Preventive Medicine 119 (2019) 70–76

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Factors influencing U.S. physicians' decision to provide behavioral counseling

Daniel M. Goldberg[a], Beom-Young Cho[b], Hsien-Chang Lin[c,*]

[a] Department of Counseling and Educational Psychology, School of Education, Indiana University Bloomington, 201 N. Rose Ave., Bloomington, IN 47405, USA
[b] Department of Epidemiology, School of Public Health, University of Michigan, 1415 Washington Heights, Ann Arbor, MI 48109, USA
[c] Department of Applied Health Science, School of Public Health, Indiana University, Bloomington, 1025 E. 7th Street, Bloomington, IN 47405, USA

ARTICLE INFO

Keywords:
Behavioral counseling
Non-communicable disease
Physician
Decision making

ABSTRACT

Prevention and treatment of non-communicable diseases is critical due to high costs of healthcare and increasing prevalence. Historical trends suggest physicians underperform in behavioral counseling (including exercise, diet/nutrition, or weight management). This study investigated physicians' decision-making by examining non-clinical sociological factors that influence ordering and provision of behavioral counseling. This was a retrospective multi-year cross-sectional study. Using the Eisenberg model of physician-decision making, we analyzed data from the 2005–2015 National Ambulatory Medical Care Surveys (unweighted N = 177,599). Four weighted logistic regressions were performed to examine sociological factors associated with physician prescribing or ordering of behavioral counseling. Behavioral counseling was provided at suboptimal rates. Patient age, race/ethnicity, body weight status, and reasons for a medical visit were associated with physicians' decision to provide or order behavioral counseling. There was in general a decreasing trend of odds of provision of behavior counseling from 2005 to 2015. Patients who had been seen before were more likely to receive diet/nutrition and exercise counseling. This study concluded that ordering and provision of behavioral counseling was less than optimal. Policy makers and educators can consider factors that influence physicians' decisions for behavioral counseling to improve training and site policies. Future research examining effective behavioral counseling training and strategies to promote its provision, in particular to patients of different races/ethnicities and with different medical conditions, may increase effectiveness. Integrated care with behavioral health professionals could improve rates and/or delivery of counseling. Physicians can consider providing behavioral counseling when patients present with new problems and to newly seen patients.

1. Introduction

Behavioral change is an imperative piece of medical treatment on account of the non-communicable disease (NCD) epidemic in the United States (U.S). NCDs contributed to nearly 88% of deaths in the U.S., with cardiovascular diseases being the most prevalent of these at close to 31% (World Health Organization, 2014). By 2030, it is estimated that cardiovascular disease will affect 40.5% of the U.S. population, increase direct medical costs threefold to over $800 billion, and increase indirect costs by more than double (Heidenreich et al., 2011). Specifically, obesity, a leading cause of cardiovascular disease, is on the rise, and has an estimated $315 billion annual cost for medical care (Cawley et al., 2015). National age-adjusted prevalence rates for obesity are estimated to be 35.0% for adult men and 40.4% for adult women, with African-Americans and Latinos having increased rates of obesity (Flegal et al., 2016). Diabetes has similarly surged since the 1990s, estimated to be 12%–14% of the population in 2011, with higher rates for Asian, black, and Hispanic populations (Menke et al., 2015). Additionally, 38% of the population was estimated to have pre-diabetes. Individuals with diabetes have twice the direct medical care costs compared to individuals without, and total costs to the U.S. healthcare system are nearly $220 billion annually (Ozieh et al., 2015). It is clear that NCDs are an immense burden on the healthcare system and have far reaching effects on patients.

Behavioral change is credited as a significant piece of treatment, and focus of research, for individuals with, or at risk of, developing NCDs. Elliott and Cifu (2015) found diet and physical activity counseling interventions had small, but effective outcomes on intermediate health markers (e.g., cholesterol, blood pressure, and body weight). A recent review found behavioral counseling in persons with risk for

* Corresponding author at: 1025 E. 7th Street, SPH 116, Bloomington, IN 47405, USA.
E-mail addresses: dangoldb@indiana.edu (D.M. Goldberg), bycho@umich.edu (B.-Y. Cho), linhsi@indiana.edu (H.-C. Lin).

https://doi.org/10.1016/j.ypmed.2018.12.015
Received 1 June 2018; Received in revised form 13 November 2018; Accepted 24 December 2018
Available online 27 December 2018
0091-7435/

cardiovascular disease had long-standing improvement in intermediate health outcomes (Lin et al., 2014). Physician advice has been positively linked to patient weight-loss behaviors (Rose et al., 2013). Furthermore, small changes are shown to have large economic effects. For example, in an innovative model of cost savings for health expenditures, Cawley et al. (2017) found replacing saturated fats with monounsaturated fats could result in yearly healthcare savings of close to $25 billion. Even a 5% reduction in weight has been associated with substantial decreases in medical care costs, especially in those with body-mass indexes over 35 (Cawley et al., 2015). Clearly, behavioral changes to diet and physical activity can be effective both economically and medically when properly implemented. Physicians make important clinical decisions in proactively promoting, performing, and ordering counseling for behavior change due to the nature of their work, the time they spend with patients, and their prestige.

Unfortunately, historical trends show that physicians may be underperforming in their decisions to provide lifestyle counseling. From 1992 to 2000, Ma et al. (2004) found rates of physician counseling on physical activity and diet rose over the years, but that these rates were well below what should be expected given the high prevalence and rising trends of NCDs. Specifically, diet counseling was provided at under 45% of visits and physical activity counseling was provided at < 30% of visits. However, the Ma et al. (2004) study did not address gaps in the literature including the use of a conceptual framework to explain physician decision making and investigation of weight-loss counseling. More recent studies provide evidence of physician decisions resulting in underutilized behavioral counseling (Smith et al., 2011). Physicians' decisions to provide of any type of weight-related counseling (i.e., diet, exercise, and weight loss) have decreased between 1995 and 2008 with the most decreased rates of counseling occurring in populations with hypertension, obesity, and diabetes (Kraschnewski et al., 2013). Discovering the foundations of physicians' clinical decision making in this area may help improve behavioral counseling rates.

Eisenberg's model of physician decision making theorizes that physicians' decision-making is affected by four groups of sociological factors: physician characteristics (e.g., physician specialty), physician's interaction with healthcare systems (e.g., practice setting), the physician-patient relationship (e.g., if a patient was seen before), and patient characteristics (e.g., patient age and race/ethnicity; Eisenberg, 1979). Research has found certain physician and patient characteristics to be linked to providing behavioral counseling to patients. Smith et al. (2011) found lifestyle guidance trends differed based on physician specialty, where obstetricians/gynecologists provided lifestyle guidance at less than half the rate of generalist physicians. Primary care and internalist physicians are more likely to provide weight-reduction counseling than surgeons, but trends also point to these physicians being more likely to provide obesity diagnoses indicating the centrality of a patient's presenting concern (Bleich et al., 2011). In addition, research points to racial disparities in the decision to provide behavioral counseling (i.e., lifestyle modification of diet, physical activity, or weight) as obese, black and Hispanic patients without cardiovascular risk factors are less likely to receive behavioral counseling compared to their white counterparts (Powell-Wiley et al., 2012). Furthermore, obese, black patients visiting white doctors were less likely to receive exercise counseling compared to obese, white patients, and obese, black patients visiting black doctors were less likely to receive weight-reduction counseling compared to obese, white patients (Bleich et al., 2012). However, there is a gap in the scientific literature describing how additional sociological factors may influence physicians' decision to provide behavioral counseling. By identifying physician and patient characteristics that pertain to higher provisions of behavioral counseling, influential persons overseeing physician training and professional practices may be able to facilitate improvement in quality, disparities, and rates of behavioral counseling.

This study examined if sociological factors from the Eisenberg model are associated with physicians' decisions to offer behavioral counseling using data from the nationally representative National Ambulatory Medical Care Surveys (NAMCS). We also intended to study recent trends in the provision of behavioral counseling in primary care physicians. Furthermore, this study sought to use knowledge of existing racial and ethnic disparities in disease prevalence and health care provision to discern if behavioral counseling is provided with parity. This study contributes to the extant literature by testing the following hypotheses: 1) non-clinical sociological factors are associated with physicians' decision to provide behavioral counseling; 2) recent trends of poor counseling provision rates are corroborated; and 3) the provision of counseling is not provided equally among patients based on physician and patient factors.

2. Methods

2.1. Conceptual framework and study design

This retrospective cross-sectional study utilized the Eisenberg model of physician decision-making to guide hypotheses for physicians' treatment decisions as well as independent variable selection (Eisenberg, 1979). This model has been used to describe the influence of sociological characteristics on physicians' decisions to provide multiple modes of treatment, and thus provides rationale for its use given the current knowledge gap (Goldberg and Lin, 2017; Lin et al., 2011; Sleath and Shih, 2003).

2.2. Data and study sample

Data were obtained from the publicly available 2005–2015 NAMCS datasets. The NAMCS is an annually-conducted, nationally-representative survey designed to elicit information during visits to physicians in outpatient settings (National Center for Health Statistics; Centers for Disease Control and Prevention, 2001–2011). In the NAMCS, physicians provided data about patient visits including: patient demographics, reasons for visits, diagnoses, physician characteristics, and modes of treatment (Centers for Disease Control and Prevention, 2001–2011). Study participants included 177,599 (unweighted) individuals who presented to outpatient visits with their physicians and had no missing values of the study variables. The researchers obtained exemption for this study due to the publicly available nature of the dataset from the Institutional Review Board at Indiana University.

2.3. Measurement

2.3.1. Dependent variables

Dependent variables under investigation to measure behavioral counseling are the physician's reported provision or referral to a specialist for health education (i.e., behavioral counseling) on diet or nutrition, exercise, or weight reduction during an outpatient medical visit. In the NAMCS, diet or nutrition counseling (DNC) includes counseling or referral on any topic related to food or beverages consumed by the patient (e.g., dietary guidelines); exercise counseling (EC) includes counseling or referral to a specialist on any topic related to the patient's fitness or physical conditioning (e.g., education about fitness benefits); and weight loss counseling (WLC) includes providing information or referral to a specialist with the specific goal of weight reduction. The three dependent variables were measured as binary variables as to whether or not one type of behavioral counseling was provided or referred for in session. A fourth dependent variable, provision of any of the three counseling services, was created to capture the overall provision of counseling, where whether any of these counseling services was provided was measured as a binary variable.

2.3.2. Independent variables

Independent variables were based on the sociological influences outlined in the Eisenberg model. Physician characteristic variables

included a physician's specialty (primary care physician [general and family practice, internal medicine, and family practice] or not) and type of doctor (medical or osteopathic doctor). Patient characteristic variables included sex (male/female), age (< 15, 15–24, 25–44, 45–64, 65–74, 75 or over), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, or other), BMI-based weight status (underweight, normal weight, overweight, or obese), primary source of payment (private insurance, Medicare, Medicaid/SCHIP, self-pay, or all others), and major reason for this visit (new problem, chronic problem, pre- or post-surgery/injury follow up, or preventive care). Physician-healthcare system interaction variables included type of office setting (private solo or group practice, or others including community health center, mental health center, non-federal government clinic, and family clinic), ownership status (owner of solo practice, owner of non-solo practice, or non-owner), who owns the practice (physician or physician group; medical/academic health center, or other hospital; insurance company, health plan, or health maintenance organization [HMO]; other health care corporation; or others), region of practice (Northeast, Midwest, South, or West), and metropolitan status (yes/no). Physician-patient relationship variables included if the patient was seen by the physician before (yes/no) and the amount of time spent with doctor (minutes).

2.4. Statistical analysis

Weighted descriptive statistics (percentage and frequency for categorical variables and mean and standard deviation for a continuous variable) were computed. Four logistic regressions were conducted to examine the associations between sociological variables (i.e., the independent variables) and each of the four dependent variables (including DNC, EC, WLC, and any of the three), respectively. All analyses were weighted using the NAMCS sampling scheme for national generalizability. All analyses were conducted using Statistical Analysis System version 9.4.

3. Results

A total number of 177,599 participants (unweighted) were studied. Descriptive statistics and prevalence of the weighted study sample are presented in Table 1. A total of 21.1% of visits were ordered or provided at least one type of counseling. Overall, 16.6% received DNC, 12.5% received EC, and 5.3% received WLC.

Results of the multiple logistic regression are presented in Table 2. The weighted logistic regressions display results which examined the associations between sociological factors and prescription or ordering of the three types of behavioral counseling as well as any counseling. Adjusted odds ratios (AORs) of the independent variables and their 95% confidence intervals (CIs) were reported.

Regarding physician characteristics, visits to primary care physicians were more likely to receive the three types of counseling compared to visits to non-primary care physicians. In addition, visits to osteopathic doctors were less likely to include DNC compared to medical doctors. Regarding patient characteristics, older ages were associated with lower likelihoods of receiving the three types of counseling compared to those aged < 15 years old. Compared to non-Hispanic white patients, both non-Hispanic black and Hispanic patients were more likely to receive DNC, whereas only Hispanic patients were more likely to receive EC and WLC than non-Hispanic white patients, even after adjusting for patient body weight status.

Regarding patients' weight status, those who were underweight, overweight, and obese were more likely to receive DNC, whereas only overweight and obese patients were more likely to receive EC and WLC, compared with normal weight patients. A visit's primary source of payment also associated with the likelihood of receiving counseling. Patients with Medicaid were less likely to receive DNC and EC than those with private insurance. Lastly, the major reason for a visit held to be a significant patient factor in the odds of a visit issuing behavioral counseling. Compared to those visiting for new problems, those visiting for chronic problems were more likely to receive all types of counseling, while those visiting for preventive care or surgery−/injury-related conditions were more likely to receive only DNC and EC.

Physician-healthcare system interaction characteristics were generally not associated with the provision of behavioral counseling. Only geographic location (region of practice and metropolitan area) was associated with the likelihood of behavioral counseling provision. Compared to patients in the Northeast, patients in the Midwest, South, and West were less likely to receive DNC and WLC. Patients in metropolitan areas were more likely to receive DNC than those in non-metropolitan areas. Additionally, the relationship between the physician and the patient was associated with behavioral counseling in some regards. Patients who had been seen before were more likely than new patients to receive DNC and EC. Furthermore, spending more time with the physician slightly increased the likelihood of receiving all types of counseling.

The years in which surveys were administered were also significantly associated with the odds of a visit being provided with behavioral counseling. There was in general a decreasing trend of odds of provision of behavior counseling from 2005 to 2015. All types of counseling were less likely to be ordered or provided in years 2012 to 2014 compared to 2005.

4. Discussion

This study examined the association between non-clinical sociological factors and physicians' decisions to provide behavioral counseling. Specific to our hypotheses, the results showed that non-clinical, sociological factors were associated with physicians' decisions. Also, low rates of physician ordering and provision of counseling corroborated previous findings, and counseling was unequally distributed across populations. Given the current trends of NCDs in the U.S., behavioral counseling is not provided or referred for adequately, which aligns with, and builds on gaps in, previous analyses (Kraschnewski et al., 2013; Ma et al., 2004). Results indicate that DNC and EC were provided or ordered at greater rates than WLC, but WLC was less likely to be provided or ordered after 2001. DNC and EC likelihood rates did not increase over time. The current study's results are striking as NCD prevalence rates have risen dramatically. It may be that physicians find more success with their patients when providing WLC, or that it is achieved with less effort. Nevertheless, DNC and EC appeared to be underutilized.

This study found that sociological factors played a significant role in the likelihood of behavioral counseling ordering or provision as predicted. For primary care physicians, likelihood of providing each type of behavioral counseling was higher compared to non-primary care physicians. Primary care physicians may be more likely to provide behavioral counseling for lifestyle concerns than doctors with other specialties (e.g., gynecologists or surgeons) as they may see patients with diagnoses that would specifically benefit from lifestyle counseling (e.g., obesity diagnosis) or may have more exposure to providing lifestyle counseling (Bleich et al., 2011; Smith et al., 2015). Despite this, specialty physicians likely work with those with intensive needs who could greatly benefit from behavioral changes. Furthermore, behavioral counseling of all types was more likely for visits centered on chronic problems, surgery−/injury-related conditions, or prevention compared to visits with new problems. New problems may be visits for acute issues, but physicians can improve on instilling messages for preventative health at all visits. Healthcare administrators and educators may consider encouraging and training specialty physicians to provide more behavioral counseling for all medical conditions and types of visits.

Considering patient characteristics, as age increased compared to those 15 years and younger, physicians were less likely to provide or order DNC, EC and WLC. A healthy diet is a pillar of weight maintenance and health at all ages (Mozaffarian, 2016), and patients may

Table 1
Weighted descriptive statistics of U.S. study sample and prevalence among types of behavioral counseling: 2005–2015.

	Descriptive statistics (total sample)		Type of behavioral counseling							
			Diet/nutrition		Exercise		Weight loss		Any of three	
Variable	N	%	N	%	N	%	N	%	N	%
Overall prevalence			23,434	16.56	17,877	12.54	7939	5.26	30,352	21.05
1. Physician characteristics										
Primary care physician										
No	99,942	54.30	8487	10.99	7462	9.59	3620	4.11	12,745	16.15
Yes	77,657	45.70	14,947	21.26	10,415	15.02	4319	6.23	17,607	25.18
Type of doctor										
Doctor of medicine	162,669	91.59	21,381	16.79	16,123	12.60	7166	5.23	27,571	21.24
Doctor of osteopathy	14,930	8.41	2053	14.07	1754	11.82	773	5.68	2781	19.03
2. Patient characteristics										
Sex										
Female	100,877	57.85	13,319	16.27	10,273	12.43	4703	5.37	17,355	20.82
Male	76,722	42.15	10,115	16.96	7604	12.69	3236	5.12	12,997	21.38
Age group in years										
< 15	20,477	11.71	4324	25.12	2380	13.84	373	1.97	4585	26.43
15–24	12,666	7.26	1545	14.46	1275	12.12	388	3.63	1966	18.16
25–44	34,889	19.87	4079	13.61	3428	11.37	1889	6.20	5628	18.42
45–64	59,147	33.10	7829	17.07	6447	13.65	3478	7.00	10,679	22.76
65–74	26,814	14.72	3193	16.14	2539	12.89	1209	5.78	4276	21.21
75 or over	23,606	13.34	2464	13.82	1808	10.21	602	2.77	3218	17.45
Race/ethnicity										
Non-Hispanic White	131,546	71.20	15,423	14.86	12,436	11.75	5447	4.99	20,668	19.33
Non-Hispanic Black	18,451	10.93	3053	20.42	2070	13.13	1093	6.90	3766	24.58
Hispanic	19,015	12.41	3474	21.67	2376	14.71	1028	5.87	4122	25.41
Other	8588	5.46	1481	19.44	995	16.68	371	4.24	1796	26.54
BMI-based weight status										
Underweight	16,121	9.30	3099	23.09	1556	12.04	46	0.27	3283	24.31
Normal weight	50,036	28.36	5025	12.51	4025	9.92	412	0.87	6488	16.05
Overweight	51,789	29.48	5729	14.67	4717	11.54	1524	3.58	7676	19.23
Obese	59,653	32.85	9581	19.91	7579	15.84	5957	11.99	12,905	26.09
Primary source of payment										
Private insurance	88,758	52.74	11,898	17.20	9387	13.26	4007	5.54	15,445	21.74
Medicare	46,914	25.74	5287	15.15	3993	11.49	1835	4.75	7026	19.62
Medicaid/SCHIP	20,388	10.78	3337	19.07	2048	11.51	1001	5.42	3945	22.30
Self-pay	7029	3.70	1173	17.14	965	15.60	439	6.47	1499	23.62
All the others	14,510	7.04	1739	12.85	1484	10.93	657	4.22	2437	17.87
Major reason for this visit										
New problem	55,816	33.07	4661	10.24	3383	7.63	1587	3.45	6345	13.84
Chronic problem	77,282	40.66	10,160	17.59	7910	13.68	4198	6.62	13,653	22.92
Pre- or post- surgery/injury follow up	12,617	6.02	859	9.64	881	8.13	419	2.92	1484	15.64
Preventive care	31,884	20.25	7754	26.90	5703	19.59	1735	6.20	8870	30.70
3. Physician-healthcare system interaction										
Type of office setting										
Private solo or group practice	150,177	89.56	18,925	16.69	14,591	12.54	6475	5.32	24,767	21.13
Others	27,422	10.44	4509	15.46	3286	12.51	1464	4.79	5585	20.37
Ownership status										
Owner of solo practice	41,687	29.39	5907	18.94	4391	14.41	2108	6.13	7555	23.80
Owner of non-solo practice	66,510	37.39	7633	15.26	5925	11.23	2568	4.71	10,208	19.73
Non-owner	69,402	33.22	9894	15.93	7561	12.36	3263	5.12	12,589	20.11
Who owns this practice										
Physician or physician group	130,523	79.74	16,484	16.70	12,730	12.67	5616	5.29	21,659	21.35
Medical/academic health center, other hospital	14,888	7.14	1746	15.17	1303	11.33	566	4.44	2260	18.61
Insurance company, health plan, or HMO; other health care corporation; others	32,188	13.13	5204	16.49	3844	12.38	1757	5.58	6433	20.62
Region of practice										
Northeast	27,386	18.80	4544	20.63	3126	13.07	1411	6.07	5688	24.84
Midwest	47,536	21.68	5796	15.12	4458	11.52	2214	5.51	7647	19.50
South	61,473	37.72	7775	16.12	5981	12.20	2669	5.28	9969	20.11
West	41,204	21.79	5319	15.25	4312	13.66	1645	4.30	7048	20.98
Metropolitan status										
Non-metropolitan	20,150	9.90	2186	13.20	1825	11.17	823	5.26	3011	18.59
Metropolitan	157,449	90.10	21,248	16.93	16,052	12.69	7116	5.27	27,341	21.32
4. Physician-patient relationship										
Patient seen before										
No	32,161	15.31	2918	11.53	2297	3.25	1153	4.46	4045	15.67
Yes	145,438	84.69	20,516	17.48	15,580	13.13	6786	5.41	26,307	22.03
Time spent with doctor (0–90 min.)[a]	22.24	12.81	23.33	12.75	22.97	12.48	23.30	12.49	23.10	12.64
5. Survey year										
2005	7870	7.79	1585	20.94	1282	16.31	556	7.59	2051	26.86

(*continued on next page*)

Table 1 (*continued*)

	Descriptive statistics (total sample)		Type of behavioral counseling							
			Diet/nutrition		Exercise		Weight loss		Any of three	
Variable	N	%	N	%	N	%	N	%	N	%
Overall prevalence			23,434	16.56	17,877	12.54	7939	5.26	30,352	21.05
2006	9635	6.55	1809	19.71	1437	16.18	696	7.05	2331	25.58
2007	11,141	7.19	1860	17.51	1371	12.75	657	5.89	2420	22.85
2008	96,73	7.59	1501	16.37	1180	14.23	507	5.94	2010	22.88
2009	12,335	8.92	2093	17.63	1620	13.85	731	6.33	2700	22.69
2010	12,471	8.51	1988	18.59	1564	14.75	719	6.57	2616	24.17
2011	13,119	9.58	2204	18.51	1561	12.20	795	6.65	2798	22.87
2012	35,133	9.72	2993	10.16	2146	7.16	1002	2.91	3938	13.00
2013	27,849	10.81	2856	13.02	2167	9.78	972	4.29	3768	16.20
2014	24,651	10.72	2896	13.56	2214	9.45	848	3.48	3646	16.31
2015	13,722	12.62	1649	18.73	1335	14.14	456	3.62	2074	22.76

Data source: 2005–2015 National Ambulatory Medical Care Survey.
Total N: 177,599.
All N's are unweighted; all %'s are weighted.
BMI-based weight status: underweight (BMI $<$ 18.5); normal weight (18.5 $\leq$ BMI $<$ 25); overweight (25 $\leq$ BMI $<$ 30); obese (BMI $\geq$ 30).
[a] Weighted mean and standard deviation.

Table 2
Adjusted odds ratios of participating in counseling for diet/nutrition, exercise, and weight reduction by weighted logistic regressions.

	Diet/nutrition		Exercise		Weight loss		Any of three	
Variable	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
1. Physician characteristics:								
Primary care physician: Yes	1.97	(1.72, 2.26)	1.51	(1.30, 1.75)	1.63	(1.42, 1.88)	1.62	(1.44, 1.81)
Type of doctor								
Doctor of medicine	–	–	–	–	–	–	–	–
Doctor of osteopathy	0.77	(0.64, 0.93)	0.88	(0.73, 1.08)	0.86	(0.70, 1.06)	0.82	(0.70, 0.97)
2. Patient characteristics								
Sex: Male	0.98	(0.92, 1.04)	0.98	(0.92, 1.04)	0.93	(0.85, 1.01)	0.98	(0.93, 1.03)
Age group in years								
$<$ 15	–	–	–	–	–	–	–	–
15–24	0.58	(0.51, 0.66)	0.81	(0.70, 0.94)	0.56	(0.44, 0.72)	0.65	(0.57, 0.73)
25–44	0.48	(0.42, 0.56)	0.66	(0.55, 0.79)	0.60	(0.48, 0.76)	0.57	(0.50, 0.66)
44–64	0.59	(0.51, 0.69)	0.77	(0.64, 0.92)	0.61	(0.48, 0.76)	0.70	(0.61, 0.81)
65–74	0.57	(0.48, 0.67)	0.76	(0.63, 0.93)	0.53	(0.41, 0.68)	0.66	(0.57, 0.77)
75 or over	0.51	(0.43, 0.62)	0.64	(0.52, 0.79)	0.32	(0.24, 0.42)	0.56	(0.48, 0.66)
Race/ethnicity								
Non-Hispanic White	–	–	–	–	–	–	–	–
Non-Hispanic Black	1.28	(1.12, 1.47)	1.02	(0.89, 1.17)	1.10	(0.92, 1.31)	1.23	(1.09, 1.38)
Hispanic	1.49	(1.29, 1.72)	1.25	(1.07, 1.46)	1.22	(1.02, 1.45)	1.37	(1.20, 1.57)
Other race/ethnicity	1.40	(1.18, 1.65)	1.49	(1.07, 2.08)	1.39	(1.06, 1.82)	1.56	(1.23, 1.97)
BMI-based weight status								
Underweight	1.16	(1.04, 1.28)	0.84	(0.74, 0.69)	0.16	(0.11, 0.26)	1.06	(0.96, 1.17)
Normal weight	–	–	–	–	–	–	–	–
Overweight	1.34	(1.24, 1.44)	1.30	(1.21, 1.39)	4.80	(3.99, 5.78)	1.35	(1.27, 1.44)
Obese	2.02	(1.85, 2.20)	1.93	(1.76, 2.10)	17.88	(14.90, 21.46)	2.08	(1.92, 2.25)
Primary source of payment								
Private insurance	–	–	–	–	–	–	–	–
Medicare	0.96	(0.87, 1.07)	0.90	(0.80, 1.01)	1.02	(0.88, 1.18)	0.97	(0.88, 1.06)
Medicaid	0.86	(0.77, 0.97)	0.76	(0.65, 0.88)	1.08	(0.94, 1.24)	0.86	(0.78, 0.96)
Self-pay	1.14	(0.86, 1.51)	1.30	(0.97, 1.74)	1.25	(0.90, 1.74)	1.22	(0.95, 1.57)
Other sources	0.76	(0.66, 0.89)	0.82	(0.69, 0.97)	0.74	(0.61, 0.90)	0.82	(0.72, 0.95)
Major reason for this visit								
New problem	–	–	–	–	–	–	–	–
Chronic problem	2.06	(1.87, 2.28)	1.99	(1.79, 2.22)	1.94	(1.71, 2.21)	1.96	(1.80, 2.12)
Pre- or post-surgery/injury follow up	1.30	(1.02, 1.67)	1.30	(1.05, 1.60)	0.97	(0.71, 1.34)	1.44	(1.20, 1.73)
Preventive care	2.89	(2.60, 3.22)	2.89	(2.55, 3.28)	2.19	(1.89, 2.55)	2.60	(2.37, 2.85)
3. Physician-healthcare system interaction								
Type of office setting								
Private solo or group practice	–	–	–	–	–	–	–	–
Other	0.92	(0.75, 1.13)	0.99	(0.81, 1.23)	0.80	(0.63, 1.02)	0.97	(0.80, 1.17)
Ownership status								
Owner of solo practice	–	–	–	–	–	–	–	–

(*continued on next page*)

Table 2 (*continued*)

	Diet/nutrition		Exercise		Weight loss		Any of three	
Variable	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Owner of non-solo practice	0.87	(0.72, 1.05)	0.82	(0.67, 1.01)	0.89	(0.75, 1.06)	0.87	(0.74, 1.02)
Non-owner	0.84	(0.69, 1.04)	0.93	(0.73, 1.17)	0.91	(0.72, 1.15)	0.87	(0.73, 1.05)
Who owns this practice								
Physician or physician group	–	–	–	–	–	–	–	–
Medical/academic health center, other hospital	1.00	(0.78, 1.28)	0.92	(0.69, 1.23)	0.94	(0.70, 1.26)	0.93	(0.74, 1.18)
Insurance company, health plan, or HMO; other health care corporation; others	1.08	(0.87, 1.36)	0.93	(0.74, 1.18)	1.07	(0.81, 1.43)	1.00	(0.82, 1.23)
Region of practice								
Northeast	–	–	–	–	–	–	–	–
Midwest	0.70	(0.58, 0.84)	0.86	(0.67, 1.10)	0.77	(0.61, 0.98)	0.73	(0.61, 0.88)
South	0.74	(0.60, 0.90)	0.93	(0.73, 1.21)	0.76	(0.61, 0.96)	0.75	(0.62, 0.91)
West	0.66	(0.54, 0.81)	1.04	(0.81, 1.34)	0.68	(0.54, 0.87)	0.78	(0.64, 0.95)
Metropolitan area: Yes	1.43	(1.15, 1.79)	1.16	(0.82, 1.63)	1.18	(0.95, 1.47)	1.21	(0.97, 1.52)
4. Physician-patient relationship								
Patient seen before: Yes	1.16	(1.04, 1.28)	1.17	(1.05, 1.31)	0.94	(0.82, 1.07)	1.16	(1.06, 1.28)
Time spent with doctor: 0–90 min.	1.02	(1.01, 1.02)	1.01	(1.00, 1.01)	1.01	(1.01, 1.02)	1.01	(1.01, 1.02)
5. Survey year								
2005	–	–	–	–	–	–	–	–
2006	0.93	(0.71, 1.24)	1.04	(0.74, 1.45)	0.95	(0.67, 1.35)	0.95	(0.74, 1.23)
2007	0.82	(0.65, 1.02)	0.76	(0.59, 0.98)	0.76	(0.57, 1.01)	0.82	(0.66, 1.01)
2008	0.69	(0.54, 0.87)	0.83	(0.62, 1.12)	0.74	(0.55, 1.00)	0.77	(0.62, 0.97)
2009	0.82	(0.63, 1.07)	0.84	(0.62, 1.15)	0.81	(0.59, 1.10)	0.81	(0.64, 1.03)
2010	0.84	(0.66, 1.08)	0.90	(0.68, 1.19)	0.85	(0.60, 1.23)	0.85	(0.67, 1.08)
2011	0.84	(0.67, 1.07)	0.70	(0.53, 0.91)	0.83	(0.60, 1.13)	0.78	(0.63, 0.97)
2012	0.41	(0.33, 0.52)	0.39	(0.30, 0.51)	0.33	(0.25, 0.45)	0.39	(0.32, 0.48)
2013	0.54	(0.43, 0.68)	0.55	(0.42, 0.71)	0.48	(0.36, 0.65)	0.50	(0.40, 0.62)
2014	0.56	(0.43, 0.72)	0.52	(0.39, 0.68)	0.38	(0.27, 0.52)	0.50	(0.39, 0.63)
2015	0.84	(0.60, 1.18)	0.82	(0.56, 1.21)	0.40	(0.29, 0.56)	0.76	(0.56, 1.04)

Data source: 2005–2015 National Ambulatory Medical Care Survey.
Unweighted N = 177,599.
AOR: adjusted odds ratio; CI: confidence interval.
BMI-based weight status: underweight (BMI < 18.5); normal weight (18.5 ≤ BMI < 25); overweight (25 ≤ BMI < 30); obese (BMI ≥ 30).

benefit from receiving counseling on diet and nutrition consistently across the lifespan. Physicians should also consider implementing more DNC with individuals as they age as changing one's diet can have fast-acting and long-term benefits to one's health and continue to provide DNC to youth in order to instill healthy, dietary habits.

Considering racial and ethnic minorities were often more likely to be ordered or provided behavioral counseling, these results may reflect current trends of high NCD rates among certain racial and ethnic minorities. Future studies are needed to uncover reasons for these disparities. While physicians were more likely to order or provide behavioral counseling for minorities, they should also be providing culturally sensitive advice to ensure effectiveness. Interventions created for one group may not be as effective with a group whose beliefs and behaviors are different. In addition, many racial minorities are disadvantaged in the U.S. society and physicians should seek to understand systemic barriers that may hinder a patient's ability to follow behavioral advice. Providing training on culturally sensitive behavioral counseling approaches, as well as health policy focused on improving access to behavioral interventions, could be useful. Furthermore, visits in the Northeast were more likely to receive all types of behavioral counseling compared to the Midwest, South, and West regions. Particularly, the South has been a largely unhealthy region in the U.S. (Slack et al., 2014). Thus, it is alarming that this region also had the lowest likelihood of behavioral advice provision and this issue should be earnestly explored to identify mechanisms for change.

Finally, there was in general a decreasing trend of provision of behavior counseling from 2005 to 2015. Given the high rates of obesity in the US, counseling provision needs to be researched further to examine effectiveness on overall health. Trends for each type of counseling may reflect physicians' preferences, self-efficacy, or site policies to provide certain types of advice. Physicians could consider assessing their own practice, and studies focused on reasons for this provision disparity are warranted. Studies are needed to understand the effectiveness of current counseling strategies. Many medical sites have moved towards integrated care over recent decades in response to an increased understanding of the link between the body and mind. Given high rates of physical and mental health comorbidities connected to diet, weight, and physical activity, there may be opportunities to address lifestyle and behavioral health concerns through integrated care initiatives (Crowley and Kirschner, 2015).

There were limitations to this study. Foremost as a result of using survey data, this study is subject to recall and response bias, and is limited in its ability to understand whether counseling was ordered or actually provided. Additionally, the NAMCS does not provide health outcomes to determine the effectiveness of each type of counseling, nor does it state whether the physician was the sole determiner of which type of counseling, if any, was provided. Furthermore, there may have been some overlap between types of counseling (e.g., weight loss and diet education may have some similar information), and providers may have made errors in coding or overlapped information in their provision. Finally, patient health diagnoses, need for counseling, severity of issues, exercise regimen, and diet routines were not identified which would be important to understand how these factors may influence the provision or ordering of behavioral counseling. Despite these limitations, this study had specific strengths. We addressed a literature gap by using a conceptual model to examine factors impacting behavioral counseling ordering and provision. Additionally, this study addressed a gap by examining three critical types of behavioral counseling for addressing NCDs, and by providing information on the current trends of each type.

5. Conclusions

Using multiple years of nationally representative data, this study investigated physicians' decision-making by examining non-clinical

sociological factors that influence ordering and provision of behavioral counseling and concluded that ordering and provision of behavioral counseling was less than optimal. Future studies can examine specific health outcomes with relation to behavioral counseling to identify the most effective method(s) and may consider continuing to focus on the quality and type of behavioral counseling physicians offer their patients. Research points to combination of high intensity resistance training with diet change to be most effective for weight and fat loss (Clark, 2015). Current research also supports using counseling strategies that teach self-monitoring to be effective in changing behavior (Michie et al., 2009). Additionally, motivational interviewing techniques have been found to be effective in counseling populations with chronic health conditions (O'Halloran et al., 2014). Physicians may benefit in learning how to incorporate strategies such as these into behavioral counseling and examining physician factors that influence use of these effective strategies.

In addition, as minorities in this study were more likely to be ordered or provided behavioral counseling, examinations into effective strategies with unique populations and into the effects of cross-cultural communication strategies on health outcomes is warranted (considering the high rate of U.S. physicians identifying as white). Of utmost importance will be the continued study of patient experiences with physician counseling to help determine effective strategies for different populations and medical conditions. Finally, studying the effectiveness of instructional methods in graduate medical education could be useful in raising physician self-efficacy, knowledge, and skill for counseling provision.

Conflicts of interest

None.

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

Bleich, S.N., Pickett-Blakely, O., Cooper, L.A., 2011. Physician practice patterns of obesity diagnosis and weight-related counseling. Patient Educ. Couns. 82 (1), 123–129. https://doi.org/10.1016/j.pec.2010.02.018.

Bleich, S.N., Simon, A.E., Cooper, L.A., 2012. Impact of patient–doctor race concordance on rates of weight-related counseling in visits by black and white obese individuals. Obesity 20 (3), 562–570.

Cawley, J., Meyerhoefer, C., Biener, A., Hammer, M., Wintfeld, N., 2015. Savings in medical expenditures associated with reductions in body mass index among US adults with obesity, by diabetes status. PharmacoEconomics 33 (7), 707–722.

Cawley, J., Meyerhoefer, C., Gillingham, L.G., Kris-Etherton, P., Jones, P.J., 2017. Estimates of the direct and indirect cost savings associated with heart disease that could be avoided through dietary change in the United States. J. Med. Econ. 20 (2), 182–192.

Centers for Disease Control and Prevention, 2001–2011. National Ambulatory Medical Care Survey. https://www.cdc.gov/nchs/ahcd/index.htm.

Clark, J.E., 2015. Diet, exercise or diet with exercise: comparing the effectiveness of treatment options for weight-loss and changes in fitness for adults (18–65 years old) who are overfat, or obese; systematic review and meta-analysis. J. Diabetes Metab. Dis 14 (1), 31.

Crowley, R.A., Kirschner, N., 2015. The integration of care for mental health, substance abuse, and other behavioral health conditions into primary care: executive summary of an American College of Physicians position paper. Ann. Intern. Med. 163 (4), 298–299.

Eisenberg, J.M., 1979. Sociologic influences on decision-making by clinicians. Ann. Intern. Med. 90 (6), 957–964.

Elliott, L., Cifu, A.S., 2015. Healthy lifestyle counseling in persons with cardiovascular risk factors. JAMA 314 (4), 398–399.

Flegal, K.M., Kruszon-Moran, D., Carroll, M.D., Fryar, C.D., Ogden, C.L., 2016. Trends in obesity among adults in the United States, 2005 to 2014. JAMA 315 (21), 2284–2291.

Goldberg, D.M., Lin, H.C., 2017. Effects of the mental health parity and addictions equality act on depression treatment choice in primary care facilities. Int. J. Psychiatry Med. 52 (1), 34–47.

Heidenreich, P.A., Trogdon, J.G., Khavjou, O.A., Butler, J., Dracup, K., Ezekowitz, M.D., Finkelstein, E.A., Hong, Y., Johnston, S.C., Khera, A., Lloyd-Jones, D.M., 2011. Forecasting the future of cardiovascular disease in the United States. Circulation 123 (8), 933–944.

Kraschnewski, J.L., Sciamanna, C.N., Stuckey, H.L., Chuang, C.H., Lehman, E.B., Hwang, K.O., Sherwood, L.L., Nembhard, H.B., 2013. A silent response to the obesity epidemic: decline in US physician weight counseling. Med. Care 51 (2), 186–192.

Lin, H.C., Erickson, S.R., Balkrishnan, R., 2011. Physician prescribing patterns of innovative antidepressants in the United States: the case of MDD patients 1993–2007. Int. J. Psychiatry Med. 42 (4), 353–368.

Lin, J.S., O'connor, E., Evans, C.V., Senger, C.A., Rowland, M.G., Groom, H.C., 2014. Behavioral counseling to promote a healthy lifestyle in persons with cardiovascular risk factors: a systematic review for the US preventive services task force healthy lifestyle counseling in persons with cardiovascular risk factors. Ann. Intern. Med. 161 (8), 568–578.

Ma, J., Urizar, G.G., Alehegn, T., Stafford, R.S., 2004. Diet and physical activity counseling during ambulatory care visits in the United States. Prev. Med. 39 (4), 815–822.

Menke, A., Casagrande, S., Geiss, L., Cowie, C.C., 2015. Prevalence of and trends in diabetes among adults in the United States, 1988–2012. JAMA 314 (10), 1021–1029.

Michie, S., Abraham, C., Whittington, C., McAteer, J., Gupta, S., 2009. Effective techniques in healthy eating and physical activity interventions: a meta-regression. Health Psychol. 28 (6), 690.

Mozaffarian, D., 2016. Dietary and policy priorities for cardiovascular disease, diabetes, and obesity – a comprehensive review. Circulation 133 (2), 187–225.

O'Halloran, P.D., Blackstock, F., Shields, N., Holland, A., Iles, R., Kingsley, M., Bernhardt, J., Lannin, N., Morris, M.E., Taylor, N.F., 2014. Motivational interviewing to increase physical activity in people with chronic health conditions: a systematic review and meta-analysis. Clin. Rehabil. 28 (12), 1159–1171.

Ozieh, M.N., Bishu, K.G., Dismuke, C.E., Egede, L.E., 2015. Trends in health care expenditure in US adults with diabetes: 2002–2011. Diabetes Care 38 (10), 1844–1851.

Powell-Wiley, T.M., Ayers, C.R., Banks-Richard, K., Berry, J.D., Khera, A., Lakoski, S.G., McGuire, D.K., Lemos, J.A., Das, S.R., 2012. Disparities in counseling for lifestyle modification among obese adults: insights from the Dallas Heart Study. Obesity 20 (4), 849–855.

Rose, S.A., Poynter, P.S., Anderson, J.W., Noar, S.M., Conigliaro, J., 2013. Physician weight loss advice and patient weight loss behavior change: a literature review and meta-analysis of survey data. Int. J. Obes. 37 (1), 118–128.

Slack, T., Myers, C.A., Martin, C.K., Heymsfield, S.B., 2014. The geographic concentration of US adult obesity prevalence and associated social, economic, and environmental factors. Obesity 22 (3), 868–874.

Sleath, B., Shih, Y.C.T., 2003. Sociological influences on antidepressant prescribing. Soc. Sci. Med. 56 (6), 1335–1344.

Smith, A.W., Borowski, L.A., Liu, B., Galuska, D.A., Signore, C., Klabunde, C., Huang, T.T.K., Krebs-Smith, S.M., Frank, E., Pronk, N., Ballard-Barbash, R., 2011. US primary care physicians' diet-, physical activity–, and weight-related care of adult patients. Am. J. Prev. Med. 41 (1), 33–42.

Smith, S., Seeholzer, E.L., Gullett, H., Jackson, B., Antognoli, E., Krejci, S.A., Flocke, S.A., 2015. Primary care residents' knowledge, attitudes, self-efficacy, and perceived professional norms regarding obesity, nutrition, and physical activity counseling. J. Grad. Med. Educ. 7 (3), 388–394.

World Health Organization, 2014. Noncommunicable Diseases Country Profiles 2014 (Last accessed: 12/19/2017. Retrieved from). http://apps.who.int/iris/bitstream/10665/128038/1/9789241507509_eng.pdf.