lifestyle (ie, sedentary behaviour/physical activity) counselling practices via patients' responses to a survey completed on a computer interface during a routine clinic visit. Participants were recruited from patients (n~16 000) in a large academic primary care clinic (Dallas, Texas, USA), which has 35 providers. A total of 1820 men and women aged 40–79 (not cognitively impaired) with an upcoming medical visit were contacted with information pertaining to the study. Of these, 709 were excluded due to meeting the following criteria: not proficient in English (n=19); a contraindication to physical activity based on the Physical Activity Readiness Questionnaire (n=559);¹⁷ a medical procedure/physical disability that restricts function (n=130); and pregnant (n=1). Of the remaining potentially eligible patients (n=1111), some declined to take part in the study (n=608), others were excluded for various 'logistical' reasons, for example, could not be reached by phone (n=324), and a few answered the RADI questionnaire for the validation study but did not complete the in-clinic lifestyle counselling survey (n=22). Hence, a total of 157 completed an elaborate survey in the clinic (December 2010–June 2011) on a computer interface¹⁸ gauging patients' perceptions of their physicians' lifestyle counselling practices in the past year. After completing this detailed survey, the research staff provided participants with an accelerometer to wear for 7 days during all waking hours. A total of 155 participants returned the accelerometers, with 151 accelerometers containing valid wear time (ie, worn for at least 4 days for 10 h/day). The study protocol was approved by the Institutional Review Boards of the University of Texas (UT) Health Science Center at Houston and UT Southwestern Medical Center at Dallas (Texas).

Measures

Sedentary behaviour and physical activity counselling in primary care—We assessed counselling practices by asking patients whether their primary care provider had inquired about their lifestyle behaviours pertaining to physical activity (eg, walking, running, cycling and yard work) and sedentary behaviours (eg, sitting while watching TV or when using the computer). More specifically, participants were asked in two separate questions about whether they received physical activity counselling or sedentary behaviour counselling (eg, decrease sitting time at home or at work) within the past 12 months (yes/no). Those responding 'yes' were then asked detailed questions based on the 5A's

framework (ask, advise, agree, assist and arrange).^{16,19,20} The following (yes/no) questions pertaining to whether their provider counselled them about physical activity and sedentary behaviour were asked separately for each behaviour: (1) asked about physical activity/sedentary behaviour either verbally or via survey; (2) advised to increase physical activity/decrease sedentary time verbally; (3) advised to increase physical activity/decrease sedentary time via a written plan; (4) offered guidance on the type/duration of health promoting physical activity/decreasing the amount of sitting time; (5) helped to identify personal barriers to increase physical activity/decrease sedentary time and ways to overcome them; (6) helped to identify opportunities for increasing physical activity/decreasing sedentary time; and (7) scheduled follow-up visits, phone calls or reminders to adhere to the physical activity plan/decrease sedentary time. For analysis, receiving physical activity and sedentary behaviour counselling in the past year were regarded as two separate dichotomous variables.

Demographic, physical activity/sedentary behaviour and clinical variables—

Participants' age, sex, race/ethnicity, education (college graduate/non-graduate), employment (employed/unemployed) and smoking status (current smoking: yes/no) were derived from responses to a survey. Information on patients' physical activity and sedentary behaviour was derived from accelerometers (Actigraph GT3X, Pensacola, Florida, USA).²¹ Sedentary time was defined as the mean minutes per day spent in <100 counts/min (cpm) and MVPA as minutes per day >1952 cpm, all based on Freedson's cut-off points while adjusting for accelerometer wear time.⁴ Wear time was calculated by subtracting non-wear time (ie, 60 min of consecutive 0 counts, while allowing 1–2 min to detect counts between 0 and 100) from 24 h.²² Additionally, information on body mass index (BMI) and clinical variables (blood pressure, diabetes and lipids) were extracted from patients' electronic health record, and were based on a clinical examination within the past 12 months. BMI (kg/m^2) was categorised into normal weight (18.5–24.9) overweight (25.0–29.9) and obese (≥ 30.0).²³ Underweight individuals ($n=4$) were not included in the analysis. Hypertension (yes/no) and type 2 diabetes (yes/no) was based physicians' diagnosis and/or prescribed antihypertensive and type 2 diabetes medication (respectively).^{24–26} Dyslipidemia (yes/no) was based on prescribed cholesterol-lowering drugs and/or one of the following: triglycerides ≥ 200 ; LDL (low-density lipoprotein) ≥ 160 ; total cholesterol ≥ 240 ; HDL (high-density lipoprotein) < 40 .²⁷

Statistical analysis

Descriptive statistics were utilised to ascertain the distribution of patients who received sedentary behaviour/physical activity counselling and to describe the frequency of the seven components of counselling (as previously described). To examine the association between the dependent variables (ie, sedentary behaviour and physical activity counselling) and covariates (sex, age, education, smoking status, BMI, hypertension, diabetes, sedentary time and MVPA), both bivariate and multivariable analyses were applied. Because most participants were non-Hispanic white (>70%) and due to the relatively small sample size ($n=157$) and multiple categories of this variable, race/ethnicity was not included in the analysis. In bivariate analysis, Pearson χ^2 was used to assess the association between two categorical variables, and ANOVA was applied to examine the relation between categorical

and continuous variables. Multivariable logistic regression was applied to determine which covariates were independently related to the dependent variables. A logistic regression model was computed for each dependent variable, and covariates associated with the dependent variables at $p \leq 0.20$ in bivariate analysis, were entered into the models. Logistic regression results are reported as OR and 95% CI for receiving sedentary behaviour or physical activity counselling versus not receiving counselling.

RESULTS

The average age of participants was 58 (SD=10), more were women (62%), college graduates (65%), and their race/ethnicity consisted of 71% non-Hispanic white, 12% non-Hispanic black and 8% were Hispanic (table 1). On average, participants were overweight (mean BMI=27, SD=5), most did not smoke (93%), they spent approximately 9 h/day (SD=1.3) in sedentary time and were moderately to vigorously physically active for close to 22 min/day (SD=19). Less than half (47%) had dyslipidemia, 10% had type 2 diabetes and one-fifth (20%) were hypertensive.

In addition, 10% of patients reported receiving sedentary behaviour counselling from their primary care provider in the past year, whereas 53% received physical activity counselling (table 2). Examination of the components of the sedentary behaviour and physical activity counselling received, based on the 5A framework, revealed that: 9% of the patients were asked about their sedentary behaviour and 6% about their physical activity; 8% were advised verbally to modify their sedentary time and 45% to modify physical activity; none received a written plan pertaining to sedentary behaviour and 14% were provided with a written plan for physical activity; 2% received detailed advice about their sedentary behaviour and 34% received this advice regarding physical activity; 4% were helped to identify barriers to sedentary behaviour change and 14% regarding physical activity; 2% were provided with specific strategies for behaviour change (eg, social support) pertaining to sedentary behaviour and 10% for physical activity; and for 2%-follow-up visits and reminders were arranged to modify their sedentary behaviour in comparison with 11% for physical activity.

Correlates associated with receiving sedentary behaviour and physical activity counselling in the past year are presented in table 3. Most notably, patients who were obese were more likely to receive counselling to decrease their sitting time (OR=7.0; 95% CI 1.4 to 35.2). In comparison, increased odds for receiving physical activity counselling was associated with: being in the younger age group—40-year-old to 59-year-old patients had higher odds for receiving counselling (OR=2.4; 95% CI 1.1 to 5.4); being a non-smoker (OR=6.1; 95% CI 1.3 to 28.4); and having dyslipidemia (OR=2.1; 95% CI 0.9 to 4.6), yet without significance ($p=0.07$).

DISCUSSION

This pilot study offers preliminary insight into sedentary behaviour counselling practices in primary care; an area that has yet to be explored. Findings indicate that the prevalence of sedentary behaviour counselling is low; only 10% of primary care patients in the study received counselling from their physician in the past year to decrease their sitting time

whereas 53% received advice pertaining to physical activity. Although the prevalence of physical activity counselling was higher than the US national average of 31%,²⁸ no data exist regarding sedentary behaviour counselling practices. This stems from the fact that the field of sedentary behaviour and health, as an independent field of inquiry, is a relatively new pursuit with no clinical guidelines for adults pertaining to decreasing and breaking up sedentary time.^{1,5} However, despite the lack of guidelines, several countries (eg, UK) and healthcare organisations (eg, American College of Sports Medicine and the Australian Heart Foundation) have begun to provide general recommendations to decrease sedentary time and replace it with lifestyle physical activity.^{29–31} Indeed, present study findings indicating that one in ten patients received specific recommendations to decrease sitting time from their physician might be due to some clinicians' awareness of the medical literature linking sitting time to morbidity and mortality.

Thus, although epidemiological (and physiological) studies have demonstrated the deleterious health effects of prolonged sitting, few attempts have been made to translate this evidence into practice.^{1,2,11,32–37} In this study, we explored both sedentary behaviour counselling and physical activity counselling in clinical practice within the context of the 5A framework. This model, based on successful interventions such as the Green Prescription Program,³⁸ has been suggested as an effective strategy to promote physical activity in primary care and could be applied to sedentary behaviour counselling.²⁰ Our findings suggest that despite the fact that 10% of patients received general advice to modify their sedentary behaviour, none received a written plan, and very few (2%) were provided with more detailed counselling (eg, amount of sedentary time to reduce). These findings are understandable, since unlike physical activity counselling, the concept of modifying patients' sedentary behaviour in primary care is not widespread. With regard to physical activity counselling, study results find that relatively few (14%) received a written plan, 34% received detailed counselling (eg, dose and type of physical activity). Similar results pertaining to physical activity counselling were ascertained in a large cross-sectional Canadian survey finding that many more primary care physicians provided a physical activity plan verbally rather than providing a written plan (69.8% vs 15.8%).¹⁹

The primary strength of this study stems from the fact that this is the first study to present results pertaining to sedentary behaviour counselling in primary care, which could inform future interventions aimed at decreasing sitting time. The primary limitations are derived from the pilot nature of the study. First, the limited sample size might have inhibited our ability to detect statistically significant correlates of lifestyle counselling. Second, participants were patients from a single primary care clinic who responded to the in-clinic survey; however, only a fraction of those eligible participated in the study—this impacts on the generalisability of the findings. Third, patients were asked about receiving lifestyle counselling from their providers in the past 12 months, which might have resulted in over-or-under reporting (ie, recall bias). Comparing patients' responses to physicians' reports to establish concurrent validity or to an objective measure (eg, direct observation) for criterion validity should be attempted in future studies. Finally, these results are cross-sectional representing one point in time, rather than a longitudinal trend.

Nonetheless, this study is the first to examine sedentary behaviour counselling practices in primary care. Asking patients to reduce and break up sedentary time requires smaller changes in energy expenditure on their part than engaging in physical activity. This might be a more achievable goal for many primary care patients, and potentially feasible for clinicians to integrate into routine practice. Additionally, time spent sitting or in passive leisure time activities tends to be clustered in time (eg, evening TV viewing) and place (on the job and in the home), and is subject to less variation than time spent in various physical activities throughout the day. Thus, interventions attempting to decrease and break up daily sedentary behaviour should focus on specific settings (eg, work or home). Primary care physicians could potentially play a major role in modifying their patients' sedentary behaviour, particularly since adults spend many of their waking hours each day sitting or in passive leisure activities (on average 7.7 h nationally in comparison to 8.9 h in the current study).³⁹ The 5A framework could be applied to sedentary behaviour counselling in primary care; which incorporates written prescriptions coupled with providing strategies to overcome barriers to behaviour change, identifying opportunities for lifestyle activity, and follow-up on recommendations in subsequent visits.²⁰ Future research should attempt to establish a 'knowledge base' to inform development of sedentary behaviour interventions in clinical settings; which could be followed by testing the feasibility and efficacy of programmes aimed at modifying sedentary behaviour.¹¹

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References

1. van der Ploeg HP, Chey T, Korda RJ, Banks E, et al. Sitting time and all-cause mortality risk in 222 497 Australian adults. *Arch Intern Med.* 2012; 172:494–500. [PubMed: 22450936]
2. Dunstan DW, Owen N. New exercise prescription: don't just sit there: stand up and move more, more often: comment on "sitting time and all-cause mortality risk in 222 497 Australian adults". *Arch Intern Med.* 2011; 172:500–501. [PubMed: 22450937]
3. Chau JY, van der Ploeg HP, Merom D, et al. Cross-sectional associations between occupational and leisure-time sitting, physical activity and obesity in working adults. *Prev Med.* 2012; 54:195–200. [PubMed: 22227284]
4. Healy GN, Matthews CE, Dunstan DW, et al. Sedentary time and cardio-metabolic biomarkers in US adults: NHANES 2003–06. *Eur Heart J.* 2011; 32:590–597. [PubMed: 21224291]
5. Owen N, Sparling PB, Healy GN, et al. Sedentary behavior: emerging evidence for a new health risk. *Mayo Clin Proc.* 2010; 85:1138–1141. [PubMed: 21123641]
6. Owen N, Healy GN, Matthews CE, et al. Too much sitting: the population health science of sedentary behavior. *Exerc Sport Sci Rev.* 2010; 38:105–113. [PubMed: 20577058]
7. Gardiner PA, Healy GN, Eakin EG, et al. Associations between television viewing time and overall sitting time with the metabolic syndrome in older men and women: the Australian Diabetes, Obesity and Lifestyle study. *J Am Geriatr Soc.* 2011; 59:788–796. [PubMed: 21568949]
8. Pate RR, O'Neill JR, Lobelo F. The evolving definition of "sedentary". *Exerc Sport Sci Rev.* 2008; 36:173–178. [PubMed: 18815485]

9. Sedentary Behaviour Research Network. Standardized use of the terms “sedentary” and “sedentary behaviours”. *Appl Physiol Nutr Metab*. 2012; 37:540–542. [PubMed: 22540258]
10. Grøntved A, Hu FB. Television viewing and risk of type 2 diabetes, cardiovascular disease, and all-cause mortality: a meta-analysis. *JAMA*. 2011; 305:2448–2455. [PubMed: 21673296]
11. Owen N, Sugiyama T, Eakin EE, et al. Adults’ sedentary behavior determinants and interventions. *Am J Prev Med*. 2011; 41:189–196. [PubMed: 21767727]
12. Patrick K, Pratt M, Sallis RE. The healthcare sector’s role in the U.S. national physical activity plan. *J Phys Act Health*. 2009; 6:S211–219. [PubMed: 20120130]
13. Smitherman TA, Kendzor DE, Grothe KB, et al. State of the Art Review: physical activity counseling in primary care settings: A review of the cognitive and behavioral strategies. *Am J Lifestyle Med*. 2007; 1:397–409.
14. US Preventive Services Task Force. Recommendations for adults: cancer. Rockville, MD: US Preventive Services Task Force; 2011. <http://www.uspreventiveservicestaskforce.org/adultrec.htm> [Accessed April 2, 2012]
15. Hébert ET, Caughey MO, Shuval K. Primary care providers’ perceptions of physical activity counselling in a clinical setting: a systematic review. *Br J Sports Med*. 2012; 46:625–633. [PubMed: 22711796]
16. Estabrooks PA, Glasgow RE, Dziewaltowski DA. Physical activity promotion through primary care. *JAMA*. 2003; 289:2913–2916. [PubMed: 12799388]
17. Thomas S, Reading J, Shephard RJ. Revision of the Physical Activity Readiness Questionnaire (PAR-Q). *Can J Sport Sci*. 1992; 17:338–345. [PubMed: 1330274]
18. Harris PA, Taylor R, Thielke R, et al. Research electronic data capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009; 42:377–381. [PubMed: 18929686]
19. Petrella RJ, Lattanzio CN, Overend TJ. Physical activity counseling and prescription among canadian primary care physicians. *Arch Intern Med*. 2007; 167:1774–1781. [PubMed: 17846397]
20. Carroll JK, Fiscella K, Meldrum SC, et al. Clinician-patient communication about physical activity in an underserved population. *J Am Board Fam Med*. 2008; 21:118–127. [PubMed: 18343859]
21. John D, Freedson P. ActiGraph and Actical physical activity monitors: a peek under the hood. *Med Sci Sports Exerc*. 2012; 44:S86–89. [PubMed: 22157779]
22. Healy GN, Matthews CE, Dunstan DW, et al. Sedentary time and cardio-metabolic biomarkers in US adults: NHANES 2003–06. *Eur Heart J*. 2011; 32:590–597. [PubMed: 21224291]
23. Troiano RP, Berrigan D, Dodd KW, et al. Physical activity in the United States measured by accelerometer. *Med Sci Sports Exerc*. 2008; 40:181–188. [PubMed: 18091006]
24. WHO. WHO Technical Report Series 894. Geneva: World Health Organization; 2000. Obesity: preventing and managing the global epidemic. Report of a WHO Consultation.
25. US Department of Health and Human Services. National Heart Lung and Blood Institute. [Accessed March 4, 2012] The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7). <http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7full.pdf>
26. Genuth S, Alberti KG, Bennett P, et al. Follow-up report on the diagnosis of diabetes mellitus. *Diabetes Care*. 2003; 26:3160–3167. [PubMed: 14578255]
27. International Expert Committee. International Expert Committee report on the role of the A1C assay in the diagnosis of diabetes. *Diabetes Care*. 2009; 32:1327–1334. [PubMed: 19502545]
28. US Department of Health and Human Services. National Heart Lung and Blood Institute. Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III).
29. Centers for Disease Control and Prevention. National Center for Health Statistics. Trends in Adults Receiving a Recommendation for Exercise or Other Physical Activity From a Physician or Other Health Professional. Feb.2012 :8. (PHS) 2012-1209.
30. National Heart Foundation of Australia. [Accessed August 7, 2012] Sit less, move more. INF-071-C. <http://www.heartfoundation.org.au/SiteCollectionDocuments/HW-PA-SittingLess-Adults.pdf>

31. Department of Health. [Accessed August 7, 2012] Publications policy and guidance. UK physical activity guidelines. http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_127931
32. American College of Sports Medicine. [Accessed August 7, 2012] Reducing Sedentary Behaviors: Sitting Less and Moving More. <http://www.acsm.org/docs/brochures/reducing-sedentary-behaviors-sitting-less-and-moving-more.pdf>
33. Dunstan DW, Barr EL, Healy GN, et al. Television viewing time and mortality: the Australian Diabetes, Obesity and Lifestyle Study (AusDiab). *Circulation*. 2010; 121:384–391. [PubMed: 20065160]
34. Hansen AL, Wijndaele K, Owen N, et al. Adverse associations of increases in television viewing time with 5-year changes in glucose homeostasis markers: the AusDiab study. *Diabet Med*. 2012 Epub ahead of print. 10.1111/j.1464-5491.2012.03656.x
35. Dunstan DW, Kingwell BA, Larsen R, et al. Breaking Up Prolonged Sitting Reduces Postprandial Glucose and Insulin Responses. *Diabetes Care*. 2012 Epub ahead of print.
36. Healy GN, Dunstan DW, Salmon J, et al. Breaks in sedentary time: beneficial associations with metabolic risk. *Diabetes Care*. 2008; 31:661–666. [PubMed: 18252901]
37. Booth FW, Gordon SE, Carlson CJ, et al. Waging war on modern chronic diseases: primary prevention through exercise biology. *J Appl Physiol*. 2000; 88:774–787. [PubMed: 10658050]
38. Hamilton MT, Hamilton DG, Zderic TW. Role of low energy expenditure and sitting in obesity, metabolic syndrome, type 2 diabetes, and cardiovascular disease. *Diabetes*. 2007; 56:2655–2667. [PubMed: 17827399]
39. Elley CR, Kerse N, Arroll B, et al. Effectiveness of counselling patients on physical activity in general practice: cluster randomised controlled trial. *BMJ*. 2003; 326:793.
40. Matthews CE, Chen KY, Freedson PS, et al. Amount of time spent in sedentary behaviors in the United States, 2003–2004. *Am J Epidemiol*. 2008; 167:875–881. [PubMed: 18303006]

New findings

- Population-based studies have demonstrated the deleterious health effects of prolonged sitting (independent of the protective effects of physical activity); however, few attempts have been made to examine whether this evidence has been translated into clinical practice.
- The current study explores sedentary behaviour counselling in clinical practice within the context of the 5A framework.
- Study findings suggest that 10% of primary care patients received general advice to modify sedentary behaviour, none received a written plan and very few (2%) were provided with more detailed counselling (eg, amount of sedentary time to reduce).

How might it impact on clinical practice in the near future?

- Promoting reduction of sedentary time might be a more achievable goal than physical activity since it requires smaller changes in energy expenditure than meeting physical activity guidelines; which entails a complex behaviour change, particularly for inactive patients.
- Primary care physicians could play a major role in modifying their patients' sedentary behaviour, particularly since adults spend many of their waking hours each day sitting or in passive leisure activities.
- The 5A framework could be applied to sedentary behaviour counselling in primary care; which incorporates written prescriptions coupled with providing strategies to overcome barriers to behaviour change, identifying opportunities for lifestyle activity and follow-up on recommendations in subsequent visits.

Table 1

Characteristics of Sampled Primary Care Patients (n=157), Dallas, Texas

Characteristics	n (%) [*]
Sex	
Male	59 (38)
Female	98 (62)
Age	
40–59	92 (59)
60–79	65 (41)
Race/Ethnicity	
Non-Hispanic black	19 (12)
Non-Hispanic white	110 (71)
Hispanic	13 (8)
Asian	12 (8)
College Graduate	
No	55 (56)
Yes	101 (64)
Current Smoker	
No	146 (93)
Yes	11 (7)
BMI [†]	
Normal weight	45 (30)
Overweight	69 (46)
Obese	36 (24)
Hypertensive [‡]	
No	123 (80)
Yes	31 (20)
Type 2 Diabetic [‡]	
No	126 (90)
Yes	14 (10)
Dyslipidemia [‡]	
No	69 (53)
Yes	60 (47)
Sedentary Time (min/d)- mean (SD) §	536.3 (77.8)
MVPA(min/d)- mean (SD) §	21.7 (18.7)

* Some categories do not total 157 due to missing data; percentages are rounded.

[†] BMI was calculated using the standard formula (kg/m^2), and was categorised based on the WHO criteria: normal: body mass index (BMI) 18.5–24.9; overweight: BMI 25–29.9; obesity: BMI >30 (20). Underweight (<18.5) individuals ($n=4$) were not included in the analysis.

[‡] Clinical information was obtained from patients' electronic medical records.

[§] Sedentary behavior and physical activity information is based on accelerometers using Freedson cut-off points.

MVPA, moderate-to-vigorous intensity physical activity.

Table 2

Correlates of sedentary behaviour and physical activity counselling* in primary care: pilot finding from the Rapid Assessment Disuse Index (RADI) study

Characteristic	Sedentary Behavior Counseling n=157	Physical Activity Counseling n=157
General Counseling in the past 12 months	16 (10%)	84 (53%)
Component of Counseling (5As[†])		
Ask		
Asked verbally or via survey	15 (9%)	5 (3%)
Advise		
Advised verbally	13 (8%)	71 (45%)
Advised via written plan	0 (0%)	22 (14%)
Agree		
Detailed counseling (e.g. dose, type)	4 (2%)	54 (34%)
Assist		
Provided strategies to overcome barriers to change	7 (4%)	22 (14%)
Identified community resources and social support	3 (2%)	16 (10%)
Arrange		
Arranged follow up visits and reminders	4 (2%)	18 (11%)

* Based on patients' responses to separate survey questions pertaining to physical activity and sedentary behaviour counselling received from their primary care physician in the past year.

[†] Based on the 5A framework (ask, advise, agree, assist and arrange).

Table 3

Correlates of sedentary behaviour and physical activity counselling* in primary care: pilot finding from the Rapid Assessment Disuse Index (RADi) study

Characteristics	Received Sedentary Behavior Counseling			Received Physical Activity Counseling		
	N	n (%)	P	Bivariate [†]	Multivariable [‡]	Multivariable [‡]
				OR (95%CI)	n (%)	P
Sex						
Male	59	3 (5.1)	0.10	1.0-reference	28 (47.5)	0.23
Female	98	13 (13.3)		2.2 (0.4–11.5)	56 (57.1)	
Age						
40–59	92	8 (8.7)	0.46	—	54 (58.7)	0.12
60–79	65	8 (12.3)			30 (46.2)	2.4 (1.1–5.4)
						1.0-reference
College Graduate						
No	55	6 (10.9)	0.68	—	34 (61.8)	0.15
Yes	101	9 (8.9)			49 (48.5)	1.5 (0.6–3.6)
						1.0-reference
Current Smoker						
No	146	16 (100.0)	0.24	—	81 (55.5)	0.07
Yes	11	0 (0.0)			3 (27.3)	6.1 (1.3–28.4)
						1.0-reference
BMI (kg/m ²) [§]						
Normal weight	45	2 (4.4)	0.00	1.0-reference	20 (44.4)	0.06
Overweight	69	2 (2.9)		0.8 (0.1–6.1)	35 (50.7)	1.0 (0.4–2.6)
Obese	36	9 (25.0)		7.0 (1.4–35.2)	25 (69.4)	2.2 (0.7–6.4)
Hypertensive [§]						
No	123	12 (9.8)	0.60	—	66 (53.7)	0.83
Yes	31	4 (12.9)			16 (51.6)	
Type 2 Diabetic [§]						
No	126	13 (10.3)	0.70	—	69 (54.8)	0.73

	Received Sedentary Behavior Counseling				Received Physical Activity Counseling			
		Bivariate [†]		Multivariable [‡]		Bivariate [†]		Multivariable [‡]
Characteristics	N	n (%)	P	OR (95%CI)	n (%)	P	OR (95%CI)	
Yes	14	1 (7.1)			7 (50.0)			
Dyslipidemia [§]								
No	69	5 (7.2)	0.25	—	33 (47.8)	0.05	1.0-reference	
Yes	60	8 (13.3)			39 (65.0)		2.1 (0.9–4.6)	
Sedentary Time (mean, SD) [¶]								
No Counseling	135	0.639 (0.783)	0.40	—	—	—	—	
Yes Counseling	16	0.657 (0.979)						
MVPA (mean, SD) [¶]								
No Counseling	70	—		—	0.026 (0.027)	0.65	—	
Yes Counseling	81				0.025 (0.018)			

Italics indicate a statistically significant association at $p < 0.05$; Missing cells are indicative of covariates not included in the multivariable models.

* Based on patients responses to separate survey questions pertaining to physical activity and sedentary behaviour counselling received from their primary care physician in the past year.

[†] In bivariate analysis—Pearson χ^2 was used to assess the association between two categorical variables, and ANOVA was applied to examine the relation between a categorical and continuous variables.

[‡] Multivariable logistic regression was applied to determine which covariates were independently related to the dependent variables. Two logistic regression models were computed (one for each dependent variable), and covariates associated with the dependent variables at $p \leq 0.20$ in bivariate analysis, were entered into the models.

[§] BMI was calculated using the standard formula (kg/m^2), and was categorised based on the WHO criteria: normal: BMI 18.5–24.9; overweight: BMI 25–29.9; obesity: BMI >30 . Underweight (<18.5) individuals ($n=4$) were not included in the analysis. Clinical information was gleaned from patients' electronic medical records. Hypertension, type 2 diabetes and dyslipidemia were defined based on clinical guidelines.

[¶] Sedentary behaviour and physical activity information is based on accelerometers using Freedson cut-off points. Minutes spent in sedentary time and MVPA per day are adjusted for accelerometer wear time. A total of 151 patients had complete and valid accelerometer data— 4 wearing days with for at least 10 h/day.

ANOVA, analysis of variance; BMI, body mass index; MVPA, moderate-to-vigorous intensity physical activity.