Published in final edited form as:

Cancer Control. 2014 October ; 21(4): 343–349.

Social Determinants of Racial and Ethnic Disparities in Cutaneous Melanoma Outcomes

Valerie M. Harvey, MD, Hitesh Patel, MS, MBA, Sophia Sandhu, MD, Sherrie Flynt Wallington, PhD, and Ginette Hinds, MD

Eastern Virginia Medical School (VMH, HP, SS), Norfolk, Virginia, the Hampton University Skin of Color Research Institute (VMH), Hampton, Virginia, the Lombardi Comprehensive Cancer Center at Georgetown University Medical Center (SFW), Washington, DC, and the Johns Hopkins University School of Medicine (GH), Baltimore, Maryland

Abstract

Background—This article sought to elucidate how aspects of poverty and culture may contribute to race- and ethnicity-based disparities in cutaneous melanoma outcomes.

Methods—We identified published studies addressing the social determinants of melanoma. Selected review articles included US-based studies comprised of patients representing adults, children, and adolescents.

Results—African Americans and Hispanics diagnosed with cutaneous melanoma are more likely to present with more advanced stages of disease at diagnosis and have higher rates of mortality than their nonminority counterparts. These disparities may be a consequence of economic, social, and cultural barriers such as low income, public forms of health insurance, lower levels of education, lower levels of melanoma awareness and knowledge, and lower rates of participation in melanoma screening. No studies in the literature examined the potential impact of social injustice, English proficiency, immigrant status, and health literacy.

Conclusions—Substantial gaps exist in our knowledge of the pathways linking social determinants and race- and ethnicity-based disparities in melanoma. More studies are warranted to inform the development of effective interventions aimed at narrowing inequities and improving cutaneous melanoma outcomes among minority populations.

Introduction

Cutaneous melanoma is a significant public health concern. In 2013, 76,690 incident cases and 9,480 deaths occurred from cutaneous melanoma in the United States alone.¹ The poor prognosis and limited treatment options of advanced-stage disease make early detection and diagnosis critical. Although the incidence of cutaneous melanoma is greatest in Caucasians,²

Address correspondence to Valerie M. Harvey, MD, Department of Dermatology, Eastern Virginia Medical School, 721 Fairfax Avenue, Suite 200, Andrews Hall, Norfolk, VA 23507. harveyvm@evms.edu.

No significant relationships exist between the authors and the companies/organizations whose products or services may be referenced in this article.

most studies have shown that racial and ethnic minorities diagnosed with cutaneous melanoma are more likely to experience worse cutaneous melanoma outcomes.²⁻⁷

Surveillance, Epidemiology, and End Results data reveal that Hispanics, African Americans, American Indians, and Asians diagnosed with cutaneous melanoma are more likely to present with advanced (regional and metastatic) cutaneous melanoma than Caucasians.^{3,4,8-12} Moreover, while the proportions of local stage or in situ cutaneous melanomas have increased among Caucasians, an opposing trend has been observed among Hispanic men living in California who present with thicker primary tumors at diagnosis.⁴ Evidence also suggests variability in the quality of care received by minority patients with cutaneous melanoma. A Surveillance, Epidemiology, and End Results-based study found that blacks were less likely than Caucasians to receive surgical treatment for melanoma,¹³ and those who underwent surgery experienced shorter survival time than other races.¹³

After accounting for demographical and clinical characteristics, minorities have an approximate two- to three-fold greater risk of melanoma-specific mortality than their nonminority counterparts.¹⁴ In African Americans, differences in mortality rates persist even after stage at diagnosis is considered.² Although biological factors may account for some of these differences (cutaneous melanomas in minorities tend to occur at unusual anatomical sites and may be of more aggressive histological subtypes), the underlying mechanisms of these disparities remain unclear.²

Theoretical Framework

Freeman's health disparities cancer model provides a framework for organizing racial and ethnic disparities in cancer research (Fig).^{15,16} The model is based on the premise that social setting contributes to disease outcome and considers 3 major variables, ie, poverty, culture, and social justice, and posits an important connection between the social determinants of health and health inequities.^{16,17} Numerous studies have helped to further elucidate this connection to determine how individual health outcomes are shaped by individual motivation and higher-level social and structural forces (ie, social determinants of health).¹⁸⁻²⁵ The model developed by Freeman and Chu¹⁶ suggests that many of the factors related to the successful acquisition of cancer prevention, control, and treatment are shaped and influenced by socially determined elements, including cultural and economic factors, social support networks, the physical and social environment, access to health care services, and social and health policies.²¹⁻²⁴

As such, based on this theoretical framework and the literature, this review summarizes how aspects of social determinants, including poverty and culture, contribute to race- and ethnicity-based disparities in the prevention, early detection, diagnosis incidence, treatment, and mortality rates of cancer. Given the paucity of literature linking race-based disparities in cutaneous melanoma to social justice, this article will focus on the domains of poverty and culture.

Methods

The medical literature was searched to identify all published studies that addressed social determinants of cutaneous melanoma within the United States using such search terms as melanoma, minorities, health disparities, social determinants, socioeconomic status, education, income, race, ethnicity, insurance, public insurance, Medicaid, Medicare, African Americans, Hispanics, Asians, Pacific Islanders, sunscreen, sun protection, skin examinations, poverty, cancer disparities, literacy, US acculturation, melanoma awareness, melanoma knowledge, and immigrants. References within selected articles were also reviewed to identify additional pertinent publications. Due to the relative paucity of studies that included minorities with cutaneous melanoma, articles addressing the aspects of social determinants in non-Hispanic whites were also reviewed to provide context.

Barriers Related to Poverty

Measures of socioeconomic status, such as level of educational attainment, occupation, income, poverty level, health insurance status, and place of residence, are key determinants for preventive skin screenings, cutaneous melanoma incidence, stage at diagnosis, and melanoma mortality rates.^{4,26,27} Regardless of the economic measure employed, the preponderance of studies demonstrates a direct correlation of the incidence of cutaneous melanoma with measures of high socioeconomic status.^{6,7,26,27,28} Conversely, lower socioeconomic status is associated with the development of thicker primary tumors, more advanced stages of disease at the time of diagnosis, and increased mortality rates.^{3,5,7,26,27,29,30–32}

Income

Pollitt et al⁴ examined the differences in incidence rates of melanoma and tumor thickness between Hispanics and non-Hispanic whites of various socioeconomic groups, which were measured by income, education, and poverty. Although most cases of cutaneous melanoma in non-Hispanic whites occurred within a high socioeconomic strata, only 35% of cutaneous melanomas in Hispanics occurred within a high socioeconomic group.⁴ Irrespective of race, ethnicity, or sex, patients of lower socioeconomic groups had thicker tumors (> 2 mm) at diagnosis; however, this association was most pronounced among Hispanics, a finding that suggests Hispanics may be disproportionately burdened by barriers related to poverty.⁴

In their examination of cutaneous melanoma survival rates among beneficiaries of Medicare, Reyes-Ortiz et al^{32,33} found that patients residing in low-income regions had lower 5-year, melanoma-specific survival rates than those living in high-income areas. The researchers found that the interactions between race, ethnicity, socioeconomic status, and cutaneous melanoma survival rates were greatest among minorities, with non-Caucasians earning less than \$30,000 having the highest percentages of advanced-stage melanoma and thicker tumors.³³

Treatment for melanoma also varied by socioeconomic status. Medicare enrollees living in poor areas were less likely to receive chemotherapy than their Medicare counterparts living in wealthier regions.³²

Education

The association between education and health is well established.^{34,35} Education and knowledge may help individuals recognize the signs and symptoms that necessitate prompt medical care and navigate through the health care system.³⁶ Geller et al³¹ found that patients with cutaneous melanoma who were less educated presented with more advanced-stage disease and had greater mortality rates. Reductions in mortality rates for cutaneous melanoma between 1993 and 1997 compared with 2003 and 2007 were confined to the most highly educated individuals (≥ 13 years of education), while patients with fewer years of education experienced increases in mortality rates during that same time period.³¹

Buster et al³⁷ found that people who were less educated, elderly, or black were more likely to perceive themselves as being at low risk for developing skin cancer and were less inclined to receive skin examinations. In their survey of more than 500 patients who survived cutaneous melanoma, Pollitt et al⁵ found that lower levels of education were associated with decreased perception and knowledge of risk for cutaneous melanoma. They also found that physicians were less likely to counsel survivors of melanoma who had only achieved a high school education compared with their college graduate counterparts on skin cancer risks and the importance of regular self- and physician-performed skin examinations, thus demonstrating the impact of educational status on patient–physician communication.⁵

Health Insurance

Health insurance status also influences cutaneous melanoma outcomes.^{14,29,38} Kirsner et al³⁹ found that patients covered by Medicare health maintenance organizations (HMOs) were diagnosed in the earlier stages of cutaneous melanoma and experienced longer survival times than age-matched controls enrolled in Medicare fee-for-service programs. Similarly, Medicare HMO enrollees who were Hispanic were less likely to be diagnosed with advanced-stage melanoma than patients using fee-for-service programs.⁴⁰ Although Hispanics using fee-for-service programs were more likely to have an advanced-stage cutaneous melanoma at diagnosis than non-Hispanic whites using fee-for-service programs, no significant difference was seen in stage at diagnosis or median survival rates among non-Hispanic whites and Hispanics enrolled in HMOs.⁴⁰ These disparities may be explained in part by the “HMO effect.” For example, patients enrolled in HMOs are seen by their primary care physicians more often than those using a fee-for-service program; therefore, they are more likely to use preventative services such as skin cancer screenings.³⁹

The duration of Medicaid enrollment inversely correlates with cutaneous melanoma stage at the time of diagnosis.²⁹ One study found that newly enrolled patients were 13 times more likely to be diagnosed with late-stage melanoma, whereas intermittently enrolled patients were twice as likely to have late-stage cutaneous melanoma as those not on Medicaid.²⁹ Medicaid beneficiaries continuously enrolled for more than 1 year were just as likely to be diagnosed with late-stage disease as those not enrolled in Medicaid.²⁹ A second study showed that Medicaid beneficiaries enrolled at least 3 months prior to diagnosis experienced more favorable survival outcomes than those who enrolled upon or after receiving a diagnosis of cancer.⁴¹ Together, these findings support the importance of continuous access

to preventive services in improving mortality rates for melanoma and suggest that Medicaid services may be sufficient for continuously enrolled beneficiaries.

Despite the benefits of continuous enrollment, patients on Medicaid experience less favorable outcomes than their non-Medicaid counterparts.⁴¹ Possible explanations include (1) the receipt of late or inadequate treatment, (2) Medicaid beneficiaries commonly consisting of disadvantaged populations with numerous physical comorbidities, psychiatric comorbidities, or both, which may contribute to their poor prognosis, and (3) additional barriers, including lack of transportation and psychosocial support, that may preclude the receipt of adequate treatment or continuous care.^{5,41} Although minority populations represent approximately one-third of the US population,⁴² they account for more than one-half of people covered by Medicaid.⁴³

Health insurance status also affects the diagnostic staging evaluation of cutaneous melanoma. In one study, patients on Medicare and Medicaid were less likely than privately insured patients to undergo sentinel lymph node biopsy for cutaneous melanoma, indicating that publicly insured individuals may be understaged and possibly inadequately treated.⁴⁴

Barriers Related to Culture

Because culture can either amplify or reduce the expected negative effects of poverty, an understanding of the cultural contributors to cutaneous melanoma inequities is essential.⁴⁵ Risk factors for melanoma, such as sun exposure behavior and the aesthetic benefits of a tanned appearance, can be rooted in cultural tendencies and preferences.

Risk Behaviors

Compared with Caucasians, minority populations typically engage in fewer types of behavior that increase risk for skin cancer.⁴⁶ Specifically, minority populations have a lower prevalence of sunburn,⁴⁷ indoor tanning use,^{47,48} and sunscreen consumption,⁴⁹ and are more likely to seek shade than Caucasians.⁴⁹ Female sex, education, income, and age are associated with sunscreen use in blacks and Hispanics.^{47,50,51}

Acculturation

Acculturation, the process by which immigrants adopt the language, attitudes, behaviors, and norms of their host country, has been associated with behavioral changes in relation to skin cancer risk among Hispanics.^{52–55} US cultural norms favor sunscreen use and sun tanning more than Hispanic cultural norms.⁵² Acculturation among Hispanics has been linked to higher perceived benefits of exposure to ultraviolet radiation,⁵⁵ less worry about skin damage,⁵⁵ higher rates of sunbathing,⁵³ higher rates of indoor tanning,⁵³ and an increased risk of sunburns.⁵⁴ Of note, a subgroup analysis of Mexicans and Puerto Ricans revealed that differences in sun protection behaviors varied by country of origin,⁵⁴ exemplifying the limitations of aggregating heterogeneous populations.

Perception of Skin Cancer Risk

In general, the medical literature as it pertains to cancer has shown that a patient's lack of perceived risk of cancer is a barrier to risk reduction and that perceived risk of cancer is a

positive predictor of preventative behaviors.^{37,56–58} Blacks^{37,50,59} and Hispanics^{59–62} perceive themselves to be at very low risk for developing skin cancer. A study by Pichon et al⁵⁰ observed no difference in sunscreen use among blacks who reported they perceived a high risk of skin cancer versus those who perceived no risk of skin cancer. These findings are in contrast to the medical literature on cancer, which shows a positive correlation between perceived cancer risks and preventative behaviors.

A study by Buster et al³⁷ found that blacks placed less emphasis on the importance of regular skin examinations as a method for early detection of skin cancer than whites. Both blacks and Hispanics believed that they could do little to reduce their risk of skin cancer, primarily because too many recommendations exist about preventing skin cancer to know which ones to follow.³⁷

Awareness and Knowledge

Temoshok et al⁶¹ found that both a low level of knowledge about cutaneous melanoma prior to diagnosis and a poor understanding of melanoma treatment were associated with greater tumor thickness. Compared with non-Hispanic whites, both Hispanics^{60,61,64–66} and blacks^{64,66,67} appear to be less knowledgeable about melanoma. Blacks and Hispanics may also be less likely to seek medical care if they have a suspicious skin lesion.^{2,67} Even when comparing Hispanics and non-Hispanic whites with similar access to health care, Hispanics continued to demonstrate lower levels of melanoma awareness.⁶¹ Among middle school students, knowledge emerged as the strongest sun safety predictor for Hispanics.⁶⁸ Knowledge-based interventions have been shown to increase monthly self-skin examinations in minority populations.⁵⁹ However, the evidence is not sufficient to determine how and if knowledge gaps contribute to race- and ethnic-based disparities in melanoma outcomes.

Individuals are more likely to perform skin self-examinations if they have a high level of knowledge and awareness about melanoma,⁶⁶ and patients practicing skin self-examinations can potentially decrease cutaneous melanoma mortality rates by 63%.⁶⁹ Several studies have reported that the rates of skin self-examinations^{9–11,61,70,71} among minority populations and physician-assisted skin examinations^{49,71,72} are significantly lower than those of non-Hispanic whites. Among Hispanics, factors associated with higher rates of skin self-examinations and physician-assisted skin examinations include greater US acculturation, older age, an increased number of melanoma risk factors, physician recommendations,^{62,73,74} fewer skin self-examination barriers,⁷⁴ country of origin,⁷³ tanning indoors, a higher level of knowledge about skin cancer, a high level of perceived skin cancer severity, a low worry of skin cancer, and added physician-assisted skin examination benefits.⁷⁴ The primary reasons Hispanics cited for not performing skin self-examinations were lack of awareness regarding the necessity of skin self-examinations and lack of knowledge about how to conduct such an examination.^{61,62,70} The primary reasons Hispanics provided for not receiving physician-assisted skin examinations were inadequate amount of time with the physician and not knowing to ask or how to ask for a physician-assisted skin examination.⁶²

Language Fluency

Low English proficiency has been linked to having less access to care, receiving lower quality care, and having poor health outcomes.⁷⁵ Although numerous studies have found detrimental associations between limited English proficiency and health outcomes,^{76–78} we were unable to find any studies that investigated the role of English proficiency on outcomes among patients with cutaneous melanoma.

Gaps in Knowledge

No studies have explored the potential impact of social justice, English proficiency, health beliefs, health literacy, disability, immigrant status, or housing status despite the fact that these variables have been shown to contribute to ethnic and racial disparities in many other malignancies.^{76–81} We were also unable to identify studies addressing the post-treatment quality of life among minority patients with cutaneous melanoma. Much remains unknown about cutaneous melanoma in other US minority groups, including Asians, Pacific Islanders, American Indians, and Native Alaskans. The Table illustrates our current knowledge on this topic organized along the cancer continuum.^{2–4,6–13,27,29,33,37,38,40,46–55,59–62,65,68,70,71,73,74}

Conclusions

Hispanics and African Americans diagnosed with cutaneous melanoma typically present at diagnosis during the advanced stages of disease and experience high mortality rates. The literature on the social determinants of cutaneous melanoma outcomes in minorities is limited. In addition, decreased access to dermatological care is associated with poor melanoma outcomes; however, how this impacts outcomes among minority populations is unclear. Poverty and insurance status are key contributors of socioeconomic status–based disparities in patients with cutaneous melanoma. Barriers related to poverty also disproportionately burden minorities who are more likely to be impoverished and publicly insured. Hispanics and blacks possess lower self-perceived risk for melanoma than their counterparts, and they have less awareness and knowledge about melanoma. They are also less likely to participate in melanoma prevention and screening. Furthermore, the increasing US acculturation among Hispanics is associated with increased skin cancer risk behaviors.

This review also exposes the paucity of literature addressing the social determinants of inequities in outcomes among patients with cutaneous melanoma. Although the low incidence and prevalence rates of cutaneous melanoma among Hispanics and blacks contribute to the sparseness of studies on this topic, many of the barriers discussed are potentially modifiable; therefore, they are important to understand. Additional studies are needed to unravel the cultural, economical, and biological complexities that contribute to the observed inequities in outcomes among patients with cutaneous melanoma. This information may be valuable for the development of effective interventions in the future as well as developing cancer prevention measures and cancer control strategies targeting these specific populations.

Acknowledgments

This work was supported in part by grants from the US Department of Education (P031B100033) and the National Cancer Institute (5 K01 CA155417-04).

References

1. American Cancer Society. [Accessed August 13, 2014] Melanoma skin cancer: what is cancer?. <http://www.cancer.org/acs/groups/cid/documents/webcontent/003120-pdf.pdf>
2. Cormier JN, Xing Y, Ding M, et al. Ethnic differences among patients with cutaneous melanoma. *Arch Intern Med*. 2006; 166(17):1907–1914. [PubMed: 17000949]
3. Hu S, Parmet Y, Allen G, et al. Disparity in melanoma: a trend analysis of melanoma incidence and stage at diagnosis among whites, Hispanics, and blacks in Florida. *Arch Dermatol*. 2009; 145(12): 1369–1374. [PubMed: 20026844]
4. Pollitt RA, Clarke CA, Swetter SM, et al. The expanding melanoma burden in California hispanics: importance of socioeconomic distribution, histologic subtype, and anatomic location. *Cancer*. 2011; 117(1):152–161. [PubMed: 20737564]
5. Pollitt RA, Swetter SM, Johnson TM, et al. Examining the pathways linking lower socioeconomic status and advanced melanoma. *Cancer*. 2012; 118(16):4004–4013. [PubMed: 22179775]
6. Rouhani P, Hu S, Kirsner RS. Melanoma in Hispanic and black Americans. *Cancer Control*. 2008; 15(3):248–253. [PubMed: 18596677]
7. Wich LG, Ma MW, Price LS, et al. Impact of socioeconomic status and sociodemographic factors on melanoma presentation among ethnic minorities. *J Community Health*. 2011; 36(3):461–468. [PubMed: 21080042]
8. Bergfelt L, Newell GR, Sider JG, et al. Incidence and anatomic distribution of cutaneous melanoma among United States Hispanics. *J Surg Oncol*. 1989; 40(4):222–226. [PubMed: 2927134]
9. Black WC, Goldhahn RT Jr, Wiggins C. Melanoma within a southwestern Hispanic population. *Arch Dermatol*. 1987; 123(10):1331–1334. [PubMed: 3662565]
10. Clairwood M, Ricketts J, Grant-Kels J, et al. Melanoma in skin of color in Connecticut: an analysis of melanoma incidence and stage at diagnosis in non-Hispanic blacks, non-Hispanic whites, and Hispanics. *Int J Dermatol*. 2014; 53(4):425–433. [PubMed: 23968545]
11. Rouhani P, Pinheiro PS, Sherman R, et al. Increasing rates of melanoma among nonwhites in Florida compared with the United States. *Arch Dermatol*. 2010; 146(7):741–746. [PubMed: 20644034]
12. Wu XC, Eide MJ, King J, et al. Racial and ethnic variations in incidence and survival of cutaneous melanoma in the United States, 1999–2006. *J Am Acad Dermatol*. 2011; 65(5 suppl 1):S26–S37. [PubMed: 22018064]
13. Collins KK, Fields RC, Baptiste D, et al. Racial differences in survival after surgical treatment for melanoma. *Ann Surg Oncol*. 2011; 18(10):2925–2936. [PubMed: 21479687]
14. Roetzheim RG, Pal N, Tennant C, et al. Effects of health insurance and race on early detection of cancer. *J Natl Cancer Inst*. 1999; 91(16):1409–1415. [PubMed: 10451447]
15. Freeman HP. Commentary on the meaning of race in science and society. *Cancer Epidemiol Biomarkers Prev*. 2003; 12(3):232s–236s. [PubMed: 12646516]
16. Freeman HP, Chu KC. Determinants of cancer disparities: barriers to cancer screening, diagnosis, and treatment. *Surg Oncol Clin N Am*. 2005; 14(4):655–669. v. [PubMed: 16226685]
17. Gerend MA, Pai M. Social determinants of Black-White disparities in breast cancer mortality: a review. *Cancer Epidemiol Biomarkers Prev*. 2008; 17(11):2913–2923. [PubMed: 18990731]
18. Braveman P, Egerter S, Williams DR. The social determinants of health: coming of age. *Annu Rev Public Health*. 2011; 32:381–398. [PubMed: 21091195]
19. Koh HK, Oppenheimer SC, Massin-Short SB, et al. Translating research evidence into practice to reduce health disparities: a social determinants approach. *Am J Public Health*. 2010; 100(suppl 1):S72–S80. [PubMed: 20147686]

20. Williams DR, Sternthal M. Understanding racial-ethnic disparities in health: sociological contributions. *J Health Soc Behav.* 2010; 51(suppl):S15–S27. [PubMed: 20943580]
21. Márquez-Magaña L, Samayoa C, Umanzor C. Debunking ‘race’ and asserting social determinants as primary causes of cancer health disparities: outcomes of a science education activity for teens. *J Cancer Educ.* 2013; 28(2):314–318. [PubMed: 23532632]
22. Wheeler SB, Reeder-Hayes KE, Carey LA. Disparities in breast cancer treatment and outcomes: biological, social, and health system determinants and opportunities for research. *Oncologist.* 2013; 18(9):986–993. [PubMed: 23939284]
23. Krieger N. A glossary for social epidemiology. *J Epidemiol Community Health.* 2001; 55(10):693–700. [PubMed: 11553651]
24. Berkman, LF.; Kawachi, I., editors. *Social Epidemiology.* New York: Oxford University Press; 2000.
25. Wallington, SF. Health disparities research and practice: the role of language and health communication. In: Wen-Ying, C.; Hamilton, HE., editors. *The Routledge Handbook of Language and Health Communication.* New York: Routledge; 2014.
26. Ortiz CA, Goodwin JS, Freeman JL. The effect of socioeconomic factors on incidence, stage at diagnosis and survival of cutaneous melanoma. *Med Sci Monit.* 2005; 11(5):RA163–RA172. [PubMed: 15874907]
27. Singh SD, Ajani UA, Johnson CJ, et al. Association of cutaneous melanoma incidence with area-based socioeconomic indicators-United States, 2004–2006. *J Am Acad Dermatol.* 2011; 65(5 suppl 1):S58–S68. [PubMed: 22018068]
28. Clegg LX, Reichman ME, Miller BA, et al. Impact of socioeconomic status on cancer incidence and stage at diagnosis: selected findings from the surveillance, epidemiology, and end results: National Longitudinal Mortality Study. *Cancer Causes Control.* 2009; 20(4):417–435. [PubMed: 19002764]
29. Pollitt RA, Clarke CA, Shema SJ, et al. California Medicaid enrollment and melanoma stage at diagnosis: a population-based study. *Am J Prev Med.* 2008; 35(1):7–13. [PubMed: 18482824]
30. Cokkinides VE, Geller AC, Jemal A. Trends in melanoma mortality among non-Hispanic whites by educational attainment, 1993–2007. *Arch Dermatol.* 2012; 148(5):587–591. [PubMed: 22250192]
31. Geller AC, Miller DR, Lew R, et al. Cutaneous melanoma mortality among the socioeconomically disadvantaged in Massachusetts. *Am J Public Health.* 1996; 86(4):538–543. [PubMed: 8604786]
32. Reyes-Ortiz CA, Goodwin JS, Zhang DD, et al. Socioeconomic status and chemotherapy use for melanoma in older people. *Can J Aging.* 2011; 30(1):143–153. [PubMed: 21356154]
33. Reyes-Ortiz CA, Goodwin JS, Freeman JL, et al. Socioeconomic status and survival in older patients with melanoma. *J Am Geriatr Soc.* 2006; 54(11):1758–1764. [PubMed: 17087705]
34. Ross CE, Wu CL. The links between education and health. *Am Sociol Rev.* 1995; 60(5):719–745.
35. Winkleby MA, Jatulis DE, Frank E, et al. Socioeconomic status and health: how education, income, and occupation contribute to risk factors for cardiovascular disease. *Am J Public Health.* 1992; 82(6):816–820. [PubMed: 1585961]
36. US Department of Health and Human Services. [Accessed August 13, 2014] Healthy People 2020: disparities. <http://www.healthypeople.gov/2020/about/disparitiesAbout.aspx>
37. Buster KJ, You Z, Fouad M, et al. Skin cancer risk perceptions: a comparison across ethnicity, age, education, gender, and income. *J Am Acad Dermatol.* 2012; 66(5):771–779. [PubMed: 21875760]
38. Halpern MT, Ward EM, Pavluck AL, et al. Association of insurance status and ethnicity with cancer stage at diagnosis for 12 cancer sites: a retrospective analysis. *Lancet Oncol.* 2008; 9(3):222–231. [PubMed: 18282806]
39. Kirsner RS, Wilkinson JD, Ma F, et al. The association of Medicare health care delivery systems with stage at diagnosis and survival for patients with melanoma. *Arch Dermatol.* 2005; 141(6):753–757. [PubMed: 15967922]
40. Rouhani P, Arheart KL, Kirsner RS. Differences in melanoma outcomes among Hispanic Medicare enrollees. *J Am Acad Dermatol.* 2010; 62(5):768–776. [PubMed: 20219264]
41. Koroukian SM, Bakaki PM, Raghavan D. Survival disparities by Medicaid status. *Cancer.* 2012; 118(17):4271–4279. [PubMed: 22213271]

42. US Department of Commerce. [Accessed Augsut 13, 2014] US Census Bureau: 2004 interim national population projects. <http://www.census.gov/population/projections/data/national/usinterimproj.html>
43. Artiga, S. [Accessed August 13, 2014] Health coverage by bace and ethnicity: the potential impact of the Affordable Care Act. <http://kff.org/disparities-policy/issue-brief/health-coverage-by-race-and-ethnicity-the-potential-impact-of-the-affordable-care-act/>
44. Bilimoria KY, Balch CM, Wayne JD, et al. Health care system and socioeconomic factors associated with variance in use of sentinel lymph node biopsy for melanoma in the United States. *J Clin Oncol*. 2009; 27(11):1857–1863. [PubMed: 19273706]
45. Freeman HP. Poverty, culture, and social injustice: determinants of cancer disparities. *CA Cancer J Clin*. 2004; 54(2):72–77. [PubMed: 15061597]
46. Coups EJ, Manne SL, Heckman CJ. Multiple skin cancer risk behaviors in the U.S. population. *Am J Prev Med*. 2008; 34(2):87–93. [PubMed: 18201637]
47. Buller DB, Cokkinides V, Hall HI, et al. Prevalence of sunburn, sun protection, and indoor tanning behaviors among Americans: review from national surveys and case studies of 3 states. *J Am Acad Dermatol*. 2011; 65 (5 suppl 1):S114–S123. [PubMed: 22018060]
48. Hall HI, Saraiya M, Thompson T, et al. Correlates of sunburn experiences among U.S. adults: results of the 2000 National Health Interview Survey. *Public Health Rep*. 2003; 118(6):540–549. [PubMed: 14563911]
49. Santmyre BR, Feldman SR, Fleischer AB Jr. Lifestyle high-risk behaviors and demographics may predict the level of participation in sun-protection behaviors and skin cancer primary prevention in the United States: results of the 1998 National Health Interview Survey. *Cancer*. 2001; 92(5): 1315–1324. [PubMed: 11571748]
50. Pichon LC, Corral I, Landrine H, et al. Perceived skin cancer risk and sunscreen use among African American adults. *J Health Psychol*. 2010; 15(8):1181–1189. [PubMed: 20522507]
51. Pichon LC, Corral I, Landrine H, et al. Sun-protection behaviors among African Americans. *Am J Prev Med*. 2010; 38(3):288–295. [PubMed: 20171530]
52. Andreeva VA, Unger JB, Yaroch AL, et al. Acculturation and sun-safe behaviors among US Latinos: findings from the 2005 Health Information National Trends Survey. *Am J Public Health*. 2009; 99(4):734–741. [PubMed: 19150918]
53. Coups EJ, Stapleton JL, Hudson SV, et al. Linguistic acculturation and skin cancer-related behaviors among hispanics in the southern and Western United States. *JAMA Dermatol*. 2013; 149(6):679–686. [PubMed: 23752366]
54. Coups EJ, Stapleton JL, Hudson SV, et al. Sun protection and exposure behaviors among Hispanic adults in the United States: differences according to acculturation and among Hispanic subgroups. *BMC Public Health*. 2012; 12:985. [PubMed: 23153104]
55. Heckman CJ, Cohen-Filipic J. Brief report: ultraviolet radiation exposure, considering acculturation among Hispanics (project URECAH). *J Cancer Educ*. 2012; 27(2):342–346. [PubMed: 22228464]
56. Vernon SW. Risk perception and risk communication for cancer screening behaviors: a review. *J Natl Cancer Inst Monogr*. 1999; 1999(25):101–119. [PubMed: 10854465]
57. Katapodi MC, Lee KA, Facione NC, et al. Predictors of perceived breast cancer risk and the relation between perceived risk and breast cancer screening: a meta-analytic review. *Prev Med*. 2004; 38(4):388–402. [PubMed: 15020172]
58. McQueen A, Swank PR, Bastian LA, et al. Predictors of perceived susceptibility of breast cancer and changes over time: a mixed modeling approach. *Health Psychol*. 2008; 27(1):68–77. [PubMed: 18230016]
59. Kundu RV, Kamaria M, Ortiz S, et al. Effectiveness of a knowledge-based intervention for melanoma among those with ethnic skin. *J Am Acad Dermatol*. 2010; 62(5):777–784. [PubMed: 20219266]
60. Ma F, Collado-Mesa F, Hu S, et al. Skin cancer awareness and sun protection behaviors in white Hispanic and white non-Hispanic high school students in Miami, Florida. *Arch Dermatol*. 2007; 143(8):983–988. [PubMed: 17709656]

61. Pipitone M, Robinson JK, Camara C, et al. Skin cancer awareness in suburban employees: a Hispanic perspective. *J Am Acad Dermatol.* 2002; 47(1):118–123. [PubMed: 12077590]
62. Roman C, Lugo-Somolinos A, Thomas N. Skin cancer knowledge and skin self-examinations in the Hispanic population of North Carolina: the patient's perspective. *JAMA Dermatol.* 2013; 149(1):103–104. [PubMed: 23324772]
63. Temoshok L, DiClemente RJ, Sweet DM, et al. Factors related to patient delay in seeking medical attention for cutaneous malignant melanoma. *Cancer.* 1984; 54(12):3048–3053. [PubMed: 6498779]
64. Cheng CE, Irwin B, Mauriello D, et al. Health disparities among different ethnic and racial middle and high school students in sun exposure beliefs and knowledge. *J Adolesc Health.* 2010; 47(1): 106–109. [PubMed: 20547300]
65. Hay J, Coups EJ, Ford J, et al. Exposure to mass media health information, skin cancer beliefs, and sun protection behaviors in a United States probability sample. *J Am Acad Dermatol.* 2009; 61(5): 783–792. [PubMed: 19596487]
66. Miller DR, Geller AC, Wyatt SW, et al. Melanoma awareness and self-examination practices: results of a United States survey. *J Am Acad Dermatol.* 1996; 34(6):962–970. [PubMed: 8647989]
67. Friedman LC, Bruce S, Weinberg AD, et al. Early detection of skin cancer: racial/ethnic differences in behaviors and attitudes. *J Cancer Educ.* 1994; 9(2):105–110. [PubMed: 7917894]
68. Andreeva VA, Reynolds KD, Buller DB, et al. Concurrent psychosocial predictors of sun safety among middle school youth. *J Sch Health.* 2008; 78(7):374–381. [PubMed: 18611212]
69. Berwick M, Begg CB, Fine JA, et al. Screening for cutaneous melanoma by skin self-examination. *J Natl Cancer Inst.* 1996; 88(1):17–23. [PubMed: 8847720]
70. Arnold MR, DeJong W. Skin self-examination practices in a convenience sample of US university students. *Prev Med.* 2005; 40(3):268–273. [PubMed: 15533538]
71. Imahiyero-Ip J, Ip I, Jamal S, et al. Skin cancer awareness in communities of color. *J Am Acad Dermatol.* 2011; 64(1):198–200. [PubMed: 21167417]
72. Saraiya M, Hall HI, Thompson T, et al. Skin cancer screening among U.S. adults from 1992, 1998, and 2000 National Health Interview Surveys. *Prev Med.* 2004; 39(2):308–314. [PubMed: 15226039]
73. Coups EJ, Stapleton JL, Hudson SV, et al. Skin cancer screening among Hispanic adults in the United States: results from the 2010 National Health Interview Survey. *Arch Dermatol.* 2012; 148(7):861–863. [PubMed: 22801634]
74. Coups EJ, Stapleton JL, Hudson SV, et al. Skin cancer surveillance behaviors among US Hispanic adults. *J Am Acad Dermatol.* 2013; 68(4):576–584. [PubMed: 23182066]
75. Shi L, Lebrun LA, Tsai J. The influence of English proficiency on access to care. *Ethn Health.* 2009; 14(6):625–642. [PubMed: 19953393]
76. Kandula NR, Wen M, Jacobs EA, et al. Low rates of colorectal, cervical, and breast cancer screening in Asian Americans compared with non-Hispanic whites: cultural influences or access to care? *Cancer.* 2006; 107(1):184–192. [PubMed: 16721803]
77. Derosé KP, Baker DW. Limited English proficiency and Latinos' use of physician services. *Med Care Res Rev.* 2000; 57(1):76–91. [PubMed: 10705703]
78. Jacobs EA, Karavolos K, Rathouz PJ, et al. Limited English proficiency and breast and cervical cancer screening in a multiethnic population. *Am J Public Health.* 2005; 95(8):1410–1416. [PubMed: 16043670]
79. De Alba I, Hubbell FA, McMullin JM, et al. Impact of U.S. citizenship status on cancer screening among immigrant women. *J Gen Intern Med.* 2005; 20(3):290–296. [PubMed: 15836535]
80. Gomez SL, Clarke CA, Shema SJ, et al. Disparities in breast cancer survival among Asian women by ethnicity and immigrant status: a population-based study. *Am J Public Health.* 2010; 100(5): 861–869. [PubMed: 20299648]
81. Haverkamp SM, Scandlin D, Roth M. Health disparities among adults with developmental disabilities, adults with other disabilities, and adults not reporting disability in North Carolina. *Public Health Rep.* 2004; 119(4):418–426. [PubMed: 15219799]

Fig.

Modified model of theoretical framework. From Freeman HP, Chu KC. Determinants of cancer disparities: barriers to cancer screening, diagnosis, and treatment. *Surg Oncol Clin N Am.* 2005;14(4):655–669. © 2005 Reprinted with permission from Elsevier.

Table
Select US Studies Addressing Social Determinants Across the Cancer Care Continuum for Racial and Ethnic Minorities

Domain	Primary Prevention	Secondary Prevention	Diagnosis and Incidence	Treatment	Survival and Mortality
Poverty					
Race and ethnicity			Cormier ² Hu ³ Pollitt ⁴ Rouhani ⁶ Bergfelt ⁸ Black ⁹ Clairwood ¹⁰ Rouhani ¹¹ Wu ¹²	Collins ¹³	Cormier ² Collins ¹³
Education	Buster ³⁷	Singh ²⁷	Pollitt ⁴ Wich ⁷ Singh ²⁷		
Income	Buster ³⁷	Singh ²⁷	Pollitt ⁴ Singh ²⁷		Reyes-Ortiz ³³
Access to health care		Coups ⁷³ Coups ⁷⁴			
Insurance status		Halpern ³⁸	Wich ⁷ Pollitt ²⁹ Halpern ³⁸ Rouhani ⁴⁰		
Culture					
Race and ethnicity	Coups ⁴⁶ Butler ⁴⁷ Hall ⁴⁸ Santmyire ⁴⁹				
US acculturation	Andreeva ⁵² Coups ⁵³ Coups ⁵⁴ Heckman ⁵⁵ Hay ⁶⁵ Andreeva ⁶⁸				
Melanoma awareness and knowledge	Ma ⁶⁰ Piptone ⁶¹ Imahiyerobo-Ip ⁷¹	Kundu ⁵⁹ Temoshok ⁶² Arnold ⁷⁰ Imahiyerobo-Ip ⁷¹			

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Domain	Primary Prevention	Secondary Prevention	Diagnosis and Incidence	Treatment	Survival and Mortality
Perceived risk of melanoma	Pichon ⁵⁰ Pichon ⁵¹ Ma ⁶⁰ Piptone ⁶¹	Kundo ⁵⁹			