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The Role of the Environmental Context in Advance Care Planning Among Older Adults

Brittany E. Gaines

THE ROLE OF THE ENVIRONMENTAL CONTEXT IN ADVANCE CARE PLANNING AMONG OLDER ADULTS

A Dissertation Presented

by

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ABSTRACT

THE ROLE OF THE ENVIRONMENTAL CONTEXT IN ADVANCE CARE PLANNING AMONG OLDER ADULTS

December 2019

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Research has focused on various individual characteristics associated with advance care planning (ACP), but little is known about how the environment context is associated with ACP. This study examined the role of environmental characteristics in ACP by addressing three key aims: 1) examine the independent effects of environmental factors on ACP, 2) assess the moderating effects of environmental factors on the associations between ACP and individual household income and educational attainment, and 3) conduct a longitudinal examination of ACP and environmental characteristics. I combined individual ACP information from the 2004 and 2011 waves of the Wisconsin Longitudinal Study with county level characteristics from publicly available datasets (i.e., Dartmouth Atlas, US Census Bureau, and the Area Health Resource File). Multilevel models showed that several environmental factors were associated with ACP, including county level sociodemographic

(e.g., rurality, age composition, prevalence of one-person households) and healthcare-related characteristics (e.g., number of hospice agencies, Medicare reimbursement rates). Environmental factors also revealed moderating effects in the associations between ACP and individual household income and educational attainment. Moreover, results indicated longitudinal effects of environmental characteristics in obtaining ACP status over time. Findings from this study suggest that the environmental context of an individual's residence can impact their engagement in ACP, even after controlling for their individual characteristics. Evidence from this study may be used to target areas for, and guide the design of, effective intervention strategies to help increase ACP at an environmental level.

DEDICATION

This dissertation is dedicated to Eleanor Knight Young. I carry you in my heart every day.

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CHAPTER 1

INTRODUCTION

Over the past century, medical and technological advances have allowed individuals in developing countries to lead longer, healthier, and safer lives. Simultaneously, these advances have prompted the increase of deaths associated with prolonged chronic disease and illness as opposed to unexpected or sudden deaths resulting from injuries or an acute sickness. In response to the rise in the number of deaths associated with chronic disease, decisions regarding medical treatments at the end-of-life (EOL) are a reality for nearly half (43%) of all dying persons, and among this population, 70% are unable to make these medical decisions on their own due to limited physical and/or mental capabilities (Silveira, Kim, & Langa, 2010). As a result, those not previously establishing their EOL treatment preferences may not receive their desired form of care. When EOL treatment preferences are unknown, patients are more likely to receive aggressive forms of life sustaining or life prolonging care, which often leads to unnecessary high medical treatment costs (Nicholas, Langa, Iwashyna, & Weir, 2011), as well as emotional burden for the patient and their families (Kramer, Boelk, & Auer, 2006). However, advance care planning (ACP) can help alleviate these issues.

ACP includes the discussion and/or documentation of EOL care and treatment preferences with loved ones and medical providers in the event individuals are unable to make decisions on their own. ACP can be conducted informally or formally. Informal ACP

planning refers to simply discussing EOL wishes with someone, such as a spouse, child, or close friend, in an unofficial capacity. Formal planning involves legally documenting EOL wishes with advance care directives (AD). There are two main types of ADs, a living will (LW) and a durable power of attorney for health care (DPAHC). A LW is a legal document outlining medical treatment preferences, and a DPAHC is a legally designated surrogate to make decisions on behalf of the patient if he or she is physically and/or mentally unable to do so. In addition to the two main forms of ADs, there are several types of medical orders in which care preferences can be expressed, such as a Do-Not-Resuscitate Order (DNR), a Do-Not-Hospitalize Order (DNH), or the Physician's or Medical Order for Life-sustaining Treatments (POLST/MOLST), which among others includes a DNR and DNH section. In an effort to honor the desired medical treatments of those at the EOL unable to make medical decisions on their own, in 1990, Congress passed the Patient Self-Determination Act (PSDA), a law requiring all federally funded hospitals and nursing homes to provide patients with the opportunity to complete ADs. It is important to note that these types of medical orders (e.g., DNR, DNH) are only meant for individuals with a high risk of death (e.g., very old age, serious illnesses) and are therefore viewed separately from other, more general, types of ACP (e.g., informal, DPAHC, LW) which are recommended for persons without a limited life expectancy. The focus of this dissertation is on the latter.

Research indicates that a two-pronged approach to ACP (i.e., establishing formal ADs and engaging in informal discussions) is more effective in terms of individuals receiving desired treatment preferences at the EOL compared to informal or formal ACP only (Moorman & Carr, 2008). In addition to receiving desired treatment at the EOL, ACP is shown to be associated with increased autonomy (Moorman, 2011) and quality of life and

death for patients (Chan & Pang, 2010; Detering, Hancock, Reader, & Silvester, 2010; Glavan, Engelberg, Downey, & Curtis, 2008; Temel et al., 2010). Evidence has also found an association between ACP and fewer hospital admissions (Brinkman-Stoppelenburg, Rietjens, & van der Heide, 2014), as well as less days spent in the hospital during the last year of life (Abel, Pring, Rich, Malik, & Verne, 2013). In addition, ACP is shown to be associated with fewer hospitalized and more in-home deaths (Jeurkar et al., 2012; Nicholas et al., 2011), a reduction in feeding tube and respirator utilization (Teno, Grunier, Schwartz, Nanda, & Wetle, 2007), an increased likelihood of being enrolled in hospice care (Bischoff, Sudore, Miao, Boscardin, & Smith, 2013), and a reduction in costs at the EOL (Zhang, Wright, Haiden, & Huskamp, 2009). ACP has also been shown to be beneficial for family members and loved ones, with evidence indicating decreased levels of stress, anxiety, and depression (Chan & Pang, 2010; Detering et al., 2010; Silveira et al., 2010; Tilden, Tolle, Nelson, & Fields, 2001).

Studies have indicated a wide variation of ACP rates, ranging anywhere from 12.4% to 94%, depending on the population considered (Dunlay, Swetz, Mueller, & Roger, 2012; Hammes, Rooney, & Gundrum, 2010; Hirschman, Corcoran, Straton, & Kapo, 2010; Pollack, Morhaim, & Williams, 2010; Resnick, Schuur, Heineman, Stone, & Weissman, 2008; Waite et al., 2013). Although ACP has increased over the past decade, engagement remains low for certain subgroups of the population, such as racial and ethnic minorities (Carr, 2012b; Sanders, Robinson, & Block, 2016; Silveira et al., 2010). Understanding why these varying rates of ACP occur is critical in targeting populations who are the least likely to engage in ACP, as well as for designing effective intervention strategies to help increase ACP.

Research has pointed to the role of various individual factors in ACP such as race and ethnicity (e.g., Sanders et al., 2016), gender (e.g., Inoue, 2016), age (e.g., Alano et al., 2010), income level (e.g., Ko & Lee, 2014), educational attainment (e.g., Koss, 2017), marital status (e.g., Woosley, Danes, & Stum, 2017), social relationships and their quality (e.g., Boerner, Carr, & Moorman, 2013), previous experience with death (Carr, 2012a), and religious beliefs (e.g., Garrido, Idler, Leventhal, & Carr, 2012). However, little attention has been given to understanding the role of an individual's environmental context and geographic location in ACP. This study seeks to address this gap in the literature by exploring the association between contextual characteristics and individual ACP.

CHAPTER 2

LITERATURE REVIEW

To provide a comprehensive examination of the ACP literature, I discuss a variety of topics outlining key predictors of ACP, beginning with a discussion of individual factors associated with ACP, including demographic characteristics, residential setting, previous experience with death, religiosity and spirituality, role of physicians, and social relationships. Next, I provide a review of the literature investigating the association between ACP and environmental characteristics (e.g., rurality, proportion of nursing home residents receiving Medicaid) among hospital patients, long-term care residents, and the general aging population. I conclude this section with a discussion of the gaps and limitations within the ACP literature.

ACP and Individual Characteristics

Demographic characteristics. The vast majority of the ACP literature has assessed the influence of individual characteristics in ACP. Evidence from numerous studies indicated gender to be a strong correlate of ACP, with rates significantly higher for women compared to men (Alano et al., 2010; Inoue, 2016). One possible explanation for gender variance in ACP is that women may anticipate outliving their husbands as a result of their increased longevity, and therefore, they do not rely on their husbands to make future decisions on their behalf (Carr & Khodyakov, 2007b). Marital and parental status are also associated with ACP, with married individuals and parents significantly more likely to engage in ACP compared to

their non-married and child free counterparts, including those widowed or divorced (Carr & Khodyakov, 2007b). Possible explanations for these findings offered include wanting to minimize future stress and burden on loved ones at the EOL (Carr, 2012a) and encouragement from family members to plan for the EOL (Umberson, Crosnow, & Reczek, 2010). It is also possible that non-married individuals without children simply do not have anyone to designate as their DPAHC. Evidence from these studies point to the role of marital and parental status, as well as gender in ACP.

Age is also reported throughout the literature as a correlate of ACP, with older individuals significantly more likely than their younger counterparts to have prepared for the EOL, either with informal or formal ACP (Alano et al., 2010; Black, Reynolds, & Osman, 2008; Inoue, 2016; Resnick, Hickman, & Foster, 2012). In addition to older adults being closer to the EOL, it is likely this association can be explained by other factors, such as an increased likelihood of chronic illness and having undergone surgery, both of which are associated with ACP (Alano et al., 2010; Ashcraft & Owen, 2016). Overall physical and cognitive health have also been shown to be associated with ACP, and although results are mixed, those in declining or worse health are typically more likely than their healthier counterparts to engage in ACP (Ai, Hopp, & Shearer, 2006; Alano et al., 2010; Hopp, 2000). One possible explanation for this association is that people in worse health spend time thinking about their disease progression, and consequently, their EOL wishes. These findings provide evidence for the association between ACP and both age and health.

Strong evidence further points to racial and ethnic disparities in ACP (Alano et al., 2010; Carr, 2012b; Inoue, 2016; Sanders et al., 2016). It is important to note that most of the ACP research examining racial and ethnic differences has focused primarily on African

American and White comparisons, although there has been an increase in the past decade in including other racial and ethnic groups such as Hispanic. Understanding why racial and ethnic variation in ACP exists is important in developing targeted ACP intervention strategies for these populations. Although ACP rates for all racial and ethnic minority groups are significantly lower compared to Whites, findings also show that ACP rates vary by racial and ethnic group. Evidence has found that African Americans and Hispanics are approximately half and a quarter, respectively, as likely to engage in ACP as Whites (Smith et al., 2008), and reported ACP rates for Korean Americans have been shown to be as little as 5% (Ko & Lee, 2009). Findings have indicated that racial and ethnic minorities are likely to have a family dynamic that may hinder engagement in ACP (Ko & Berkman, 2012; Morrison, Zayas, Mulvihill, Baskin, & Meier, 1998; West & Hollis, 2012). Racial and ethnic minorities have also been shown to report feelings of mistrust in the healthcare system (Johnson, Kuchibhalta, & Tulsky, 2008) and be less likely to acknowledge a terminal illness status (Smith et al., 2008), both of which may be contributing to their lower rates of ACP. ACP may also contradict core cultural beliefs (e.g., minimizing burden for those who are terminally ill by not discussing EOL related topics) among racial and ethnic minority groups (Blackhall, Murphy, Frank, Michel, & Azen, 1995), as well as shielding them from their terminal prognoses (Ko & Lee, 2009). These findings highlight the impact of race and ethnicity in ACP, as well as provide insight into possible causal factors.

Evidence has also indicated an association between ACP and socioeconomic status, as defined by educational attainment, income level, and insurance coverage (Alano et al., 2010; Inoue, 2016; Ko & Lee, 2014). In terms of insurance coverage, even though EOL conversations were not covered under Medicare and some private insurance companies until

recently, findings from relatively older data indicated that while those enrolled in Medicaid or without private health insurance coverage were less likely to engage in ACP, Medicare beneficiaries and those with private health insurance had an increased likelihood of ACP (Daaleman et al., 2009; Resnick et al., 2012; Wenger et al., 1995). It is likely that as more insurance providers cover EOL conversations, the association between insurance coverage and ACP in the US will strengthen. Additionally, both higher educational attainment and income level have been found to be related to ACP (Carr, 2012c; Inoue, 2016).

Inoue (2016) offered possible explanations for the ACP-socioeconomic status associations, such as a limited exposure to ACP, a lack of awareness of ACP and its importance, and difficulty understanding the language used in AD documentation among individuals with low socioeconomic status. Moreover, evidence from a study by Carr (2012c) showed the association between wealth and ACP, specifically DPAHC status and LW, was largely explained by whether individuals had an estate plan. This finding suggests that individuals are likely exposed to ACP during estate planning, and since poorer individuals do not typically have estate plans, they are less likely to be exposed to ACP compared to their wealthier counterparts. It is evident from these findings that socioeconomic status plays an influential role in ACP among older adults.

Residential setting. Residential setting has been shown to be associated with ACP (Alano et al., 2010). Given that the PSDA mandates all federally funded hospitals and nursing homes to provide patients with the opportunity to complete ADs, AD rates among nursing home residents tend to be high, with as many as 91% of nursing home residents having some form of AD in place (Cohen-Mansfield & Lipton, 2008). Although most hospice patients reside at home, hospice patients represent the population with the highest

ACP rate, with evidence indicating rates as high as 94% (Resnick et al., 2008). Resnick and colleagues (2012) suggest these high completion rates can likely be explained by hospice's regulations (i.e., diagnosed with 6 months or less to live) and mission (i.e., providing comfort care to patients and not life sustaining, aggressive forms of care).

Excluding those in hospice care, home health clients have significantly lower AD rates compared to those residing in care settings. Studies have shown that that less than 30% of home health clients complete ADs. One possible explanation offered for this finding is that because this population is often in transition from an acute medical setting back to their homes, there may be a greater emphasis on maintaining or gaining independence than on ACP (Resnick et al., 2012).

ACP rates among community-dwellers that are not in hospice care have also been shown to be lower compared to those in care facilities. For example, a study by Carr (2012c) utilizing data from the Wisconsin Longitudinal Study found that 55% and 52% of community-dwelling older adults had a LW and DPAHC, respectively. In addition to being healthier, another possible explanation for lower ACP rates among community-dwelling older adults, as compared to individuals in other residential settings, may be living alone.

According to the Institute on Aging (2017), close to 1/3 (approximately 11.3 million) of community-dwelling older adults reported living alone in 2010, and findings have indicated that individuals living alone are less likely to engage in ACP (Black et al., 2008). There are several possible explanations for this finding. For example, it is possible that individuals who are able to live alone are simply healthier compared those in other residential settings. It is also suggested by Black and colleagues (2008) that the association between living alone and ACP may be explained by a lack of social relationships and having no one to

serve as a DPAHC or caregiver if needed. Evidence from these studies point to the role of residential characteristics in ACP among older adults.

Previous experience with death. Experiencing the death of loved one has been found to be associated with ACP (Carr, 2012a; Carr & Khodyakov, 2007a), and findings have indicated that the quality of a loved one's death is related to both informal and formal ACP. For example, a study by Carr (2012a) found that those whose partners were mentally aware (i.e., able to make decisions on their own) experienced no problems with their EOL care (e.g., no inconsistencies between EOL wishes and care), and those whose partners had only minimal pain were significantly more likely than their counterparts to have informal ACP. On the other hand, another study found that experiencing the painful death of a loved one was associated with a two-pronged approach to ACP, including both informal and formal ACP (Carr & Khodyakov, 2007a). Additionally, previously serving as a proxy for a deceased loved one has been shown to be associated with a two-pronged approach to ACP (Amjad, Towle, & Fried, 2014), and individuals with previous death experience are more likely to plan for the EOL if their loved one did (Carr, 2012a). One possible explanation for these findings offered by Carr and Khodaykov (2007a) is that individuals may learn more about EOL related issues, including ACP, when experiencing them as an outsider and not in relation to their own health. These findings highlight the association between prior death experience and ACP.

Religiosity. Although findings related to the association between religion and ACP are somewhat mixed, most findings have indicated that religiosity is negatively associated with ACP, particularly among those with fundamentalist beliefs (Carr & Khodyakov, 2007a; Garrido et al., 2012). For example, in a study by Garrido and colleagues (2012) examining

the association between religion and ACP, even after controlling for religiosity, conservative Protestants were still less likely to engage in ACP compared to their counterparts with other religious affiliations (i.e., Mainline Protestant, Catholic, Jewish, Hindu, Muslim, Unitarian, and no religious affiliation). This association was partially explained by beliefs related to God's control over life length, a weaker consideration of death as a natural part of life, and valuing all available medical treatments and freedom from shortness of breath. Authors suggested that conservative Protestants may have theologically fundamentalist beliefs (Garrido et al., 2012), which have been shown to be associated with preferring life sustaining treatments at the EOL (Sharp, Carr, & MacDonald, 2012). Rhodes and colleagues (2017) also suggested that a possible explanation for these findings is that individuals with certain religions may view ACP as being immoral and presumptuous or in opposition to God's will. This evidence points to the role of religiosity in ACP among older adults.

Role of physicians. Research has shown that individuals are more likely to engage in ACP following a discussion regarding EOL care options with their physician (Keary & Moorman, 2015). Despite this association, physicians typically do not initiate these types of conversations with their patients, although the chance is heightened when patients and physicians have an established relationship (Goldstein, Mehta, Teirelbaum, Bradley, & Morrison, 2008). Findings have indicated various reasons why physicians do not discuss ACP with patients, including a physician's personal and professional experiences with ACP and EOL issues (Snyder, Hazelett, Allen, & Radway, 2013), a lack of understanding regarding ADs, time constraints, and financial incentives (Morrison, Morrisson, & Glickman, 1994). Demographic factors of physicians have also been shown to be associated with their willingness to discuss ACP, such as age and ethnicity (Synder et al., 2013; Wallace et al.,

2007). Some physicians believe this to be out of the scope of their position and do not think it is appropriate for them to have such discussions with their patients (Morrison et al., 1994). Findings from these studies indicate the role of physicians in ACP among patients.

Social relationships. Social relationships have been found to be associated with ACP, with individuals experiencing supportive and high quality relationships more likely to engage in ACP (Ai et al., 2006; Carr, Moorman, & Boerner, 2013). In addition, types and quality of social relationships have been shown to be predictive of DPAHC delegation selection (Carr & Khodyakov, 2007b). For example, results have indicated parents are more likely to designate a DPAHC than those without children, and married individuals are more likely to designate a DPAHC compared to their divorced, widowed, or never married counterparts (Carr & Khodyakov, 2007b). The increased likelihood of DPAHC delegation by married individuals is not, however, shared by cohabitators (Moorman, Carr, & Boerner, 2014). This finding was largely attributed to cohabitators being younger and in newer relationships compared to their married counterparts.

Evidence has also shown that individuals typically designate their next-of-kin as their DPAHC (Carr & Khodyakov, 2007b), and these findings provide evidence for Cantor's hierarchical compensatory model. Cantor's hierarchical model proposes that individuals utilize a rank ordering system for receiving assistance from others and tend to select those closest to them, generally preferring their spouse, followed by their children, then other family members, and lastly, close friends (Cantor, 1979). However, there are instances when individuals select someone besides their next-of-kin as their DPAHC. For example, a study by Moorman and Boerner (2017) found that among their sample, 22% whose next-of-kin was a spouse and 32% whose next-of-kin was an adult child did not choose their closest relative

as their DPAHC. Findings from this study also showed that lower marital or familial support was associated with selecting someone other than next-of-kin as the DPAHC, and those who did not choose their closest relative had larger social networks outside of the family. It is evident from these studies that social relationships play a key role in ACP among older adults, particularly in terms of DPAHC selection.

Gaps and limitations. Findings from the literature assessing the role of individual characteristics in ACP provide important insight and strengthen the understanding of facilitators and barriers to ACP among older adults. However, the majority of these studies did not examine the role of environmental factors in ACP. Environmental factors have been shown in other fields of research to be strong predictors of outcomes such as health behaviors (e.g., smoking, alcohol consumption; Trim & Chassin, 2008) and healthcare utilization (Kirby & Kaneda, 2005). Given that ACP is often identified as a health behavior (Boerner et al., 2013) and has been shown to be associated with healthcare utilization at the EOL (Khandelwal et al., 2015), it is expected that environmental characteristics play a similar role in ACP. Although the association between ACP and the environment has not been studied at length, there is some research exploring this subject. In the next section, I provide an overview of the literature assessing the association between ACP and the environmental context.

ACP and Environmental Characteristics

Knowledge regarding the role of the environmental context in ACP is limited. Studies examining the influence of the environmental context in ACP mostly include DNR or DNH orders as ACP outcome measures, contain facility characteristics of long-term care facilities (e.g., nursing homes) and hospitals, and samples typically consist of residents and patients

within these settings. In this section, I explore the current knowledge regarding the role of environmental characteristics in ACP. This section is categorized in terms of sample population (i.e., hospital patients, long-term care residents, general population), as well as by data source.

Hospital patients. The literature examining ACP among hospital patients draws on a limited number of datasets, with the majority utilizing the California Office of Statewide Health Planning and Development (OSHPD) database. The OSHPD includes information on all California hospital admissions since 1999, including data related to patient demographics, geographic location, health and clinical indicators, hospital expenditures, and expected source of hospital payment. These data also include DNR status, as well as when the order was put in place. All California hospitals are mandated to submit these data every six months. Data are then de-identified to protect patient privacy and are available for public use on an annual basis (OSHPD, 2017).

Findings from the OSHPD database. Among the studies in this review that obtained data from the OSHPD, either early (i.e., within 24 hours of admission) or late (i.e., more than 24 hours following admission) DNR status was used as the outcome measure, and various hospital correlates were examined (i.e., academic affiliation, geographic location, size, ownership, presence of in-hospital trauma center). The distinction between early and late DNR status is made in some of the studies discussed in this section because, while the majority of hospital administrative data only includes early DNR status, in the early 2010s, an amendment was made to the OSHPD that mandated the capture of both early and late DNR status, thus allowing for the exploration of varying determinants between early and late DNR status.

Two studies examined the association of academic affiliation and the presence of an in-hospital trauma center with early DNR status among hospital patients. Hemphill and colleagues (2004) utilized a sample of patients following an intracerebral hemorrhage (n = 8,233) from 1999-2000, and Dean, Martinez, and Newgard (2015) assessed those with a traumatic brain injury between 2002 and 2010 (n = 71,275,141). Findings from these studies showed that patients in hospitals without either an academic affiliation or an in-patient trauma center were more likely to have an early DNR order in place compared to their counterparts. However, with the exception of patient age by Dean and colleagues (2015), these studies did not control for individual determinants of ACP. Additionally, these studies lack generalizability based on the inclusion of participants with specific diagnoses (i.e., intracerebral hemorrhage and traumatic brain injury).

Chang and Brass (2014) also assessed the association between academic affiliation, hospital size, and both early and late DNR status among hospital patients with sepsis (n = 77,329). Consistent with other findings, even after controlling for individual characteristics, results showed that patients in hospitals without an academic affiliation, as well as those in smaller hospitals, were more likely to have an early DNR in place compared to those in larger and academically affiliated settings. However, although late DNR orders were also examined, there were no significant associations between hospital characteristics and late DNR status. Authors note that this finding suggests that while early DNR status is influenced by a number of factors, including both patient and hospital characteristics, later implementation of a DNR order is likely related more to the patient's medical condition (Chang & Brass, 2014).

In addition to hospital academic affiliation and size, three studies also examined the associations between early DNR status and hospital ownership and geographic location. Zingmond and Wenger (2005) examined patients with the most prevalent medical and surgical diagnoses from the 2000 wave of the OSHPD (n = 819,686). The other two studies both utilized OSHPD data between 2002 and 2010 and included hospital patients 65 years of age and older admitted from an emergency department (n = 6,398,023; Richardson, Zive, Daya, & Newgard, 2012) or with an out-of-hospital cardiac arrest (n = 5,212; Richardson, Zive, & Newgard, 2013). Findings from these two studies showed that, after controlling for individual factors, patients in smaller, non-profit, and rural hospitals were more likely than their counterparts to have an early DNR order in place. However, while results from the Zingmond and Wenger (2005) study found academic affiliation to be negatively associated with early DNR status, this was not significant in Richardson and colleagues (2012)'s study. Similarly, the study by Richardson et al., (2013) found no hospital indicators, including academic affiliation, rural location, size, ownership, or annual cardiac arrest volume, to be significantly associated with early DNR status. It is possible that this lack of significant findings is related to the relatively small sample size utilized in this study. It is also likely there is something unique to the population examined (i.e., out-of-hospital cardiac arrests). For example, authors note that individuals with a DNR order in place prior to their out-of-hospital cardiac arrest likely did not survive to hospital admission and were therefore not included in this study's sample (Richardson et al., 2013).

Findings from other databases. The remaining studies examining ACP variation among hospital patients drawn from various databases included many of the same hospital indicators (e.g., geographic location, size, and academic affiliation). These studies also

employed additional hospital characteristics, such as proportion of Medicaid patients and religious affiliation. While the majority of the remaining studies examined DNR status, regardless of when the order was put in place, one study did specifically assess early DNR status, defined as 12 or less hours after hospital admission.

Similar to the hospital-based studies previously mentioned, Phadke and Heidenriech (2016) utilized California hospital patient data from the Healthcare Cost and Utilization Project database. This national data registry includes inpatient discharge reports from all community hospitals in participating US states and includes both clinical and nonclinical (e.g., demographics) data on hospital patients. This study examined the association between hospital indicators and DNR status among patients with heart failure between 2007 and 2010 (n = 347,541). After controlling for individual characteristics, patients in public or nonprofit hospitals were more likely to have a DNR order compared to those in private hospitals. In addition, patients who resided in higher income areas were more likely to have a DNR order compared to those in lower income areas. Contrary to previous findings, results from this study found that patients in hospitals with an academic affiliation or with a graduate medical education program were more likely to have a DNR in place. However, those in hospitals associated with the Council on Teaching Hospitals were less likely to have a DNR. The findings related to academic affiliation and the Council on Teaching Hospitals seem counterintuitive. It is possible these findings are the result of these two factors being correlated with one another.

Using data from a Research and Development Corporation (RAND) study examining the quality of care in hospitals, Wenger and colleagues (1995) found that among Medicare patients aged 65 or older hospitalized for congestive heart failure, acute myocardial

infarction, pneumonia, cerebrovascular accident, or hip fracture (*n* = 14,008), those in rural hospitals, as well as those in hospitals with a high prevalence of Medicaid patients, were less likely to have a DNR order in place compared to those in urban hospitals and in hospitals with fewer Medicaid patients. Authors suggest these findings may be explained by physician treatment preferences among rural hospitals and skepticism among lower income individuals regarding care limitations (Wenger et al., 1995). It is important to note that the finding related to rural hospital location does not align with other literature indicating an association between hospital rurality and DNR status (Richardson et al., 2012; Zingmond & Wenger, 2005).

Also inconsistent with the literature, the last two studies in this section found null relationships among hospital characteristics that have been shown in previous research to be associated with DNR status among hospital patients. Shepardson and colleagues (1997) examined hospital variation in DNR status among stroke patients using data from 30 hospitals in the Cleveland, Ohio metropolitan area and assessed academic and religious affiliation and hospital size (*n* = 13,337). Although bivariate analyses showed that patients in academic and religious affiliated hospitals were less likely to have a DNR order in place, these differences were no longer significant once individual patient characteristics were accounted for. Hospital size was not significantly associated with DNR status in any of the models.

Additionally, Fendler and colleagues (2017) assessed the association between early DNR status (i.e., 12 or less hours of hospital admission) and hospital characteristics among patients with an in-hospital cardiac arrest (*n* = 236) between 2006 and 2012. This study utilized data from the American Heart Association's Get with the Guidelines Resuscitation

Program, a registry of in-hospital cardiac arrests among participating US hospitals. Although the following hospital indicators were considered, academic affiliation, size, ownership, geographic location (i.e., rural/urban and US region), trauma center level, and presence of an urgent care center, only academic affiliation was significantly correlated with early DNR status. Hospitals with the lowest rates of DNR orders were more likely to be academically affiliated compared to those hospitals with higher rates of DNR orders.

Potential explanations of findings. Authors suggested potential explanations for findings from this literature related to ACP and hospital characteristics. For example, the association between ACP and rural hospital location may be explained by regional physician treatment preferences, with providers working in rural areas emphasizing DNR orders among their patients (Wenger et al., 1995; Zingmond & Wenger, 2005). This potential explanation aligns with more recent findings that point to the role of physician treatment practices in explaining geographic differences in ACP (Nicholas et al., 2011). Authors also posed that patients in smaller hospitals may have a more established relationship with their physicians (Richardson et al., 2012; Zingmond & Wenger, 2005), which is associated with an increased likelihood of physician-patient discussions on EOL issues (Goldstein et al., 2008). However, it is important to note that the prevalence of physicians who discuss EOL care and planning with their patients is small (Goldstein et al., 2008).

A potential explanation offered for the association between Medicaid population prevalence and ACP is that poorer individuals may be more skeptical about forgoing life sustaining treatments (Wenger et al., 1995). In the individual ACP literature, Inoue (2016) suggested that poorer individuals may be less informed regarding EOL care options and the benefits of ACP, and it is possible that this explanation applies to individuals residing in

lower income areas as well. The hospital ownership status and ACP finding may be explained by privately funded facilities having a different approach to care than public or nonprofit entities that influence ACP among patients (Phadke & Heideneriech, 2016). Moreover, given that a higher intensity of care means higher hospital reimbursement, Zingmond and Wenger (2005) suggested that patients in for-profit hospitals may be less likely to engage in ACP because of financial disincentives on behalf of the hospital. Regarding academic affiliation, authors suggested that academic hospitals may place a larger emphasis on aggressive forms of treatment instead of EOL care and planning (Zingmond & Wenger, 2005). Academic facilities may attract patients interested in more aggressive forms of care (Phadke & Heideneriech, 2016). Additionally, academic hospitals may employ new or resident physicians who likely have limited experience and training related to EOL guidance or may prefer to continue with the form of care already in place (Zingmond & Wenger, 2005). Lastly, some of the literature resulted in inconsistent and/or null findings for the association between hospital indicators and DNR status. It is possible that while there are no independent effects, hospital indicators may have potential moderating effects on DNR status, as well as on other types of ACP.

Overall, findings from this group of literature highlight the connection between DNR status and hospital characteristics among patients, particularly hospital size, academic affiliation, geographic location, and ownership status. In the next section, I describe the current understanding regarding the associations between environmental characteristics and ACP among long-term care residents.

Long-term care residents. In alignment with research examining the hospital context, studies on ACP in the long-term care context have examined some environmental

characteristics such as facility size, academic affiliation, and ownership status. This research added to the literature by including a wider variety of ADs compared to the hospital-based studies that solely relied on DNR status as an outcome, including DNR, DNH, LW, and DPAHC status. Yet, it also drew on a limited number of datasets, with 7 out of the 10 studies utilizing the Minimum Data Set (MDS). The MDS is comprised of clinical assessment data for nursing home residents in all Medicare and Medicaid certified nursing homes in the US (Centers for Medicare and Medicaid Services, 2017). In this section, I first describe the relevant findings from the MDS, followed by a discussion of results from other datasets.

Findings from the MDS. Castle and Mor (1998) examined the role of facility factors in ACP (i.e., DNR, DNH, and LW) across 10 US states. Nursing home factors included staffing ratios of registered nurses (RN), licensed practical nurses (LPN), and nurse aides, as well as ownership status, Medicaid occupancy rate, overall occupancy rate, size, and chain membership status. The study had a cross-sectional pre- (i.e., 1990; N = 2,042) and post- (i.e., 1993; N = 1,756) design (pre- and post-implementation of Patient Self-Determination Act; PSDA). Additional data were also obtained from the Health Care Financing Administration and the Medicare/Medicaid Automated Certification Survey.

In 1990, residents had an increased likelihood of DNR status if they lived in a facility with a high RN staffing ratio and high Medicaid population, as well as both a high and medium occupancy rate. In contrast, residents in nursing homes with a high LPN and medium nurse aid staffing ratio, a high and medium size, and for-profit ownership had a reduced likelihood of having a DNR order in place. Resident DNH status was positively associated with a both a high and medium occupancy rate. Conversely, high LPN and medium nurse aid staffing ratios and a medium size was negatively correlated with DNH

status. For-profit ownership was negatively related to LW status among residents, and no facility characteristics were associated with an increased likelihood of having a LW.

Findings from the 1993 data were, for the most part, inconsistent with those from 1990. While in 1990 a high Medicaid population was associated with an increased likelihood of DNR status, there was a negative association between a high Medicaid population and DNR status in 1993. Also inconsistent with 1990 findings, in 1993, both high and medium Medicaid population were negatively associated with DNH status, and there was a negative association between DNR status and chain membership. Although in both 1990 and 1993 high RN staffing ratios were associated with an increased likelihood of DNR status, in 1993, both high and medium RN and nurse aide staffing ratios, as well as a medium size, were positively associated with DNR status. Consistent with the 1990 data, no nursing home indicators were positively associated with LW status, and for-profit ownership was negatively related to LW status. However, in 1993, high RN staffing ratio and high occupancy rate were associated with a decreased likelihood of having a LW in place.

The authors commented on the difficulty in interpreting these findings, as most of the facility indicators showed inconsistent effects across the different types of ACP outcomes. However, they did point out that both staffing ratios and Medicaid occupancy rate were fairly consistent for DNR and DNH orders. They further suggested that facilities with a higher Medicaid population may have fewer resources and therefore be unable, or less willing, to discuss ACP with residents (Castle & Mor, 1998). A possible explanation for the finding related to staffing ratios is that facilities with more staff members per resident may have more time to discuss ACP. In addition, although data were used from 10 US states, state findings were not presented in this study.

Associations between DNH status and both Medicaid occupancy rate and staff related characteristics were also found in a study by Mitchell and colleagues (2007; *N* = 91,521). This study assessed other facility indicators including the presence of a special dementia unit, the facility's racial profile, and geographic location. Findings showed that even after controlling for individual characteristics, several facility factors were associated with DNH status among residents. Residents were more likely to have a DNH in place if they resided in a facility with a special dementia unit, an on-staff nurse practitioner or physician's assistant, a high number of staffing hours per resident each day, and in a facility that provided less subacute care and had more complex cases. Additionally, residents in facilities with a lower proportion of Medicaid or African American residents, as well as those who did not belong to a corporate chain, were more likely to have a DNH in place. Those in nursing homes situated in urban settings, or in regions with fewer intensive care unit admissions during hospitalizations, were more likely to have a DNH in place. Mitchell and colleagues (2007) suggested that facilities with the characteristics associated with DNH status mentioned above may be more likely to emphasize EOL care in alignment with the palliative or hospice care approach. In addition, they noted that findings related to the location of the facility provided evidence for the cultural influence of EOL treatment and care on individual ACP.

In addition to DNH status, urban/rural location has been shown to be associated with other measures of ACP, including DPAHC, DNR, and LW status (Buchanan, Bolin, Wang, Zhu, & Kim, 2004). Contrary to Mitchell and colleagues (2007)'s study, results from Buchanan et al. (2004) examined urban and rural differences with respect to a variety of ADs (i.e., DPAHC, DNR, DNH, LW, feeding, medical, and other treatment restrictions) at nursing home admission (*n* = 551,208) and found that rural residents were significantly more likely

than their urban counterparts to have any AD in place. Rural residents were also older, more likely to be White, and more dependent on others for daily decision making than urban residents. However, authors did not control for other factors in their analyses, so it is unclear whether demographic factors contributed to the variance in ADs. Moreover, the authors noted that because AD status in this study was assessed at nursing home admission only, it remains unknown as to whether these individuals put ADs in place following admission.

In addition to urban/rural location, Levy, Fish, and Kramer (2005) also assessed the association between both DNR and DNH status and other facility characteristics (n = 1,962,742). In alignment with Buchanan et al. (2004)'s study, findings showed that, after controlling for individual factors, residents in facilities situated in rural areas were more likely to have DNR and DNH orders compared to their urban counterparts. Also, those in freestanding facilities, as opposed to hospital-based facilities, and those in medium sized facilities, compared to those in small or large facilities, were more likely to have a DNR and DNH order in place. Additionally, even after controlling for individual and facility characteristics, state variance in DNR and DNH status among nursing home residents remained. Although the authors suggested possible explanations for geographic variance such as state legislation related to ACP, availability of healthcare resources, and regional level protocols for EOL treatment, they also noted that future research in this area is needed because none of these explanations provide substantial reasoning for these differences.

State ACP variance was found in three additional studies from this literature utilizing the MDS. Kiely and colleagues (2001) assessed state variance in ACP (i.e., LW, DNR, and DPAHC) among nursing home residents in 4 states (i.e., California (n = 130,308), Massachusetts (n = 59,691), Ohio (n = 98,954), and New York (n = 112,080)). Although chi-

square analysis showed state variation in terms of LW, DNR status, and DPAHC, the variation was only pronounced enough for regression analysis for LW status. Specifically, regression analysis showed that after controlling for individual factors, residents in the state of Ohio were significantly more like than those in the other three states to have a LW in place. The authors suggested that this high ACP prevalence in Ohio may be the result of a LW educational program initiated by the state in 1991.

Teno and colleagues (1997) also found state differences in DNR status among nursing home residents in 10 US states both prior to (i.e., 1990; N = 2,175) and following the implementation of the PSDA (i.e., 1993; N = 2,088). With the exception of Oregon, findings showed that DNR rates significantly increased for each state between 1990 and 1993. However, it is important to note that the prevalence of DNR orders in Oregon in 1990 was already 21.1% higher than the second highest ranked state (i.e., Minnesota), and in 1993, Oregon still had the second highest prevalence of DNR orders, second only to Minnesota. Although state differences were reported, given that the focus of this study was to assess changes pre- and post-PSDA, the significance of the variance between states was not reported, and individual characteristics were not accounted for. Additionally, although the authors did note that they ruled out state legislation as a contributing factor to DNR variation between states, they did not offer any other explanations for the existence of this variation.

Lastly, Levin and colleagues (1999) assessed regional AD variation among nursing home residents in 3 regions of the US (i.e., West Coast, New England, and Western; n = 413). While bivariate results showed an association between DNR status and residing in the Western region of the US, after controlling for individual factors, regression analyses showed that residing in a New England facility was associated with having a DNR order in place.

Despite the regional variation reported, the study yielded no insights as to other environmental characteristics that could account for this variance.

Findings from other databases. The remaining studies in this section drew upon three different datasets for their examination of the environmental context in ACP among long-term care residents. While some of the same contextual factors were considered, including state variance, Medicaid occupancy rate, type of care provided, ownership status, and facility size, these studies also included additional indicators such as county characteristics and facility policies.

Troyer and McAuley (2006) conducted a study examining facility and county factors associated with AD completion (any AD: LW, DNR, DNH, limitation on feeding, medication, or other treatments) among nursing home residents (n = 2,665). Whether these factors explained racial variance in AD completion between White and African American individuals was also explored. This study utilized data from the Medical Expenditure Panel Survey Nursing Home Component and merged these data with county characteristics from the Area Resource File. Findings showed that county per capita income, poverty rate, and proportion of the population age 65 and older were negatively associated with having an AD in place. County education, defined as proportion of adults 25 years of age and older with a high school diploma, was positively associated with having an AD. In terms of facility characteristics, while those in facilities with a high prevalence of Medicaid residents were less likely to have an AD in place, those in facilities with a high occupancy rate were more likely to have an AD in place. Regarding the role of facility and county factors in explaining racial disparities in ACP, findings showed that close to half of the racial variance found could be explained by county characteristics. For example, African American residents were more

likely to live in metropolitan counties and in counties with a higher poverty rate, and results indicated that residents in counties with these characteristics were less likely to have ADs compared to their counterparts. Facility characteristics also contributed to the racial variance, the most prominent being the prevalence of Medicaid occupants. African American residents were more likely to reside in facilities with a higher proportion of Medicaid residents, and residents in these facilities were less likely to have ADs. Although the finding related to county poverty and AD status is consistent with findings on the association between individual poverty and ACP (Inoue, 2016), the reason behind the contradictory finding related to per capita income is unclear. It is also surprising that the proportion of adults in the county age 65 or older was found to be negatively associated with AD, given that the likelihood of ACP tends to increase with age (Resnick et al., 2012). No explanations for these findings were offered; however, study limitations noted the lack of accounting for the use of multilevel data and a small sample size (Troyer & McAuley, 2006). It is possible these limitations contributed to these unusual findings.

In addition to Medicaid occupancy rate, Daaleman and colleagues (2009) also examined the associations between ADs (i.e., LW and DPAHC) and state location, ownership status, type of medical care provided, prevalence of Medicaid occupants, and facility size. This study utilized facility reports from 164 nursing home and assisted living facilities in Florida, Maryland, New Jersey, and North Carolina (n = 1,015). Findings showed that residents in facilities with more than 50% of residents receiving Medicaid benefits were less likely to have a DPAHC compared to those in facilities with less than 50% of residents receiving Medicaid benefits. Also, residents in North Carolina and Maryland were less likely than the control state of New Jersey to have a LW in place. No other significant state

differences or facility correlates with ACP were found in this study. The authors concurred with previously posited explanations offered by Levy and colleagues (2005) for state variation in ACP, including access disparities in healthcare resources, state legislation regarding EOL care preferences, and regional variation in treatment protocols.

In an effort to understand the role of facility policy in ACP among residents, Culberson, Levy, and Lawhorne (2005) examined DNH facility policies among nursing homes belonging to the American Medical Directors Association Foundation Long-term Care Research Network (n = 293). Although many of the facility characteristics assessed in this study followed similar patterns found within the existing literature, this study had no significant results. For example, DNH policies were less prevalent among chain facilities and more prevalent among rural nursing homes. Authors attributed this lack of significance to the small sample size utilized in this study.

General aging population. To my knowledge, this is the only study that examined the association between the environment and ACP that did not employ a sample strictly from a hospital or long-term care setting. Nicholas and colleagues (2011) examined regional differences in the association between ADs and EOL Medicare expenditures. Participants were deceased Health and Retirement Study respondents, and interviews were conducted with their next-of-kin to obtain AD information (n = 3,302). Interview participants were asked whether their deceased relative had a LW or DPAHC and whether the LW specified treatment limitations. Regions were operationalized by hospital referral regions (i.e., regional healthcare markets), as developed by the Dartmouth Atlas, and were categorized by quartiles of EOL Medicare expenditures. Findings showed that, even after controlling for individual characteristics, individuals who resided in low spending regions (compared to high spending

regions) were more likely to have a treatment limiting AD in place. In terms of EOL spending, among individuals in high spending areas, those with treatment limiting ADs had less EOL Medicare expenditures compared to those without treatment limiting ADs residing in the same region. Authors suggested that these findings provide evidence for the role of geographic context in EOL treatment and that the presence of ADs may have the largest impact in areas where the default approach to EOL treatment and AD specifications vary the most. No other environmental characteristics were assessed in this study.

Gaps and limitations. Of the literature currently available examining the role of the environmental context in ACP, limited methodologies, sampling techniques, and databases were utilized. With the exception of the study by Nicholas and colleagues (2011), all of the studies consisted of samples from hospital or long-term care settings and are thus not representative of the general population. Further, the bulk of studies relied on either the Minimum Data Set (MDS) or the California Office of Statewide Health Planning and Development (OSHPD) database which has implications for generalizability.

There were also a limited number of ACP outcome variables. The majority of studies included only a specific type of AD, DNR order status. While this is reflective of the type of participants, as DNR status is particularly relevant for long-term care residents and hospital patients because these individuals are likely in poor health with life threatening conditions and the likelihood of their heart or breathing stopping is high, these types of medical orders (i.e., DNR, DNH) are inadequate in terms of ACP for those without such severe health concerns. A more general approach to measuring ACP is needed which not only encompasses broader types of ADs, such as DPAHC and LWs, but also informal ACP discussions. Ideally, given the documented success of a two-pronged approach to ACP

(Moorman & Carr, 2008), future research should include both informal and formal types of planning when examining determinants of ACP.

Another gap in this literature is the limited use of environmental factors at the area level (i.e., county). Environmental characteristics explored were typically examining facility factors (e.g., occupancy rate, chain membership affiliation). The inclusion of area characteristics, such as provider density, could enhance our understanding of an area's environmental context and how this context influences ACP among residents. Additionally, none of the studies in this literature assessed geographic variation at small units of location, such as the census tract level, which likely provide a more detailed understanding of the area's environmental context.

These studies also provided limited interpretations of results; explanations behind many of the findings were not explored or discussed. Future research is needed to examine potential causal effects of ACP determinants. An additional limitation of this literature is that the majority studies were cross-sectional; therefore, the causal direction and underlying mechanisms of findings are unknown.

CHAPTER 3

CONCEPTUAL FRAMEWORK

The majority of the ACP literature, as well as the bulk of research related to area variation in health, has not been informed by theory. In terms of ACP, conceptual thought has typically only been introduced when it made sense for a specific group of predictors of ACP. For example, ACP literature examining the role of social relationships has often drawn on conceptual frameworks such as social support and social control, as well as Cantor's hierarchical compensatory model (Boerner et al., 2013; Moorman & Boerner, 2017). Although there is no overarching theory explaining ACP or the association between ACP and the environment, ACP has been conceptualized as a preventative health behavior (Boerner et al., 2013) because of its association with a more optimal death and dying experience for individuals and their loved ones (Detering et al., 2010). In the examination of health behavior, fields of research, such as the neighborhood health effects literature, emphasize the role of the social and cultural context in explaining individual behavior. While used occasionally in the neighborhood health effects field, the health promotion and public health literature commonly utilize an ecological approach in explaining health behavior, which accentuate the role of contextual factors in influencing individual behavior while simultaneously considering the impact of individual characteristics (e.g., demographics, psychosocial factors; Glass & Balfour, 2003; Sallis, Owen, & Fisher, 2015).

Given that the purpose of this study is to assess the role of environmental characteristics associated with individuals' residential location in ACP, this study's theoretical framework was guided by the conceptualization of the neighborhood and its effects on health behavior, as well as the ecological approach to understanding health behavior. In research following an ecological approach, environmental characteristics are typically comprised of factors measured at the area level, such as rurality and population size, as well as of individual characteristics aggregated at the area level (Chuang, Cubbin, Ahn, & Winkleby, 2005; Ennett, Flewelling, Lindrooth, & Norton, 1997; Trim & Chassin, 2008). Aggregated individual factors, such as area socioeconomic status or an area's racial profile, characterize the environment residents live in and are therefore important to consider in addition to representing personal factors. In this section, I first provide a broad description of the neighborhood health effects literature. Then, I describe the application of the ecological approach in understanding individual health behavior typically utilized in the health promotion and public health literature. Lastly, I present the conceptual framework used for this study based on insights from both the ACP and neighborhood health effects literature, as well as the ecological approach to health behavior.

Overview of the Neighborhood Health Effects Literature

Findings from the literature. A growing body of research indicates associations between various neighborhood characteristics and health related outcomes, including health behaviors. The most commonly examined neighborhood characteristic, socioeconomic status, has been shown to be associated with poor mental and physical health outcomes including elevated all-cause mortality (Karpati, Bassett, & McCord, 2006) and risk for cardiovascular disease (Diez-Roux, Link, & Northridge, 2000), decreased physical (Balfour & Kaplan,

2002) and cognitive function (Wight et al., 2006), depression (Beard et al., 2009), poor self-reported health (Franzini, Caughy, Spears, & Esquer, 2005) and smoking behaviors (Duncan, Jones, & Moon, 1999).

Evidence also points to the role of neighborhood racial and ethnic composition in individual health outcomes, although findings are mixed. While much of the evidence indicates that those residing in areas with a higher proportion of racial and ethnic minorities are at a heightened risk of poor health outcomes (Pruitt, Craddock, Tiro, Xuan, Ruiz, & Inrig, 2015; Sudano, Perzynski, Wong, Colabianchi, & Litaker, 2013; Zhou, Bemanian, & Beyer, 2017), other research has indicated an "ethnic enclave effect" which has been shown to be associated with positive health outcomes. A study by Fang and colleagues (1998) found that residing in a neighborhood with a large concentration of African Americans was associated with lower mortality among older African Americans. Similarly, evidence has shown that Hispanic individuals, particularly Mexican Americans, residing in Hispanic majority neighborhoods may derive health benefits from their environments resulting from factors such as increased levels of social cohesion, social support, and labor force participation, as well as intact family structures and community institutions (Eschbach, Ostir, Patel, Markides, & Goodwin, 2004; Patel, Eschbach, Rudkin, Peek, & Markdies, 2003).

Moreover, structural components of the neighborhood, such as air quality, traffic, noise, crime, and street lighting have been found to be associated with poor health outcomes among residents (Balfour & Kaplan, 2002). A study by Hill and colleagues (2005) showed that perceived neighborhood disorder, defined by factors such as abandoned houses, gangs, assaults, muggings, and unsafe streets during the day, was associated with poorer self-reported health, even after controlling for individual characteristics. Similarly, studies have

also indicated an association between neighborhood disorder and poor mental health outcomes (Kim, 2010) and negative health behaviors (Mendes de Leon et al., 2009).

Assessing causality in neighborhood health effects. Evidence of neighborhood health effects prompted two distinct types of explanatory approaches for conceptualizing why neighborhood health effects exist, compositional and contextual. The compositional approach posits that associations between neighborhood characteristics and health related outcomes exist because similar people tend to live in close proximity to one another, either purposefully because of shared cultural beliefs and customs, or because of comparable personal resources, such as income. The contextual explanation suggests that neighborhood effects are distinct contributing factors to health, regardless of the aggregated individual characteristics of the area. This debate led to an increase of studies utilizing multilevel modeling techniques, which permit the inclusion of both compositional and contextual effects. However, while much of the neighborhood health effects research using multilevel modeling techniques indicate that neighborhood significantly impacts individual health outcomes independent of individual characteristics, the area level variance is often small (Diez-Roux, 2001), and additional research employing these analytics techniques is needed to better understand how the neighborhood impacts individual health effects. To address this need in the research, this study utilized a multilevel modeling approach to examining the relationship between environmental characteristics and ACP.

Application of theoretical perspectives. While much of the neighborhood health effects research is atheoretical, there are two broad theoretical perspectives to understanding and assessing associations between neighborhood characteristics and health, structural and ecological components. The structural approach, also referred to as "person in environment"

models, posits that neighborhood characteristics impact all residents uniformly, regardless of their individual attributes. Conversely, the ecological perspective, also referred to as "person-environment fit" models, theorizes that neighborhood effects are a function of the interplay between residents' individual attributes and neighborhood characteristics. According to the ecological perspective in understanding neighborhood health effects, neighborhood effects can either be characterized as environmental press (e.g., poverty) or buffering effects (e.g., social services; Glass & Balfour, 2003). Moreover, individual characteristics are considered competencies (e.g., level of educational attainment). When environmental press outweighs the neighborhood buffering effects and/or individual competencies, it is likely that negative health effects will occur. Conversely, optimal health outcomes are likely to occur when individual competencies and/or neighborhood buffering effects offset environmental press factors.

Many researchers utilizing the ecological perspective within neighborhood health effects research posit that while the neighborhood context is important for understanding individual health outcomes for residents of all ages, it is especially pertinent for older adults because they may be more vulnerable and dependent on the physical and social characteristics of their environment (Cagney, Browning, & Wen, 2005; Glass & Balfour, 2003; Robert & Li, 2001). Older adults residing in disadvantaged neighborhoods (i.e., neighborhood lacking necessary resources and support services) are at a heightened risk of environmental press factors outweighing their individual competencies and neighborhood buffering effects, and consequently, poor health outcomes. Suggested drivers of this increased vulnerability and dependency on the environment among older adults include a longer exposure to neighborhood characteristics as a result of living in the area for an

extended period of time, concentrated daily activities resulting from declines in cognitive and physical function, and a greater reliance on neighborhood resources for services and support (Glass & Balfour, 2003).

The neighborhood health effects literature offers insight in how the environmental context impacts individual health related outcomes, including health behaviors. Additionally, this field emphasizes the importance of the environmental context for older adults, who may be particularly sensitive to the physical and social conditions of their environment. Moreover, this body of work is sometimes guided by an ecological perspective, according to which individual competency interacts with environmental press and buffering characteristics. However, the application of the ecological perspective in the neighborhood health effects literature is limited, and this approach has been utilized more extensively in other fields of research such as health promotion and public health. Therefore, in the next section, I present a comprehensive description of the ecological perspective and describe its application in the health promotion and public health literatures.

An Ecological Approach to Health Behavior

The ecological approach has evolved over the past several decades and includes contributions from numerous scientists. Although there was an initial emphasis on perceptions of the environment (e.g., Lewin's "ecological psychology"; Lewin, 1951), the focus of the ecological approach now encompasses both direct environmental effects as well as environmental perceptions. For example, in 1979, Urie Bronfenbrenner first developed the ecological systems theory that included the discussion of different levels or types of influence in human development, including the role of an individual's environment (Bronfenbrenner, 1979). This perspective eventually evolved into the Bioecological Model, a

theoretical framework comprised of five levels of influence on individual development (i.e., microsystem, mesosystem, macrosystem, exosystem, and chronosystem; Bronfenbrenner, 2005).

The first level of influence, the microsystem, refers to an individual's biological and demographic characteristics, as well as their immediate relationships, interactions, and environmental settings (e.g., relationship with family members, work environment). The mesosystem represents the relationship and interactions between an individual's microsystems, such as family and church. The exosystem represents the larger societal context in which the individual does not play an active role but is still influenced indirectly. Examples of the exosystem include the media and community services and resources. The macrosystem encompasses cultural beliefs and values that influence both the microsystem and mesosystem. Lastly, the chronosystem refers to time and includes both consistency and change over time. Components of the chronosystem can be either external (e.g., timing of the death of a loved one) or internal (e.g., age-related biological changes) to an individual (Bronfenbrenner, 2005).

The Bioecological Model emphasizes the interaction between all systems and how change in one system of influence can result in overall change. Although Bronfenbrenner's work was initially developed for explaining influences of human development, it has been utilized in examining influences of health behavior (Gubbels, Van Kann, de Vries, Thijs, & Kremers, 2014). Other researchers have also built upon Bronfenbrenner's conceptual thought in the development of theories involving the role of the environment in examining health behaviors.

McLeroy, Bibeau, Steckler, and Glanz (1988) developed an ecological model of health promotion, drawing largely on Bronfenbrenner's initial framework. This modified model is comprised of five types of factors thought to influence individual health behavior including intrapersonal, interpersonal, organizational, community, and public policy factors. Intrapersonal factors are individual characteristics (e.g., demographics, beliefs, and skills). Interpersonal factors encompass an individual's social network and connections, both formally and informally, including family, friends, and work-related relationships. Institutional factors are organizational infrastructures, and community factors are the relationships an individual has with these institutions and organizations. Public policy factors include the laws and policies within an individual's local, state, and national setting.

A guiding principle of McLeroy and colleagues' ecological model of health promotion, and the ecological approach in general, is that individuals do not exist within a vacuum and are influenced by their larger social and cultural environments on a constant and ongoing basis. The goal of an ecological approach is to emphasize the role of these external elements and how these various factors work in combination with one another to influence individual health behavior (McLeroy et al., 1988). According to the ecological model of health promotion, there is an ongoing interplay between each of the five areas of influence, and this interaction is thought to result in a cumulative effect impacting an individual's engagement in health behaviors.

Ecological models of health behavior have been predominately utilized to guide intervention strategies for health behavior change such as tobacco use (DeVries et al., 2003), sexual activity (Salazar et al., 2010), and both physical activity and nutrition (Elder et al., 2007). Although the environmental context is meant to be the focus of ecological models, a

review of the utilization of ecological models in health promotion strategies by Golden and Earp (2012) concluded that the majority of public health interventions guided by the ecological perspective target inter- and intrapersonal characteristics for behavior change only and do not consider environmental factors.

However, though they are limited, intervention strategies employing an ecological approach to address issues at the contextual level have been successful in influencing health promotion. For example, Clark and colleagues (2010) assessed the outcomes of the Allies Against Asthma program, an initiative targeting public policy reform related to asthma management in low income areas in the US. This program utilized an ecological approach to addressing asthma reform and focused on one of the contextual levels of influence, public policy. The evaluation of the Allies Against Asthma program not only indicated a significant shift in policy reform, with 89 policy related changes as a result of the program, but also showed how these policy changes influenced individual behavior and outcomes. For example, compared to controls, children impacted by the Allies Against Asthma program had less asthma symptoms, and parents felt less helpless, frightened, and angry regarding their child's asthma (Clark et al., 2010). Findings from this evaluation highlight how larger contextual factors have the capacity to influence individual level outcomes. This study provides evidence for the importance of considering environmental level characteristics in examining individual health behaviors, including ACP.

Conceptual Framework of Study

This study is guided by the conceptualization of ACP as a health behavior, the ecological approach to examining both neighborhood health effects and health behaviors, and empirical findings from the ACP and neighborhood health effects literature. I drew from

components of both Bronfenbrenner's Bioecological Model (2005) and McLeroy and colleagues' (1988) ecological model of health promotion, as well as the application of the ecological perspective within the neighborhood health effects literature, to emphasize the role of the environment in ACP while concurrently accounting for individual characteristics. Intra- and interpersonal characteristics from the ecological model of health promotion were used to categorize individual factors which were comprised of known determinants of ACP from the literature, as well as findings from the neighborhood health effects literature. Additionally, in alignment with the ecological model of health promotion, the conceptual framework categorized environmental characteristics as either organizational or institutional. Moreover, environmental characteristics were further categorized as either environmental press or buffering factors in accordance with the application of the ecological perspective in the neighborhood health effects literature. Lastly, in order to understand causality of the association between ACP and the environment, I drew from the Bioecological Model's chronosystem (i.e., influence of time) and assessed longitudinal effects.

In this section, I describe each component of the conceptual framework and discuss the various types of relationships examined. Figure 1 illustrates the association between ACP and individual and environmental characteristics. Given that each of the individual characteristics included have been identified as correlates of ACP, I drew on the application of the ecological perspective in the neighborhood health effects literature and broadly conceptualized individual characteristics as individual competencies. Additionally, I drew on the ecological model of health promotion (McLeroy et al., 1988) and categorized individual competencies as either intra- or interpersonal characteristics. Intrapersonal characteristics refer to demographic factors (i.e., gender, race/ethnicity, age, educational attainment,

household income, health insurance coverage, religiosity/spirituality, and previous experiences with death). Interpersonal characteristics refer to an individual's social relationships and relationship quality (i.e., marital and parental status, established relationship with physician, and social support).

Similarly, environmental characteristics included in this study's theoretical framework were conceptualized as either press or buffering factors as described in the application of the ecological perspective in the neighborhood health effects literature. Based on findings from the ACP and neighborhood health effects literature, the following factors were conceptualized as environmental press factors, which corresponded with predicted negative associations with ACP: Medicare reimbursement rates (i.e., hospital and nursing facility, physician, and home health agency), disability, living alone, and racial and ethnic composition. The remaining environmental characteristics were conceptualized as buffering environmental factors, indicative of predicted positive associations with ACP outcomes: Medicare hospice reimbursement rate, number healthcare providers (i.e., general practitioners and medical specialists) and facilities (i.e., hospitals, hospice agencies, and nursing facilities), number of Medicare enrollees, educational attainment, household income, age composition, health insurance coverage, and rurality.

Moreover, environmental characteristics were also categorized as either organizational or community characteristics based on the ecological model of health promotion (McLeroy et al., 1988). The organizational and community characteristics selected consisted of environmental correlates drawn from the ACP literature (e.g., Medicare expenditures). In addition, based on the conceptualization of ACP as a health behavior and the utilization of aggregated individual characteristics in examining other health behaviors,

the organizational and community characteristics included also consisted of individual determinants of ACP aggregated to the environmental level (e.g., age composition). Because the data utilized in this study did not include policy related information, the public policy component of the ecological model of health promotion was not included.

The outcome measure included five indicators of ACP, 1. Any EOL Planning, 2. Informal ACP, 3. Formal ACP, 4. DPAHC Status, and 5. Two-Pronged Approach to ACP. Five indicators of ACP were used to gain a better understanding of factors influencing all types of ACP to assist in the development of intervention strategies encouraging individuals to proactively establish EOL wishes and not just during a time of crisis or when individuals are severely ill and near death.

The black arrows in Figure 1 represent the examination of the independent effects of individual and environmental characteristics simultaneously. Although the literature examining associations between environmental factors and ACP is limited, there is evidence for factors such as rurality, racial and ethnic composition, and Medicare reimbursement. As noted in the figure next to the black arrows, these associations were assessed as part of Aim 1 of this study. The gray arrow in Figure 1 is representative of the assessment of the moderating effects of environmental characteristics on ACP-individual characteristic associations, which, as labeled, were examined in Aim 2 of this study. Although no studies were found assessing moderating effects of environmental factors on the relationship between individual level factors and ACP, it is possible moderating effects exist, such as area level provider prevalence moderating the association between socioeconomic status and ACP. Additionally, while not denoted in Figure 1, this study also examined associations

between ACP and environmental characteristics over time, as described in Bronfenbrenner's Bioecological Model's (2005) conceptualization of the chronosystem.

In summary, the conceptual framework described was used to guide this study in its examination of the role of the environmental context in ACP. This framework considered independent and moderating effects of environmental factors in ACP, as well as a longitudinal assessment of these associations.

CHAPTER 4

KEY AIMS

The overall objective of this study was to assess the effects of environmental characteristics on informal and formal approaches to ACP. To explore this relationship, this study examined three key aims.

Aim 1

The first aim of this study was to assess the independent effects of environmental and individual characteristics on ACP to determine which factors may be most influential in terms of ACP. Based on previous literature examining the role of environmental factors in ACP and evidence from the neighborhood health effects literature, I hypothesized that percent residing in a rural area, percent 65 years of age and older, number of Medicare enrollees, and median household income would be associated with ACP. The predicted direction of the associations between ACP and these factors aligned with the literature, such that residents in counties with more rural residents, more residents 65 years of age and older, more Medicare enrollees, and in areas with a higher median household income would have a higher likelihood of ACP compared to their counterparts. However, it is important to note that one study found ACP to be lower in counties with a higher prevalence of older adults (Troyer & McAuley, 2006), an unexpected finding given the positive association between individual age and ACP (Alano et al., 2010; Black et al., 2008; Inoue, 2016; Resnick et al., 2012) which has been explained by increases in health concerns (Alano et al., 2010; Ashcraft

& Owen, 2016) that prompt the consideration of EOL related issues. Additionally, previous findings on the positive association between rurality and ACP are counterintuitive to evidence on the association between ACP and area level educational attainment (Troyer & McAuley, 2006) and healthcare provider prevalence (Mitchell et al., 2007). Since both of these factors are likely to be poorer in rural communities, the prediction of a positive association between rurality and ACP was only tentative.

Furthermore, I predicted that number of healthcare professionals (i.e., general practitioners and medical specialists) would be associated with ACP. Number of general practitioners and medical specialists were selected as variables of interest because evidence suggests that receiving information regarding EOL care by healthcare professionals is associated with an increased likelihood of ACP (Alano et al., 2010). In addition, a shortage of healthcare professionals can be used as a proxy measure for poor healthcare access (Pericak, 2011). Residents in areas with more healthcare professionals likely have better healthcare access, and this could increase the chance of healthcare professionals discussing ACP options with them. However, findings have also pointed to the role of provider treatment preferences in reducing the likelihood of ACP. For example, evidence indicates a strong association between EOL Medicare expenditures and ACP, with ACP typically resulting in significantly less spending at the EOL (Nicholas et al., 2011), and although there is significant regional variance in Medicare expenditures and ACP, research indicates no such variation in terms of patient preferences in EOL care (Barnato et al., 2007). Therefore, researchers have argued that provider treatment preferences or regional treatment norms may be a major driver of this variance (Barnato et al., 2007; Nicholas et al., 2011). Based on this,

the direction of the association between number of general practitioners and medical specialists was explored.

Moreover, I predicted an association between ACP and number of healthcare facilities (i.e., nursing facilities, home health agencies, hospitals, and hospice agencies). Number of nursing facilities was considered as a possible correlate of ACP because evidence suggests that older adults in residential care facilities, such as nursing homes and assisted living facilities, are more likely to engage in ACP compared to those in hospitals or within the community without hospice care services (Alano et al., 2010; Cohen-Mansfield & Lipton, 2008; Resnick et al., 2008; Teno et al., 2007). Similarly, number of hospice agencies was included as an environmental characteristic in this study given the high ACP rates among hospice patients as compared to community-dwellers (Kossman, 2014). Given that residing in an area with a large prevalence of hospice agencies and nursing facilities increases the likelihood of knowing someone receiving care from these facilities and may result in a heightened awareness related to EOL care options and ACP, I predicted that individuals residing in areas with more nursing facilities and more hospice agencies would have an increased likelihood of ACP. On the other hand, evidence indicates lower ACP rates among home health clients as compared to patients in nursing facilities and hospice care settings (Resnick et al., 2012). A possible explanation offered for this finding is that because home health clients are often transitioning from acute medical facilities back to their homes, there may be a greater emphasis on maintaining or gaining independence than on ACP (2012). Based on this evidence, the direction of the associations between number of home health agencies and ACP outcomes was explored.

Additionally, given evidence related to Medicare expenditures and ACP (Nicholas et al., 2011), I predicted a negative association between ACP and the Medicare nursing facilities and hospitals, physician, and home health reimbursement rates. However, based on findings on the prevalence of ACP among hospice patients and since Medicare hospice spending may be an indicator of exposure to hospice care and its mission among residents, I hypothesized that Medicare hospice reimbursement would be positively associated with ACP.

Lastly, I expected that individual factors known to be associated with ACP (i.e., percent Hispanic, percent non-Hispanic White, percent non-Hispanic Black, percent non-Hispanic Other race, percent with a disability, percent living alone, percent with high educational attainment, and percent with health insurance coverage) would also be associated with ACP when aggregated at the environmental level. This expectation was based on the conceptualization of ACP as a health behavior and findings pertaining to these types of characteristics aggregated at an area level throughout the health behavior and neighborhood effects literature. I predicted that residents in areas with a high percent Hispanic, percent non-Hispanic Black, percent non-Hispanic Other race, percent with a disability, and percent living alone would have a reduced likelihood of ACP. Additionally, I predicted a positive association between ACP and percent non-Hispanic White, percent with high educational attainment, and percent with health insurance coverage. Known individual predictors of ACP aggregated to the county level likely influence the overall sociocultural context of an area, and all residents could be subject to the effects of these characteristics on various health behaviors and outcomes, including ACP.

Aim 2

The second aim of this study was to assess the potential moderating effects of environmental characteristics in the associations between ACP outcomes and individual household income and educational attainment. Household income and educational attainment were selected as the individual variables of interest because these factors play a significant role in where individuals reside, as indicated in the neighborhood health effects literature. The bulk of current ACP literature does not consider potential moderating effects of environmental characteristics in predicting ACP, and given the limited empirical evidence and lack of conceptual guidance, specific predictions of potential effects were only very tentative. However, I based all my hypotheses on the assumption that the association between ACP and individual household income and educational attainment would be more pronounced among individuals residing in disadvantaged areas because these residents would be less likely to rely on environmental supports. In this context, an area was considered disadvantaged based on my environmental hypotheses described in Aim 1. For example, given that I hypothesized a negative association between Medicare physician reimbursement and ACP, an area with a high, versus low, Medicare physician reimbursement rate was considered disadvantaged.

I predicted that environmental factors associated with socioeconomic status (i.e., percent with health insurance coverage, median household income, and percent with higher educational attainment), would moderate the associations between ACP and individual household income and educational attainment such that the associations would be more pronounced among residents in counties with lower socioeconomic status. Similarly, I predicted that percent 65 years of age and older and number of Medicare enrollees would

moderate the associations between ACP and individual household income and educational attainment such that individual household income and educational attainment would be more predictive of ACP among individuals living in areas with smaller 65 years of age and older and Medicare enrollee populations. Moreover, I hypothesized that percent of residents residing in a rural areas would moderate the associations between ACP and individual household income and educational attainment such that the associations would be more pronounced among individuals living in less rural areas. I also hypothesized that the number of healthcare professionals and facilities would moderate the associations between ACP and individual household income and educational such that individual household income and educational would be more predictive of ACP among residents in areas with fewer healthcare professionals and facilities. Additionally, I predicted that Medicare hospice reimbursement rates would moderate the associations between ACP and individual household income and educational attainment such that the associations would be more pronounced among individuals living in areas with lower Medicare hospice reimbursement rates.

Conversely, I predicted that the racial and ethnic composition of the area, as well as percent living alone and with a disability, would moderate the associations between ACP and individual household income and educational attainment such that the individual household income and educational attainment would be more predictive of ACP among residents in areas with smaller non-Hispanic White populations and larger populations represented by the following: percent non-Hispanic Black, percent non-Hispanic Other race, percent with a disability, and percent living alone. Lastly, I hypothesized that Medicare reimbursement rates associated with nursing facilities and hospitals, physician, and home health would moderate the associations between ACP and individual household income and educational attainment

such that individual income and educational attainment would be more predictive of ACP among residents in areas with high Medicare reimbursement rates.

Aim 3

The third aim of this study was to explore factors associated with ACP over time. Within the current literature, there are limited longitudinal assessments of ACP. I am aware of only two studies (Castle & Mor, 1998; Teno et al., 1997) that assessed the change in ACP over time, specifically pre- and post-PSDA. Although both studies found that ACP increased following implementation of the PSDA, neither of these studies examined what, if any, factors were associated with this change. Given this gap in the literature, I assessed the relationship between both environmental and individual factors and change in ACP between Wave 1 (i.e., 2004) and Wave 2 (i.e., 2011). Because of the limited empirical evidence and lack of conceptual guidance, hypotheses related to the role of environmental factors in change in ACP status were only tentative. However, I predicted the same associations between environmental and individual characteristics in change in ACP status (i.e., acquisition of ACP status between waves) as those hypothesized for the independent effects outlined in Aim 1.

CHAPTER 5

METHODS

Data Sources

Both individual and environmental data were used in this study to examine the role of the environmental context in ACP among older adults. Individual data were obtained from the Wisconsin Longitudinal Study (WLS), the longest running longitudinal cohort study in the US. The WLS utilizes telephone surveys and in-person interviews (depending on the wave), as well as mail-in surveys and is comprised of a randomly selected group of 1957 Wisconsin high school graduates. Data on the graduate cohort were obtained in 1957, 1964, 1975, 1977, 1992, 2004, and 2011, and follow-up waves included data from spouses (2004), selected siblings (1977, 1993, 2004, 2011), and spouses of selected siblings (2005).

Environmental data were obtained from four publicly available data sources, the Area Health Resource File, the Dartmouth Atlas, and both the decennial census and American Community Survey from the US Census Bureau. Data from the US Census Bureau were downloaded from the National Historical Geographic Information System website.

The Area Health Resource File is comprised of data related to health care professions and training, facilities, hospital utilization and expenditures, population demographics, and economics. Data are obtained from over 50 sources and are available at the US county, state, and national level (see https://datawarehouse.hrsa.gov/Data/AboutData/DataSources.aspx for a full description of these sources).

The Dartmouth Atlas utilizes Medicare data to provide information on health related measures such as health care access, quality, expenditures, and utilization. In addition to providing data at area levels such as the county and state, the Dartmouth Atlas has also formulated regions that categorize geographic areas. For example, hospital referral regions (HRRs) are regional tertiary healthcare markets created by the Dartmouth Atlas based on where patients were referred to for both cardiovascular and neurological surgeries. The Dartmouth Atlas has also created Hospital Service Areas, Pediatric Surgical Areas, and Primary Care Services Areas (see http://www.dartmouthatlas.org/data/region/ for a full description of these regional categories).

The decennial census includes sociodemographic information obtained by the US Census Bureau from all US citizens every 10 years, while the American Community Survey data is collected from a sub-sample of the US population monthly. The National Historical Geographic Information System is a collection of data from the US Census Bureau and other nationwide surveys from 1790-present and includes data at the national, as well as various regional levels (e.g., census tract, places and county subdivisions). For more information related to the National Historical Geographic Information System, see https://www.nhgis.org.

Sample

As described above, the sample for this study included respondents from the WLS. Although the WLS includes several waves of data and includes information from graduates (i.e., the original cohort), spouses, selected siblings, and spouses of selected siblings, the sample for this study only included graduate respondents from the 2004 and 2011 waves of data because these were the only two waves ACP information was collected. Additionally, the graduate

sample was the only group of respondents administered ACP related questions in both the 2004 and 2011 waves.

During the 2004 wave, the WLS module containing ACP questions (i.e., the EOL Preparations Module) was administered to a randomly selected 70% of the main sample (n = 4,908) and those who resided in Wiscville (i.e., the name given by the WLS in reference to a hospital referral region in Wisconsin; n = 198). Wiscville residency was defined by living in Wiscville during the 1993 survey, when tracked for the 2004 survey, and/or at the time of the 2004 survey. Wiscville residents were administered the EOL Preparations module because of an EOL intervention program administered there in the 1990s. In the 2011 wave, the EOL Preparations module was administered to the entire graduate sample (n = 5,968). In addition, 2011 was the first time the WLS allowed respondents to use proxy respondents or help from someone when answering portions of the survey, including the EOL Preparations Module. However, given the sensitive nature of EOL related questions, proxy respondents were excluded from the study's sample (n = 705). Furthermore, because the environmental variables used in this study contain US data only, respondents residing outside of the US during the time of data collection were excluded from the sample. Although foreign residency was listed as an outcome for the residency related variables in the 2004 wave (n = 21), in the 2011 wave, foreign residency was collapsed into a missing category, and therefore, no adjustments based on foreign residency were needed for this wave. Additionally, as described previously, the WLS includes two survey types at each wave, either a telephone (2004) or an in-person survey (2011) and a mail-in survey. Given that measures for this study were obtained from both the telephone or in-person survey modules, as well as the mail-in survey modules, the sample was further restricted to include only those

who responded to both survey formats. This resulted in a sample size reduction of 625 and 657 in the 2004 and 2011 waves, respectively.

The cross-sectional components of this study (i.e., Aims 1 and 2) included graduate respondents from both the 2004 (n = 4,459) and 2011 waves (n = 4,574); however, the longitudinal analyses (i.e., Aim 3) only included individuals who were administered the EOL preparations module at both the 2004 and 2011 waves (n = 2,887). In summary, the sample for Aims 1 and 2 of this study included 1957 Wisconsin high school graduates (i.e., the original WLS cohort) residing in the United States during data collection who were administered the End of Life Preparations module in 2004 and/or in 2011, responded to both survey formats, and did not use a proxy respondent in the 2011 wave. The sample utilized in Aim 3 was restricted further to those who were administered the EOL module at both the 2004 and 2011 waves.

Measures

Table 1 includes a comprehensive overview of the individual variables from the WLS utilized in this study, including the specific language used in the WLS survey and the coding structure.

Dependent variables: ACP status. In the EOL Preparations module of the WLS, respondents were asked the following questions relevant for this study: 1) “Have you made plans about the types of medical treatment you want if you become seriously ill in the future?”, 2) “Have you discussed your plans and preferences with anyone about the types of medical treatment you want if you become seriously ill in the future?”, 3) “Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself? This is sometimes called a DPAHC”, 4

"Do you have a LW or an AD, which is written instructions about the type of medical treatment you would want to receive if you were unconscious or somehow unable to communicate?" (1 = *yes*, 0 = *no*).

For this study, I created five indicators of ACP based on the WLS questions listed above: 1) Any EOL Planning, 2) Informal ACP, 3) Formal ACP, 4) DPAHC Status, and 5) Two-Pronged Approach to ACP. Any EOL Planning was coded 1 = *yes* if respondents answered yes to at least one of the questions listed above and 0 = *no* if respondents answered no or in the process for all four questions. Informal ACP was coded 1 = *yes* and 0 = *no* based on the response to the question, "Have you discussed your plans and preferences with anyone about the types of medical treatment you want if you become seriously ill in the future?" Formal ACP was coded 1 = *yes* and 0 = *no* if respondents answered yes to either, "Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself? This is sometimes called a DPAHC" or "Do you have a LW or an AD, which is written instructions about the type of medical treatment you would want to receive if you were unconscious or somehow unable to communicate?" Although *in the process* was offered as a response option for these two questions in the 2004 wave, given the small number of responses (n = 13 and n = 10, respectively) this category was coded as 0 = *no* for the purposes of this study. The variable, DPAHC Status, was coded 1 = *yes* and 0 = *no* based on the response to the question, "Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself? This is sometimes called a DPAHC." Like the Formal ACP variable, *in the process* responses from the 2004 wave were also coded as 0 = *no* for this study given the small number of responses for this category (n = 13).

Lastly, the variable Two-Pronged Approach to ACP, was based on responses from the created Informal and Formal ACP variables. Two-Pronged Approach to ACP was coded 1 = *yes* if Informal ACP and Formal ACP = *yes* and 0 = *no* if Informal or Formal ACP = *no*.

Environmental factors. All environmental factors utilized in this study were comprised of county data from years corresponding with the WLS waves (i.e., 2004 and 2011). Table 2 provides a comprehensive description of the environmental variables used in this study, including where the variables were obtained and the coding structured employed for this study.

AHRF. The following environmental variables were included from the AHRF: number of general practitioners (including general and family practices), number of medical specialists (including allergists, cardiologists, dermatologist, and gastroenterologists), number of hospitals (including both short- and long-term facilities), number of nursing facilities, number of hospice agencies, and number of home health agencies. Based on the availability of AHRF data, number of general practitioners, medical specialists, hospitals, and hospice agencies were derived from 2005 and 2010 data, and number of nursing facilities and home health agencies were derived from 2005 and 2011 data. All AHRF variables were coded as continuous, and due to normality concerns, were top coded to reduce skewness.

Dartmouth Atlas. Environmental variables obtained from the Dartmouth Atlas included number of Medicare enrollees and Medicare reimbursement rates (in US dollars) for hospitals and skilled nursing facilities, physicians, home health agencies, and hospice agencies. All were derived from 2004 and 2011 data, were age, sex, and race adjusted, and coded as continuous. Due to normality concerns, the natural log was used for analytic purposes for the Medicare reimbursement rate variables and number of Medicare enrollees

was top coded to reduce skewness. Also, it is important to note that the 2004 data were only comprised of a 20% sub-sample of the population. As a result, the number of Medicare enrollees variable for 2004 was multiplied by five in the presentation of sample descriptives to be more comparable with the 2011 data.

U.S. Census Bureau. The following variables were obtained from the decennial census and the American Community survey: percent with a disability, median household income, percent living alone, percent Hispanic, percent non-Hispanic White, percent non-Hispanic Black, percent non-Hispanic Other race, percent 65 years of age and older, percent with high educational attainment (defined as having at least a bachelor's degree), percent with health insurance coverage, and percent residing in a rural area. All of these variables were coded as continuous. Due to normality concerns, the natural log of median household was used for analytic purposes, and the racial and ethnic related variables were top coded to reduce skewness.

Individual variables. Based on findings from the ACP literature, the following individual variables from the WLS were included as control variables in this study: gender, race and ethnicity, age, educational attainment, health insurance coverage, household income, marital and parental status, living alone status, self-reported health, religiosity/spirituality, social support, established relationship with physician, and previous experience with death.

Demographics and residential setting. Gender was coded as 1 = *female* and 0 = *male*. Given the homogenous racial and ethnic profile of the WLS sample, a dichotomous variable was used, with 1 = *non-Hispanic White* and 0 = *all other races and ethnicities*. Age was coded as a continuous variable, and to reduce skewness, this variable was top and

bottom coded in both waves. Similarly, education, measured by the number of years of schooling based on an individual's highest degree, was coded as a continuous variable and top coded at 20 years in both waves to reduce skewness. In the 2004 wave, health insurance status was coded as a dummy variable (1 = *yes*, 0 = *no*) if respondents had any type of health insurance. In the 2011 wave, because all respondents were over the age of 65, and therefore Medicare eligible, the 2011 health insurance variable was coded 1 = *yes* and 0 = *no* based on Medicare insurance coverage, specifically Part A and/or Part B. Household income (in US dollars) was coded as a continuous variable, and because of normality concerns, the natural log of household income was used for analytic purposes. Marital status (1 = *currently married*, 0 = *not currently married*) was coded as a dummy variable. Similarly, parental status was measured as a dummy variable (1 = *yes*, 0 = *no*). Residential status was measured by whether participants lived alone or not and was measured based on the number of household members, including the respondent (1 = *living alone*, 0 = *not living alone*).

Health and relationship with physician. Self-reported health was rated 1 = *excellent*, 2 = *very good*, 3 = *good, fair, and poor*, with excellent as the reference category. Established relationship with physician was coded as a dummy variable based on whether individuals reported having a physician they generally see for medical concerns (1= *yes*, 0 = *no*).

Religiosity, spirituality, social support, and previous experience with death. Religiosity/spirituality was measured by the extent to which spiritual or religious beliefs would influence medical decisions if one became gravely ill, with 1 = *not at all*, 2 = *not very*, 3 = *somewhat*, 4 = *very or extremely*, with very or extremely as the reference group. Social support was measured by whether individuals reported having someone in or outside of the family that they can share private feelings and concerns (1 = *yes*, 0 = *no*). Lastly, previous

experience with death was coded as a dummy variable based on whether or not individuals experienced the recent (i.e., within 10 years) death of a spouse or parent (1 = *yes*, 0 = *no*).

Final Predictor Selection

In this section, I describe the process I used to select the predictors included in the final models addressing the study's key aims. First, I describe which predictors were excluded based on issues related to collinearity and multicollinearity. Then, I discuss how the interaction terms used in Aim 2 were selected.

Regarding the exclusion of variables based on collinearity and multicollinearity concerns, first, I examined correlations among predictors in both waves of data (Tables 3 - 8). Then, I calculated variance inflation factors (VIFs) for each of the five ACP outcomes and all predictor variables for Waves 1 and 2 (Tables 9 and 10). Results from these assessments showed that the Medicare facility and staff reimbursement rates were all highly correlated with one another and had high VIF values across models. To address this issue, all Medicare facility and staff rate variables were excluded except for number of home health agencies and number of hospice agencies because of their relatively low VIF values. Moreover, findings from these examinations indicated that percent with a disability was highly correlated with several other predictors and had high VIF values across models. Given this, I decided to exclude this variable from the final analyses. Additionally, because number of Medicare enrollees varied so drastically between the two data collection points (5,902 in 2004 vs. 23,587 in 2011) because of the 20% sub-sample used in the 2004 data, I also excluded this variable. Moreover, given that the overwhelming majority of respondents in both Wave 1 and 2 from the WLS were non-Hispanic White and since all county level racial

and ethnic variables were highly correlated with one another, I also excluded race at the individual level and percent non-Hispanic White at the county level from the final models.

In summary, the following individual variables were included in the final analyses: gender, age, educational attainment, marital and parental status, household income, health insurance coverage, living alone, self-reported health, established relationship with physician, religiosity/spirituality, social support, and previous experience with death. The environmental variables examined in the final analyses included: number of home health agencies, number of hospice agencies, percent with higher educational attainment, percent 65 years of age and older, percent living alone, percent Hispanic, percent non-Hispanic Black, percent non-Hispanic Other race, median household income, percent with health insurance coverage, percent residing in rural areas, and Medicare reimbursement rates for home health agencies, hospice agencies, hospitals and nursing homes, and physicians.

To select the interaction terms included in Aim 2's examination of the moderating environmental effects in the associations between ACP and individual household income and educational attainment, I first created interaction terms with each of the environmental characteristics and both individual household income and educational attainment for Waves 1 and 2. Then, I first ran multilevel, random-intercept logistic regression analyses that included all of the interactions terms for each of the ACP outcomes in both the 2004 and 2011 waves. Next, I excluded interaction terms, one-by-one, based on the interaction term in the model with the largest p-value. I repeated this process until all interaction terms remaining in the model were significant at an alpha level of less than .05. This process was done for each of the five ACP outcome variables in both waves.

Analytic Strategy

In this section, I describe the analytical approach used to examine each of this study's three key aims. The first aim of this investigation was to assess the independent effects of environmental and individual characteristics in ACP to determine which factors may be most influential in terms of ACP association between environmental factors and ACP. Given the nested nature of these data, I used a multilevel approach, with individuals (i.e., Level 1; individuals *i*) nested into counties (i.e., Level 2; counties *j*). Because the five measures of ACP (i.e., Any EOL Planning, Informal ACP, Formal ACP, DPAHC Status, Two-Pronged Approach) are dichotomous variables (y_{ij} = 1 or 0), multilevel random-intercept logistic regression models were used in each of the three aims, which transformed the binary dependent variable into the probability of the response using a logit link function (Guo & Zhao, 2000). All analyses were conducted using Stata 14.

Controlling for all individual variables, multilevel random-intercept logistic regression analyses were used to assess the independent environmental effects in each of five ACP outcomes. The following equations describe the analytic approach for Aim 1:

Level 1 (Individual)**:**

$$\log\left[\frac{p_{ij}}{1-p_{ij}}\right] = \beta_{0j} + \beta_{1j}\,(\text{Individual Factors}_{ij})$$

Level 2 (County)**:**

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{Environmental Factors}_{j}) + u_{0j}$$

The second aim of this study was to assess whether environmental factors moderate the associations between known individual correlates and ACP. Specifically, I tested whether environmental factors moderate the associations between ACP outcomes and individual household income and educational attainment. Interaction terms comprised of environmental

factors and individual household income and educational attainment were tested in the full cross-sectional models described for Aim 1. The equations below describe the methodological approach for addressing Aim 2:

Level 1 (Individual)**:**

$$\text{Log}\left[\frac{p_{ij}}{1-p_{ij}}\right] = \beta_{0j} + \beta_{1j}\,(\text{Income}_{ij}) + \beta_{2j}\,(\text{Education}_{ij}) + \beta_{3j}\,(\text{Individual Factors}_{ij})$$

Level 2 (County)**:**

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{Environmental Factors}_{j}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}\,(\text{Environmental Factors}_{j})$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}\,(\text{Environmental Factors}_{j})$$

In the final aim of this study, I considered a longitudinal assessment of the association between environment and ACP. To examine this aim, I tested the same multi-level random-intercept logistic regression models utilized in Aim 2 for the 2011 wave while controlling for ACP status during the 2004 wave. The equations below describe the analytic approach for addressing Aim 3:

Level 1 (Individual)**:**

$$\text{Log}\left[\frac{p_{ij}}{1-p_{ij}}\right] = \beta_{0j} + \beta_{1j}\,(\text{Income}_{ij}) + \beta_{2j}\,(\text{Education}_{ij}) + \beta_{3j}\,(\text{ACP status in 2004}_{ij}) + \beta_{4j}\,(\text{Individual Factors}_{ij})$$

Level 2 (County)**:**

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{Environmental Factors}_{j}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}\,(\text{Environmental Factors}_{j})\ \beta_{2j} = \gamma_{20} + \gamma_{21}\,(\text{Environmental Factors}_{j})$$

CHAPTER 6

RESULTS

In this chapter, I present results from both the cross-sectional and longitudinal analyses examining the role of environmental characteristics in ACP. First, I present the descriptive statistics of the study's sample during the first (i.e., 2004) and second (i.e., 2011) waves. Then, I present findings addressing Aim 1, which include a cross-sectional examination of the independent effects of environmental factors in ACP. Next, I describe the interplay between environmental and individual characteristics in ACP examined in Aim 2. Lastly, I present findings from the longitudinal examination of the role of environmental characteristics in ACP, addressing Aim 3.

Descriptives

For a complete presentation of the descriptive statistics from Waves 1 and 2, see Table 11.

Individual characteristics. In Wave 1, slightly more than half of participants were male, and the average age was 64 years. The overwhelming majority of participants were non-Hispanic White, and the average number of years of education was about 14. Most were currently married, and nearly all were parents. The mean household income of the sample was close to $69,000. The majority reported having health insurance coverage, living with others, being in either excellent or very good health, having an established relationship with their physician, and having social support. Close to half of the sample was at least somewhat

religious or spiritual, and around a quarter had recent (i.e., 10 years or less) experience with the death of a parent or spouse.

In Wave 2, the sample contained a marginally smaller percentage of males compared to Wave 1. As expected, the mean age of respondents increased by 7 years between Waves 1 and 2 from 64 to 71. As in Wave 1, the majority of the 2011 sample was non-Hispanic White, currently married, parents, and the average number of years of education was around 14. The average household income in Wave 2 was approximately $5,000 less than in the previous wave. Moreover, in comparison to Wave 1, more respondents lived alone, and fewer reported excellent self-reported health, social support, and the recent experience of parental or spousal death.

Environmental characteristics. As previously described, the following presentation of environmental characteristics are associated with the county in which individuals from the study's sample resided in during Waves 1 and 2. While all participants lived in the state of Wisconsin when the WLS originated in 1957, approximately 30% of the sample lived outside of Wisconsin during the 2004 or 2011 waves.

In 2004, participants in Wave 1 resided in counties that contained an average of approximately 30,000 Medicare enrollees. Medicare reimbursement rates ranged widely, with the largest reimbursement rates for hospital and nursing facilities and the smallest for home health agencies.

Participants in Wave 1 resided in counties where, in the year 2000, about a quarter of residents had at least a bachelor's degree and lived alone. The average median household income was approximately $45,000, and nearly all residents were non-Hispanic White and had health insurance coverage. Less than a quarter of residents in these counties were

disabled or 65 years of age or older, and approximately 32% resided in rural areas. Average medical staffing and facility rates in these counties varied, with the largest rates for medical specialists and nursing facilities.

In 2011, participants in Wave 2 resided in counties with a slightly smaller reported number of Medicare enrollees and somewhat higher Medicare reimbursement rates compared to those in 2004. As in Wave 1, individuals in Wave 2 resided in areas where, in 2010, around a quarter of residents had at least a bachelor's degree and lived alone, and nearly all were non-Hispanic White and had health insurance coverage. The average median household increased in Wave 2 by around $10,000. Between Waves 1 and 2, the percentage of residents with a disability decreased slightly, but the percentage of residents in rural areas and of those age 65 years and older was fairly consistent. Regarding medical staffing and facility rates, in comparison to Wave 1, the number of hospitals remained constant, and there were marginal increases in the number of general practitioners, medical specialists, hospice agencies, nursing facilities, and home health agencies in Wave 2.

Aim 1

Before examining hypotheses for Aim 1, I first tested bivariate correlations between each ACP outcome measure and predictor variable (Table 12). Then, I examined the intraclass correlation (ICC) coefficients of ACP outcomes to determine the appropriateness of multilevel models (i.e., individuals nested within counties; Table 13). Although the ICCs for ACP outcomes were small (ranged between .01 to .04), given that the purpose of this study was to assess the impact of environmental factors on ACP among individuals, who are in fact situated in counties, I decided to examine the study's aims using multilevel (2-level), random-intercept logistic regression analyses. I present results from these analyses in terms

of odds ratios to assist in the interpretation of findings. Additionally, I used McKelvey and Zavoina's Pseudo R^2 to assess model fit, with higher values indicating better fit.

Findings from Wave 1. Findings from the multilevel, random-intercept logistic regression analyses indicated that the following three environmental predictors were significantly associated with ACP outcomes in Wave 1 after controlling for individual characteristics (i.e., gender, age, educational attainment, marital status, parental status, household income, self-reported health, previous experience with death, established relationship with physician, religiosity/spirituality, social support, and health insurance coverage): number of hospice agencies, Medicare hospital and nursing home reimbursement, and percent living alone (Table 14). Number of hospice agencies (*OR* = 0.94) and percent living alone (*OR* = 0.95) were negatively associated with Informal ACP. Similarly, Medicare hospital and nursing home reimbursement was negatively associated with Formal ACP (*OR* = 0.44) and a Two-Pronged Approach to ACP (*OR* = 0.48).

These findings indicate that individuals living in counties with a larger number of hospice agencies were less likely than their counterparts to engage in Informal ACP, and those in counties with higher Medicare hospital and nursing home reimbursement were less likely to have Formal ACP or have taken a Two-Pronged Approach to ACP. While the findings related to Medicare reimbursement and percent living alone were as predicted, the negative association between number of hospice agencies and ACP was not in alignment with my hypothesis which predicted a positive association between number of hospice agencies and ACP.

Findings from Wave 2. Wave 1 findings were not replicated in Wave 2. Findings showed that in Wave 2, after controlling for individual characteristics, the following three

environmental factors were significantly associated with ACP, Medicare hospice reimbursement, percent 65 years of age and older, and percent residing in a rural area (Table 15). Based on these results, an increase in Medicare hospice reimbursement was associated with an increase in the likelihood of having a DPAHC (*OR* = 1.34) and in taking a Two-Pronged Approach to ACP (*OR* = 1.33). Additionally, percent 65 years of age and older was positively associated with the likelihood of Formal ACP (*OR* = 1.06) and having a DPAHC (*OR* = 1.04), and percent residing in a rural area was negatively associated with Any EOL Planning (*OR* = 0.99), Formal ACP (*OR* = 0.99), and DPAHC Status (*OR* = 0.99). All Wave 2 findings were in concordance with my hypotheses, which predicted positive associations between each of these environmental variables and ACP.

Covariates. Findings related to the association between covariates and ACP outcomes in Aim 1 varied between Waves 1 and 2. In Wave 1, apart from age and religiosity/spirituality, all covariates were significantly associated with ACP outcomes in Wave 1. In Wave 2, results indicated that age, household income, self-reported health, and health insurance status were not significantly associated with ACP. While self-reported health was shown to be negatively associated with Any EOL Planning in Wave 1, all other significant associations between covariates and ACP in both waves were positive. This aligns with my hypotheses with the exception of findings associated with religiosity and spirituality. While I anticipated a negative association between ACP and religiosity and spirituality, results from Wave 2 showed the direction of the association was positive.

Aim 1 summary. While none of the environmental predictors remained constant between Waves 1 and 2, results from both waves highlighted the impact of a county's Medicare expenditures on ACP among residents. Moreover, Aim 1 findings indicated that

structural components of an environment, such as its level of rurality, as well as aggregated characteristics of the residents themselves, like age and living alone, significantly influenced the odds of ACP engagement for residents.

Aim 2

To examine hypotheses for Aim 2, the moderating effects of environmental characteristics on the association between individual household income and educational attainment were examined for each of the five ACP outcomes in Waves 1 and 2, respectively. As in Aim 1, I used a two-level random-intercept logistic regression analysis (Tables 16 and 17). Additionally, predictive margins plots were created for each of the significant interaction terms to guide the interpretation of the moderating effects of environmental characteristics in the association between ACP and individual household income and educational attainment.

Findings from Wave 1. Results from multilevel random-intercept logistic regression analyses indicated that six interaction terms, comprised of environmental factors and either individual household income or educational attainment, were significantly associated with ACP outcomes in Wave 1, specifically Any EOL Planning, Informal ACP, and taking a Two-Pronged Approach to ACP (Table 16). Medicare physician reimbursement and percent of Hispanic residents in the county moderated the association between ACP and individual household income. Additionally, the following environmental characteristics moderated the association between ACP and educational attainment: Medicare physician reimbursement, median household income, percent non-Hispanic Black, and percent residing in a rural area.

Findings revealed that Medicare physician reimbursement moderated the association between Any EOL Planning and individual educational attainment (*OR* = 0.82). Contrary to my hypothesis, individual educational attainment was more predictive of Any EOL Planning

among residents in counties with low physician Medicare reimbursement rates (Figure 2). On the other hand, as expected, results indicated that physician Medicare reimbursement moderated the association between ACP and individual household income (*OR* = 1.19) such that the association was more pronounced among those residing in areas with higher physician Medicare reimbursement rates (Figure 3). However, the negative direction of the association between individual household income and Any EOL Planning is contrary to results from previous studies (Carr, 2012c; Inoue, 2016).

Regarding Informal ACP, as hypothesized, findings showed that county level median household income moderated the association between Informal ACP and individual educational attainment (*OR* = 0.80) such that individual educational attainment was more predictive of ACP among individuals residing in counties with low median household income (Figure 4). Moreover, as predicted, results indicated that the association between Informal ACP and individual household income was moderated by the percent of Hispanic residents in the county (*OR* = 1.01) such that individual household income was more predictive of ACP among those residents in areas with a larger percent of Hispanic residents (Figure 5). However, the negative direction of the association between Informal ACP and individual household income does not align with previous findings (Carr, 2012c; Inoue, 2016) or the independent effects identified in Aim 1.

In terms of a Two-Pronged Approach to ACP, findings showed that the percent of non-Hispanic Black residents in the county moderated the association between a Two-Pronged Approach to ACP and individual educational attainment (*OR* = 1.01) as expected. The association between individual educational attainment and a Two-Pronged Approach to ACP was more pronounced among individuals residing in counties with a larger percent of

non-Hispanic Black residents (Figure 6). Contrary to my hypothesis, findings showed that percent residing in a rural area moderated the association between individual educational attainment and taking a Two-Pronged Approach to ACP (*OR* = 1.00) such that individual education attainment was more predictive of a Two-Pronged Approach to ACP among individuals in counties with a higher percent residing in rural areas (Figure 7).

Findings from Wave 2. As in Wave 1, results showed that environmental characteristics related to county rurality and race and ethnicity moderated the associations between ACP and individual household income and educational attainment (Table 17). Findings from Wave 2 also indicated number of hospice agencies and percent 65 years of age and older significantly moderated these associations. While evidence from both waves indicated significant environmental moderators associated with Any EOL Planning, in Wave 2, environmental moderating effects were also found in relation to Formal ACP in general, and DPAHC Status specifically.

Similar to findings from Wave 1 regarding rurality and contrary to my prediction, evidence from Wave 2 showed that percent residing in a rural area moderated the association between DPAHC Status and individual household income (*OR* = 1.00) such that individual household income was more predictive of DPAHC Status among those in counties with a larger percent of residents in rural areas (Figure 8). Results also indicated that percent 65 years of age and older moderated the association between DPAHC Status and individual household income (*OR* = 1.01) such that the association was more pronounced among residents in counties with a larger percent 65 years of age and older (Figure 9). This finding is contrary to my hypothesis, and the negative direction of the association between individual

household income and DPAHC Status does not align with previous studies (Carr, 2012c; Inoue, 2016) or the independent effects identified in Aim 1.

Regarding Formal ACP, findings showed that the association between Formal ACP and individual household income was moderated by number of hospice agencies (*OR* = 0.99). Contrary to my hypothesis, individual household income was more predictive of ACP among individuals residing in areas with a fewer number of hospice agencies (Figure 11). Moreover, as expected, results indicated that the percent of Hispanic residents in the county moderated the association between Formal ACP and individual household income (*OR* = 1.01) such that individual household income was more predictive of ACP among residents in counties with a larger percent of Hispanic residents (Figure 10). However, the negative direction of the association between individual household income and ACP opposes previous findings (Carr, 2012c; Inoue, 2016).

Lastly, as hypothesized, results showed that the percent of residents representing the Other racial and ethnic category moderated the association between Any EOL Planning and individual educational attainment (*OR* = 1.02) such that the association was more pronounced among those in counties with a larger percent of residents representing the Other racial and ethnic category (Figure 12). However, the negative direction of the association between individual educational attainment and Any EOL Planning does not align with previous research (Carr, 2012c; Inoue, 2016) or independent effects identified in Aim 1.

Aim 3

To address Aim 3, I used a restricted sample of individuals who participated in both Wave 1 and 2 (*n* = 2,887). There were no major differences in terms of descriptive statistics between this sample and those utilized in Aims 1 and 2. For a complete presentation of Aim

3's sample descriptive statistics, see Table 18. To examine Aim 3, I controlled for ACP status during Wave 1 in the same multilevel random-intercept logistic regression analyses used to examine Wave 2 data in Aims 1 and 2 across the five ACP outcomes. Where applicable, significant moderators from Aim 2 were included in Aim 3 analyses. I present findings in terms of odd ratios, and as in Aims 1 and 2, I used McKelvey and Zavoina's Pseudo R^2 to assess model fit.

Aim 3 analyses revealed the following environmental factors to be associated with newly obtained ACP status in Wave 2: percent living alone, percent non-Hispanic Black, percent of residents representing the Other racial and ethnic category, percent with health insurance coverage, median household income, Medicare physician reimbursement, and the interaction term comprised of the individual educational attainment × percent of residents representing the Other racial and ethnic category (Tables 19 - 23).

Aim 3 analyses showed that newly obtained Any EOL Planning status in Wave 2 was negatively associated with percent living alone (*OR* = 0.86), percent of residents representing the Other racial and ethnic category (*OR* = 0.50), and median household income (*OR* = 0.08). These findings suggest that as percent living alone, percent of residents representing the Other racial and ethnic category, and median household income increase, the likelihood of newly obtained Any EOL Planning status in Wave 2 decreases. While findings associated with percent living alone and percent of residents representing that Other racial and ethnic category aligned with my hypotheses, the negative association between newly obtained Any EOL Planning status and median household income was unexpected.

Moreover, findings indicated a positive association between newly obtained Any EOL Planning status and percent with health insurance coverage (*OR* = 1.07) as

hypothesized, indicating that as the size of the county's population with health insurance coverage increases, so does the likelihood of a newly obtained Any EOL Planning status in Wave 2. Additionally, in alignment with my hypothesis and with findings from Aim 2, results showed that percent of residents representing the Other racial and ethnic category moderated the relationship between individual educational attainment and newly obtained Any EOL Planning status (*OR* = 1.05) such that the association was more pronounced among residents in counties with a larger percent of residents representing the Other racial and ethnic category (Figure 13). However, the negative direction of the association does not align with previous research (Carr, 2012c; Inoue, 2016) or independent effects identified in Aim 1.

As hypothesized, findings also revealed that Medicare physician reimbursement (*OR* = 0.23) was negatively associated with newly obtained Formal ACP status in Wave 2, respectively. Based on this result, as Medicare physician reimbursements increases, the likelihood of newly obtained Formal ACP status declines. Results also indicated an association between newly obtained DPAHC Status and the percent of non-Hispanic Black residents, suggesting that as the percent of non-Hispanic Black residents in a county increases, so does the likelihood of newly obtaining DPAHC Status in Wave 2. This finding was not in concordance with my hypothesis which predicted a negative association between percent of non-Hispanic Black residents and newly obtained DPAHC Status.

Covariates. Findings showed that the following covariates were positively associated with newly obtained ACP status in Wave 2: gender, previous experience with death, established relationship with physician, social support, and religiosity/spirituality. While educational attainment was positively associated with newly obtained ACP status related to a Two-Pronged Approach to ACP, and specifically Informal ACP, educational

attainment was negatively associated with newly obtained Any EOL Planning status in Wave 2. There were no significant associations between newly obtained ACP status and the remaining covariates (i.e., age, marital status, household income, parental status, self-reported health status, and health insurance coverage).

Aim 3 Summary. Findings from Aim 3 analyses showed that several environmental factors were independently associated with ACP status in Wave 2 after accounting for Wave 1 status. These environmental characteristics were related to the Medicare expenditures and aggregated individual factors at the county level (e.g., prevalence of one-person households, racial and ethnic makeup, household income, insurance coverage). Results also revealed that the percent of residents representing the Other racial and ethnic category moderated the association between individual educational attainment and newly obtained Any EOL Planning status in Wave 2.

CHAPTER 7

DISCUSSION

Previous research examining the role of the environmental context in ACP is limited, especially among community-dwelling older adults. This study addresses this gap in the literature by exploring the impact of environmental factors in ACP under three key aims: 1) the independent effects of environmental characteristics on ACP, 2) the moderating effects of environmental characteristics in the associations between ACP and individual household income and educational attainment, and 3) environmental factors influencing ACP changes over time. The results of this study indicate significant associations between environmental characteristics and ACP outcomes among community-dwelling older adults. Even after considering a host of known individual correlates of ACP, older adults are more or less likely to plan for the EOL if they reside in counties with certain environmental characteristics, and findings show that environmental factors moderate associations between ACP and known individual predictors, specifically household income and educational attainment. Moreover, results indicate that environmental characteristics impact the likelihood of obtaining ACP over time.

Drawing from the ACP and neighborhood health effects literature, as well as the conceptual framework used to guide this study, in this section, I discuss findings from Aims 1-3, present strengths and limitations of the study, and provide considerations for future research in this area.

Aim 1

According to evidence from the present study, environmental characteristics are associated with ACP outcomes among community-dwelling older adults, even after controlling for individual factors. Moreover, in alignment with the categorization of environmental characteristics used in the conceptual framework which guided this study, both community- and organizational-based factors (drawing from McLeroy and colleagues (1988) ecological health promotion model), as well as both environmental press and buffering factors (as described in the application of the ecological approach in the neighborhood health effects research) impact ACP outcomes among this population. In this section, I discuss findings in terms of the classification of environmental factors presented in the conceptual framework (i.e., community, organizational, environmental press, and buffering factors).

Community, environmental press factors. Regarding community, environmental press factors, findings show that ACP was associated with county level household composition and Medicare reimbursement. As hypothesized, the size of the living alone population in a county was negatively associated with ACP, specifically Informal ACP. The size of the living alone population may be an indicator of the availability and quality of social networks within a community. Thus, it is possible that residing in an area with a large living alone population may decrease the likelihood of strong social networks within the community, which could potentially impact ACP among residents. Additionally, it is likely that the availability of social networks within a community are particularly influential for Informal ACP since EOL discussions are typically had with close family members or friends. Moreover, this environmental level finding aligns with previous work examining individual

determinants of ACP, which show that individuals living alone are less likely to plan for the EOL (Black et al., 2008).

In terms of Medicare reimbursement, as predicted, findings indicated a negative association between Medicare hospital and nursing home reimbursement and ACP outcomes, specifically Formal ACP and Two-Pronged Approach to ACP. Given no significant association with Informal ACP, the finding related to a Two-Pronged Approach to ACP is likely driven by the Formal ACP relationship. These results align with previous research showing a negative association between regional Medicare expenditures and formal measures of ACP (Nicholas et al., 2011). Findings from the present study may be explained by regional provider treatment preferences. Barnato and colleagues (2007) and Nicholas and colleagues (2011) suggest that regional provider treatment preferences are likely a major driver of ACP regional variation, especially since evidence indicates no such variation in patient EOL care preferences (Barnato et al., 2007).

Moreover, results showed a positive association between Medicare hospice reimbursement and ACP, specifically DPAHC Status and a Two-Pronged Approach to ACP. Similar to findings related to Medicare hospital and nursing home reimbursement, given the lack of significance between Medicare hospice reimbursement and Informal ACP, the finding related to a Two-Pronged Approach to ACP is likely driven by the DPAHC relationship. This finding aligns with my hypothesis and the individual influence of hospice care on ACP. Evidence indicates that hospice patients represent the population with the highest ACP rates (Resnick et al., 2008), which is likely the result of hospice regulations (i.e., diagnosed with 6 months or less to live) and mission (i.e., providing comfort care to patients and not life sustaining, aggressive forms of treatment; Resnick et al., 2012). Residing in a county with a

higher Medicare hospice reimbursement rate may be reflective of a large number of hospice patients. This increases the likelihood of knowing someone receiving hospice treatment, as well as a heightened awareness and exposure to the hospice mission. Given the association between previous experience with death and ACP (Carr, 2012a; Carr & Khodyakov, 2007a), this may explain the relationship between Medicare hospice reimbursement and ACP. Additionally, as mentioned above regarding findings associated with Medicare hospital and nursing home reimbursement, higher county Medicare hospice reimbursement may also be indicative of area level provider treatment preferences (Barnato et al., 2007; Nicholas et al., 2011).

Community, environmental buffering factors. Findings showed that the following community, environmental buffering factors were associated with ACP, size of the 65 years of age and older population and rurality. As hypothesized, results indicated a positive association between ACP and the size of the 65 plus population, specifically DPAHC Status. Residing in an area with a large 65 plus population increases the likelihood of exposure to and awareness of topics of interests for the 65 plus population, including ACP. It is possible that this exposure contributed to an increase in ACP among residents. Moreover, this finding aligns with the association between individual age and ACP (Inoue, 2016; Resnick et al., 2012).

Contrary to my hypothesis, results showed that the size of the rural population was negatively associated with ACP outcomes, specifically Any EOL Planning, Formal ACP, and DPAHC Status. Previous findings related to the role of rurality in ACP are mixed. While evidence from a study by Mitchell and colleagues (2007) showed that residing in an urban nursing home was associated with an increased likelihood of ACP, other studies found that

residents of rural nursing homes were more likely to have ACP compared to their urban counterparts (Buchanan et al., 2004; Levy et al., 2005). The finding from the present study may be explained by area level educational attainment and healthcare provider prevalence, both of which are likely to be poorer in rural areas and have been shown to impact ACP outcomes among residents (Mitchell et al., 2007; Troyer & McAuley, 2006).

Organizational, environmental buffering factors. Findings indicated a negative association between the number of hospice agencies and ACP, specifically Informal ACP. This is contrary to the hypothesized relationship and is counterintuitive to previous research indicating a positive association between individual receipt of hospice care and ACP (Alano et al., 2010; Cohen-Mansfield & Lipton, 2008; Resnick et al., 2008; Teno et al., 2007). Additionally, this result does not align with the positive association between Medicare hospice reimbursement and DPAHC Status and a Two-Pronged Approach to ACP mentioned above. While it is surprising that results vary between the two hospice variables included in this study (i.e., Medicare hospice reimbursement and number of hospice agencies), this suggests that these variables provide distinctly different information about environmental level hospice care.

I hypothesized that the number of hospice agencies would be positively associated with ACP because I expected this variable to be an indicator for the number of hospice patients in the county and the amount of exposure residents may have to hospice care and its mission, which could impact ACP. This hypothesis was also based on previous literature examining the association between individual level hospice care and ACP. However, this unexpected finding suggests that the number of hospice agencies is not necessarily reflective of residents' overall exposure to hospice care. It is likely that a small number of large, highly

organized hospice agencies provide more awareness and exposure to a community than several small hospice agencies. Because the other hospice variable included in this study, Medicare hospice reimbursement, reflects the amount of money spent on hospice care within a county, and findings associated with this variable align with previous evidence related to the individual level receipt of hospice care and ACP, it is likely that Medicare hospice reimbursement is a better indicator than the number of hospice agencies of hospice utilization and exposure, and thus, ACP.

Additionally, it is important to note that previous research examining the role of hospice care and ACP measured ACP in terms of formal medical orders (e.g., DNR, DNH) which focus on decisions related to life-sustaining treatments and are only meant for those with a high risk of death. Because hospice regulations require patients to forgo life-sustaining treatments, the association between hospice care and these forms of ACP is expected. To my knowledge, this is the first study to examine the association between the number of hospice agencies at the county level and both informal and formal measures of ACP. Given the lack of previous research and this unexpected finding, the association between hospice care and Informal ACP remains unclear.

Aim 1 summary. While findings from this study provide insight into the role of environmental characteristics in ACP outcomes and highlight specific environmental determinants of ACP, unexpectedly, findings were inconsistent across the two waves of data utilized. I anticipated findings from the 2004 wave to be replicated in the 2011 wave. Since a large percentage of participants indicated ACP in the 2004 wave, the 2011 outcome was indicative of those same individuals and the relatively small number of participants who obtained ACP status between 2004 and 2011. While the reason for the variance across the

two waves is unclear, it may be due to sample attrition. Out of the original sample of 4,459 participants (i.e., the sample from the 2004 wave), only 2,887 remained in the 2011 wave. It is possible that those who left the study did so because of diminishing health or death, and thus, the 2011 findings may be influenced by a survivor effect.

Additionally, while the inconsistencies between the two waves were unexpected, it does align with the only other study, to my knowledge, that assessed the role of environmental factors in ACP cross-sectionally at two time points. Castle and Mor (1998) examined the associations between ACP and nursing home facility factors (e.g., proportion of Medicaid population, staffing ratios, ownership status) in 1990 and 1993 (pre- and post-implementation of Patient Self-Determination Act; PSDA), and results indicated a lack of consistency between the two waves of data and across the different types of ACP outcomes (i.e., DNR, DNH, and LW). Authors commented on the difficulty in interpreting their findings and suggested that future research utilize more precise nursing facility measures.

Similarly, I suggest that future studies examining the role of the environmental context in ACP look beyond the factors assessed here to determine if and how other environmental characteristics influence ACP outcomes among residents, such as the availability and quality of social networks within a community, religiosity and spirituality (e.g., the number of religious organizations, the proportion of residents identifying as belonging to various religions), and other factors that may contribute the sociocultural context of an area. Additionally, the lack of consistency between waves in the present study and in Castle and Mor's (1998) study highlight the need for future research exploring the impact of environmental factors in ACP over time. Lastly, given the variation in findings related to the two hospice variables (i.e., Medicare hospice reimbursement and number of

hospice agencies) mentioned above, it is important for future studies to assess associations between different indicators of environmental hospice care, including number of hospice agencies, and both informal and formal measures ACP.

Aim 2

Findings highlighted the moderating effects of environmental characteristics in the association between ACP and individual educational attainment and household income among community-dwelling older adults. To my knowledge, this is the first study to examine these relationships. Overall, results indicated 11 significant environmental interactions with individual educational attainment and household income and ACP. In this section, I discuss and provide potential explanations for these findings.

Moderating effects of Medicare physician reimbursement. Findings revealed that Medicare physician reimbursement moderates the associations between ACP and individual educational attainment and household income. As predicted, Medicare physician reimbursement moderated the association between ACP and individual household income such that individual household income was more predictive of ACP among those residing in counties with higher Medicare physician reimbursement rates. Based on this finding, individual resources (e.g., household income) may be more important in terms of ACP for those residing in disadvantaged neighborhoods because they are unable to rely on environmental supports. Given previous research indicating a negative association between Medicare spending and ACP (Nicholas et al., 2011), a county with high Medicare physician reimbursement is considered a disadvantaged neighborhood in this context.

However, contrary to my hypothesis, results also indicated that Medicare physician reimbursement moderated the association between ACP and individual educational

attainment such that the association was more pronounced among those living in counties with low Medicare physician reimbursement. While the explanation for the finding is unclear, given the unexpected nature of the result and the inconsistency between the two Medicare physician reimbursement interaction terms explored in this study, it is apparent that the interplay between Medicare physician reimbursement, socioeconomic status, and ACP is complex and requires further examination.

Moderating effects of median household income (county) on the association between ACP and individual educational attainment. As hypothesized, results showed that county level median household income moderated the association between ACP and individual educational attainment such that the association was more pronounced among individuals residing in counties with low median household income. A study by Phadke and Heideneriech (2016) showed that residents in higher income areas were more likely to engage in ACP, and findings from the neighborhood health effects literature indicate an association between low area level income and poor health outcomes (Balfour & Kaplan, 2002; Beard et al., 2009; Diez-Roux et al., 2000; Duncan et al., 1999; Franzini et al., 2005; Karpati et al., 2006; Wight et al., 2006). Based on these findings, it is likely that residing in a low income area places individuals at a disadvantage in terms of ACP. Under these circumstances, it is likely that individual resources, such as educational attainment, play a more influential role in terms of ACP because residents are unable to rely on environmental supports.

Moderating effects of county race and ethnic composition. In alignment with my hypothesis, results revealed that the size of the Hispanic, Black, and non-Hispanic Other race populations moderated the associations between ACP and individual household income and

educational attainment. Among those residing in areas with larger Hispanic, Black, and non-Hispanic Other race populations, individual household income and educational attainment was more predictive of ACP. While findings from previous studies examining the role of neighborhood racial and ethnic composition in individual health outcomes are mixed, the majority of evidence suggests that individuals living in areas with larger racial and ethnic minority populations are more likely to experience poor health outcomes (Pruitt, Craddock, Tiro, Xuan, Ruiz, & Inrig, 2015; Sudano, Perzynski, Wong, Colabianchi, & Litaker, 2013; Zhou, Bemanian, & Beyer, 2017). Furthermore, studies that do provide evidence of an "ethnic enclave effect" only identify positive health effects among racial and ethnic minorities (Eschbach et al., 2004; Fang et al., 1998; Patel et al., 2003). Given that over 99% of the sample utilized in this study are non-Hispanic White and due to previous evidence indicating a negative association between individual health outcomes and large area level racial and ethnic minority populations (Pruitt, Craddock, Tiro, Xuan, Ruiz, & Inrig, 2015; Sudano, Perzynski, Wong, Colabianchi, & Litaker, 2013; Zhou, Bemanian, & Beyer, 2017), in the context of this study, counties with large racial and ethnic minority populations are considered disadvantaged neighborhoods. As previously mentioned, due to a lack of environmental supports, individual resources, including household income and educational attainment, may play a larger role in terms of ACP among residents of disadvantaged neighborhoods.

Moderating effects of percent of residents residing in a rural area. Findings indicated that the size of the rural population moderated the associations between individual household income and educational attainment and ACP. These associations were more pronounced among those living in counties with a larger rural population. While this does not

align with my prediction, my hypothesis was based on previous studies examining the independent role of rurality in ACP among residents, in which findings are mixed. In alignment with evidence indicating a negative association between rurality and ACP (Wenger et al., 1995), including independent effects identified in Aim 1, it is likely that living in an area with a larger rural population places residents at a disadvantage in terms of ACP. As a result, individual resources, such as household income and educational attainment, may be more influential in ACP due to a lack of environmental supports.

Moderating effects of number of hospice agencies in the association between ACP and individual household income. Contrary to my hypothesis, results showed that the number of hospice agencies moderated the association between ACP and individual household income such that individual household income was more predictive of ACP among those residing in counties with a large number of hospice agencies. Given evidence on the association between ACP and individual receipt of hospice care (Resnick et al., 2008), I based my hypothesis on the assumption that the number of hospice agencies would be an indicator of the number of hospice patients in an area and the level of exposure to hospice care and its mission among residents. Under this assumption, residing in an area with a small number of hospice agencies would place residents at a disadvantage in terms of ACP. However, this finding, as well as those in Aim 1, suggest that the number of hospice agencies is likely not reflective of the number of hospice patients and the level of exposure to hospice care and its mission among residents. It is also important to note that previous studies examining the association between ACP and receipt of hospice care measured ACP in terms of formal medical orders (e.g., DNR, DNH), which focus on decisions related to life-sustaining treatments and are only meant for those with a high risk of death. Because hospice

regulations require patients to forgo life-sustaining treatments, the association between formal ACP and receipt of hospice care is expected. To my knowledge, this is the first study to examine the independent and moderating effects of the number of hospice agencies and both informal and formal measures of ACP. Given this unexpected result and the lack of previous evidence, future research is needed to better understand this variable and its influence on both informal and formal measures of ACP.

Moderating effects of percent 65 years of age and older in the association between ACP and individual household income. Contrary to my prediction, findings revealed that the size of the 65 plus population moderated the association between ACP and individual household income such that the association was more pronounced among those residing in areas with larger 65 plus populations. Given previous evidence on the associations between individual age and ACP (Alano et al., 2010; Black, Reynolds, & Osman, 2008; Inoue, 2016; Resnick, Hickman, & Foster, 2012), I hypothesized that individual household income would be more predictive of ACP among those residing in areas with small 65 plus populations because, without the environmental level influence of age, I anticipated these individuals to be at a disadvantage in terms of ACP. However, this result did not align with my prediction.

It is important to note that the only other study, to my knowledge, that examined area level age composition and ACP found a negative association between the proportion of residents 65 year of age and older and ACP (Troyer and McAuley, 2006). However, this result does not align with the independent effects examined in Aim 1 and are counterintuitive to findings associated with individual age and ACP (Alano et al., 2010; Black, Reynolds, & Osman, 2008; Inoue, 2016; Resnick, Hickman, & Foster, 2012). While the explanation for

the moderating effect of the 65 plus population is unclear, given the lack of previous research assessing the moderating role of county level age composition in ACP, further examination is needed to better understand how county level age composition interacts with ACP and known individual predictors.

Aim 2 summary. Because this is the first study, to my knowledge, to assess the moderating role of environmental factors on the associations between ACP and known individual predictors, and since many of the interaction terms identified in Aim 2's analyses are difficult to interpret and contrary to my hypotheses, future studies are needed to further explore these relationships in order to better understand if and how the environmental context moderates associations between ACP and known individual predictors. Replicating the moderating effects examined in this study would be helpful to understand if these unexpected results are specific to these data or if they exist among other populations. Additionally, future studies should consider employing different environmental level moderators, such as area level educational attainment, to better understand the moderating role environmental factors may have on the association between ACP and known individual predictors.

Aim 3

Results from this study indicated that several environmental characteristics were associated with ACP over time. Moreover, in alignment with the conceptual framework used to guide this study, both community- and organizational-based factors (drawing from McLeroy and colleagues (1988) ecological health promotion model) as well as environmental press and buffering factors (as described in the application of the ecological approach in the neighborhood health effects research) appear to impact ACP outcomes over time. In this section, I discuss Aim 3's findings according to the environmental

categorizations described in the conceptual framework (i.e., community, organizational, environmental press, and buffering factors).

Community, environmental press factors. Findings showed a negative association between Medicare physician reimbursement rate and newly obtained ACP status. As hypothesized, Medicare physician reimbursement was negatively associated with newly obtained Formal ACP status. This finding aligns with previous research indicating a negative association between Medicare spending and formal measures of ACP (Nicholas et al., 2011). As mentioned previously, some researchers suggest that provider treatment preferences may explain area level variance in ACP outcomes (Barnato et al., 2007; Nicholas et al., 2011), especially since no such area variation exists in terms patient preferences for EOL care (Barnato et al., 2007).

Furthermore, in alignment with my hypothesis, as well as with previous research examining individual determinants of ACP (Black et al., 2008) and the independent effects discovered in Aim 1, the size of the living alone population was negatively associated with newly obtained ACP status, specifically Any EOL Planning. Not only is it plausible that residing in an area with a large living alone population increases the likelihood of an individual living alone, which is shown to reduce the likelihood of ACP (Black et al., 2008), it may also reflect the availability of social networks and social ties within the community. Residing in an area with a large living alone population likely reduces community-based social networks and supports, and evidence indicates a reduced likelihood of ACP among those with limited social connections (Ai et al., 2006).

Moreover, results showed that the size of the non-Hispanic Other population was negatively associated with newly obtained ACP status. This finding is in alignment with my

hypothesis and with previous work examining the role of an area's racial and ethnic composition in health-related outcomes, including ACP (Alano et al., 2010; Carr, 2012b; Inoue, 2016; Mitchell et al., 2007; Sanders et al., 2016; Sudano et al., 2013). As suggested by Aneshensel and collegues (2016), these findings may be explained by a host of factors. The effects of neighborhood stratification and segregation, particularly among African Americans in the US, reinforce racial and ethnic differences in terms of opportunity, access to resources, and exposure to discrimination (Robert & Ruel, 2006), all of which likely impact health outcomes among residents. Additionally, residents in neighborhoods with large proportions of racial and ethnic minorities are more likely to indicate the presence of structural components, including neighborhood disorder (i.e., a perceived lack of social control based on factors such as crime, abandoned houses and buildings, and unsupervised youth), that have been identified in the neighborhood health effects literature as determinants of poor health related outcomes among residents (Balfour & Kaplan, 2002; Ross & Mirowsky, 2001).

Conversely, findings showed that the size of the non-Hispanic Black population was positively associated with newly obtained ACP status between 2004 and 2011. This finding does not align with my hypothesis, nor the bulk of research examining associations between area level racial and ethnic composition and health-related outcomes described above (Aneshensel et al., 2016; Balfour & Kaplan, 2002; Ross & Mirowsky, 2001). It is possible that this unexpected finding is due to the relatively small number of participants who newly obtained ACP status between the 2004 and 2011 waves (e.g., Any EOL Planning $n = 230$).

Lastly, as hypothesized, findings showed that the size of the non-Hispanic Other race population moderated the association between newly obtained ACP status and individual

educational attainment such that the association was more pronounced among residents in counties with larger non-Hispanic Other race populations. As mentioned previously, given evidence indicating residents in areas with large racial and ethnic minority populations are at a heightened risk for negative health-related outcomes (Pruitt, Craddock, Tiro, Xuan, Ruiz, & Inrig, 2015; Sudano, Perzynski, Wong, Colabianchi, & Litaker, 2013; Zhou, Bemanian, & Beyer, 2017), in the context of this study, counties with large racial and ethnic minority populations are considered disadvantaged neighborhoods. Among individuals residing in disadvantaged neighborhoods, individual resources, including household income and educational attainment, may be more important in terms of ACP because of a lack of environmental supports.

Community, environmental buffering factors. Contrary to my hypothesis, findings indicated a negative association between county level median household income and newly obtained ACP status, specifically Any EOL Planning. This finding also opposes evidence examining the individual household income and ACP (Carr, 2012c; Inoue, 2016), as well as evidence from the neighborhood effects literature indicating a positive association between area median household income and individual health outcomes (Beard et al., 2009; Diez-Roux et al., 2006; Wight et al., 2006). While the reason for this finding is unclear, it is possible that findings from Aim 3 were impacted by sample attrition (i.e., 1,572 participants from the 2004 wave were not surveyed in 2011) and the relatively small number of participants who newly obtained ACP status between the 2004 and 2011 waves (e.g., Any EOL Planning $n = 230$).

Lastly, as hypothesized, findings indicated a positive association between county level health insurance coverage and newly obtained ACP status, specifically Any EOL

Planning. This also aligns with the individual ACP (Daaleman et al., 2009; Resnick et al., 2012; Wenger et al., 1995) and neighborhood health effects literature (Beard et al., 2009; Beard et al., 2009; Diez-Roux et al., 2006; Wight et al., 2006), which both indicate a positive relationship between indicators of socioeconomic status and individual outcomes. Not only does residing in an area where a large portion of residents have health insurance increase an individual's likelihood of having health insurance, as well as other indicators of high socioeconomic status (e.g., high educational attainment and household income), it may also reflect a socio-cultural context that emphasizes health and health promoting behaviors, including ACP.

Aim 3 summary. Findings from the present study indicate associations between several environmental factors and ACP over time. To my knowledge, this is the first study to assess the longitudinal effects of environmental characteristics in ACP. While the majority of findings aligned with my hypotheses, evidence associated with county level median household income and the size of the non-Hispanic Black population were contrary to my predictions. As noted above, the cohort experienced sample attrition, and the number of participants who obtained ACP status between the 2004 and 2011 waves was relatively small. As such, it important to interpret my longitudinal findings with caution.

Study Strengths

This study has several strengths. It is one of the few studies examining the role of the environmental context in ACP, and the only study, to my knowledge, to examine the moderating and longitudinal effects of environmental factors in ACP. Previous studies examining the role of environmental factors in ACP generally assessed environmental characteristics in terms of facility level factors (e.g., ownership type, proportion of Medicaid

patients) and utilized hospital or nursing home patients in their samples. Moreover, given their relevance to previous studies' samples, the majority of prior results were associated with medical orders meant only for individuals with severe illness and/or at the EOL (i.e., DNR, DNH). This study addressed these gaps in the literature by employing county level indicators from several data sources encompassing a wide variety of relevant topics, utilizing a large, community-based sample, and by including informal and formal ACP indicators recommended for the general adult population. Lastly, unlike the bulk of previous literature, this study used a multilevel approach to examining the role of the environmental context in ACP which allowed me to consider, and statistically control for, the nested nature of the nature (i.e., individuals nested into counties).

Study Limitations and Future Directions

Several limitations should be noted. Although the use of a multilevel approach is a strength of this study and in accordance with recommendations from the neighborhood health effects literature in examining the role of the environmental context in health-related outcomes, the data used in this study were not ideal for this type of analytic strategy. This is evident in the relatively small ICC values (Table 13), which indicate only a modest amount of explained variance at the county level. Several of the counties examined in this study were represented by one, or just a handful, of participants from the WLS. To address this limitation, future studies may utilize samples that include greater representation at the environmental level.

Another limitation of this study was its examination of secondary data from the WLS. The WLS cohort is predominately non-Hispanic White and well educated, and the majority of the sample still resides in Wisconsin. Moreover, likely in response to these demographic

factors, ACP rates in this sample are much higher than those reported in more diverse populations (Hopp, 2000). Additionally, in this study's assessment of the longitudinal effects of environmental factors in ACP of data, given that the majority of respondents indicated ACP in the 2004 wave, only a relatively small number of participants obtained ACP status between the 2004 and 2011 waves. Additionally, the WLS cohort experienced sample attrition. Out of the original sample of 4,459 participants (i.e., the sample from the 2004 wave), only 2,887 remained in the 2011 wave. All of these factors have implications for the generalizability of this study's results. To overcome these limitations, future studies that can draw on more diverse samples in terms of race and ethnicity, educational attainment, and residential location would be helpful.

This study was also limited in the lack of previous conceptual guidance on the role of the environment in ACP. I drew from the conceptualization of ACP as a health behavior, the ecological approach to examining health behaviors, and from adjacent literature (i.e., neighborhood health effects) to develop a theoretical framework for this study that can be used in future studies exploring the impact of the environmental context in ACP. However, future research could benefit from additional theoretical consideration and expansion of this model. It is likely that important environmental factors were inadvertently excluded, and future work is needed to ensure the inclusion of pertinent environmental characteristics and to guide specific hypotheses. Additionally, more theoretical consideration is needed for assessing the moderating and longitudinal effects of environmental characteristics on ACP.

Conclusion

Findings support previous research that highlights the role of the environmental context in ACP and adds to the literature by exploring moderating and longitudinal effects of

environmental characteristics in ACP outcomes among community-dwelling older adults. Even after controlling for known individual determinants of ACP, environmental factors associated with an individual's county of residence independently increases the likelihood of ACP. Moreover, results show that environmental factors moderate the associations between ACP and known individual predictors, specifically individual household income and educational attainment, among community-dwelling older adults. Additionally, findings indicate that the environmental context also impacts the likelihood of obtaining ACP status over time.

Given the benefits of ACP, such as increased autonomy (Moorman, 2011) and quality of life and death among those who have engaged in ACP (Chan & Pang, 2010; Detering et al., 2010; Glavan et al., 2008; Temel et al., 2010), as well as decreased stress, anxiety, and depression among family members (Chan & Pang, 2010; Detering et al., 2010; Silveira et al., 2010; Tilden et al., 2001), it is important for researchers and policy makers to continue their efforts to increase ACP rates. Findings from this study have several implications for this effort. In order to increase ACP, it is critical to understand why varying rates of ACP exist. Results from this study show that not only is ACP impacted by individual characteristics, factors associated with residency also play a significant role. These findings can be used to target populations who are less likely to plan for the EOL, such as those residing in counties with high Medicare hospital and nursing home reimbursement rates, for both intervention and policy related strategies. Since environmental characteristics influence ACP among residents, even after accounting for individual factors, it is likely that area level ACP interventions and local policy changes can be effective in increasing ACP among residents. While additional research is needed to better understand the complexities of the association

between the environmental context and ACP, this study lays the groundwork for future investigations in this area and provides a conceptual framework that may be used to guide these works.

APPENDIX A

TABLES

Table 1
Individual Variables' Coding Structure and Variable Details

	Coding	Variable details	
		2004	2011
ACP Outcomes			
Any EOL Planning	Dummy; 1 = Yes, 0 = No, .= System missing Partial interview, Inappropriate	Graduate Phone: End of Life Preparations Module (2004; Have you made any preparations for the end of life?)	Graduate In Person: End of Life Preparations Module (2011; Has the participant made any preparations for the end of life?)
Informal ACP	Dummy; 1 = Yes, 0 = No, .= System missing Partial interview, Inappropriate, don't know	Graduate Phone: End of Life Preparations Module (2004; Have you discussed your plans and preferences with anyone about the types of medical treatment you want if you become seriously ill in the future?)	Graduate In Person: End of Life Preparations Module (2011; Have you discussed your plans and preferences with anyone about the types of medical treatment you want if you become seriously ill in the future?)
Formal ACP (DPAHC OR Living Will)	Dummy; 1 = Yes, 0 = No, .= DPAHC & Living Will missing	Graduate Phone: End of Life Preparations Module (2004; Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself; Do you have a living will or an advance directive?)	Graduate In Person: End of Life Preparations Module (2011; Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself?; Do you have a living will or an advance directive?)
DPAHC Status	Dummy; 1 = Yes, 0 = No, .= System missing Partial interview, Inappropriate, don't know	Graduate Phone: End of Life Preparations Module (2004; Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself?)	Graduate In Person: End of Life Preparations Module (2011; Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself?)

	Coding	Variable details	
		2004	2011
Two-Pronged Approach	Dummy; 1 = Yes, 0 = No, . = Formal & Informal missing	Graduate Phone: End of Life Preparations Module (2004; Have you discussed your plans and preferences with anyone about the types of medical treatment you want if you become seriously ill in the future? AND Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself?; Do you have a living will or an advance directive?)	Graduate In Person: End of Life Preparations Module (2011; Have you discussed your plans and preferences with anyone about the types of medical treatment you want if you become seriously ill in the future? AND Have you made any legal arrangements for someone to make decisions about your medical care if you become unable to make those decisions yourself?; Do you have a living will or an advance directive?)
Control Variables			
Gender	Dummy; 1 = Female, 0 = Male, . = System missing	WLS Status and Descriptive Variable Module [Sex of respondent]	WLS Status and Descriptive Variable Module [Sex of respondent]
Age (years)	Continuous; 2004: Bottom coded at 63 and top coded at 66, 2011: Bottom coded at 70 and top coded at 73, . = System missing	WLS Summary Variables Module (2004; Age at time of interview)	WLS Variables for Graduate CAPI Instrument Module (2011; Age at time of interview)
Race	Dummy; 1 = Non-Hispanic White, 0 = All races/ethnicities other than Non-Hispanic White, . = System missing	WLS Graduate Mail: Social Background Module (2004; Is your race/origin Hispanic, Latino, or Spanish origin? & Is your race/origin white?)	WLS Graduate Mail: Social Background Module (2004; Is your race/origin Hispanic, Latino, or Spanish origin? & Is your race/origin white?)
Education (years)	Continuous; 2004 & 2011: Top coded at 20 years	WLS Graduate Phone: Education Module (2004; How many years of education does the graduate have based on his or her highest degree?)	WLS Graduate In Person: Education Module (2011; How many years of education does the graduate have based on his or her highest degree?)

	Coding	Variable details	
		2004	2011
Marital status	Dummy; 1 = Currently married, 0 = Not currently married (including divorced, separated, widowed, and never married), . = System missing, not part of MOSAQ*	WLS Graduate Phone: Marriage Module (2004; Current marital status)	WLS Graduate In Person: Marriage, Cohabitation, and Dating Module (2011; Current marital status)
Parental status	Dummy; 1 = Parent, 0 = Not a parent, . = System missing, not ascertained, inappropriate	WLS Graduate Phone: Children Module (2004; Total number of respondent's children. Include biological, adopted, step or foster children as well as children respondent considered to be part of his/her family.)	WLS Graduate In Person: Children Module (2011; Total number of children reported in the 2011 CAPI Module)
Household income (US dollars)	Continuous; natural log used during analyses, . = System missing, partial interview	WLS Graduate Phone: Other Income Module (2004; Total Household Income)	WLS Graduate In Person: Income and Pensions (Total Household Income)
Health insurance	Dummy; 1 = Has health insurance coverage, 0 = Does not have health insurance coverage, . = System missing, left blank on MOSAW*, refused, don't know	WLS Graduate Phone: Access to Health Care and Insurance (2004; Total number of health plans)	WLS Graduate Mail: Health Insurance Coverage (2011; Does participant currently receive government or public health insurance coverage through Medicare Part A or Part B?; Does participant currently receive private health insurance coverage that works with, supplements, or replaces Medicare through Medicare HMO, Medigap Medicare, a Medicare Select policy, or other?; Does participant currently receive private health insurance coverage that does not supplement Medicare through individual private insurance, an employer, or other?)

	Coding	Variable details	
		2004	2011
Living alone	Dummy; 1 = Living alone, 0 = Not living alone, . = System missing, not part of MOSAQ*	WLS Graduate Phone: Household Module (2004; Number of household members including respondent)	WLS Graduate In Person: Household Roster Module (2011; Number of reported household members, participant included.)
Self-reported health	Categorical; 1 = Excellent, 2 = Very good, 3 = Good, fair, poor, . = System missing, refused, don't know	WLS Graduate Phone: Health Module (2004; In general, would you say your health is excellent, very good, good, fair, or poor?)	WLS Graduate In Person: Health Module (2011; In general, would you say your health is excellent, very good, good, fair, or poor?)
Established relationship with physician	Dummy; 1 = Yes, 0 = No, . = System missing, refused, don't know, partial interview	WLS Graduate Phone: Access to Health Care and Insurance (2004; Is there a doctor's office or other medical facility you usually go to when you are sick or need advice about your health? & Do you usually see the same health professional when you go to your usual medical facility)	WLS Graduate In Person: Access to and Utilization of Health Care (2011; Is there a doctor's office or other medical facility you usually go to when you are sick or need advice about your health? & Do you usually see the same health professional when you go to your usual medical facility?)
Previous experience with death	Dummy; 1 = Yes, 0 = No, . = System missing	WLS Graduate Phone: End of Life-Death Module [Spousal or Parental Death 6 months-10 years ago] (2004; Whose death is the respondent answering questions about, a parent's or a spouse's?)	WLS Graduate In Person: End of Life-Death Reactions Module [Spousal or Parental Death within past 10 years or since last interview (1992 or 2004)] (2011; Whose death is the respondent answering questions about, a parent's or a spouse's?)
Religiosity/spirituality	Categorical; 1 = Not at all, 2 = Not very, 3 = Somewhat, 4 = Very/extremely, . = System missing, left blank on MOSAQ*, not ascertained	WLS Graduate Mail: Religion and Spirituality Module (2004; How much would your spiritual or religious beliefs influence your medical decisions if you were to become gravely ill?)	WLS Graduate Mail: Religion and Spirituality Module (2011; How much would your spiritual or religious beliefs influence your medical decisions if you were to become gravely ill?)

	Coding	Variable details	
		2004	2011
Social Support	Dummy; 1 = Yes, 0 = No, . = System missing, left blank on MOSAQ*, not ascertained, refused	WLS Graduate Mail: Social Relationships Module (2004; Is there a person in your family with whom you can really share your very private feelings and concerns?; Is there a friend outside your family with whom you can really share your very private feelings and concerns?)	WLS Graduate Mail: Social Relationships Module (2011; Is there a person in your family with whom you can really share your very private feelings and concerns?; Is there a friend outside your family with whom you can really share your very private feelings and concerns?)

Notes. *MOSAQ (Mail-Only Self-Administered Questionnaire).

Table 2
Environmental Variables' Coding Structure and Variable Details

	Coding structure	Variable details
Environmental Variables		
Dartmouth Atlas		2004 data represents a 20% sub-sample of the population
Number of Medicare enrollees		
2004		
# of Medicare enrollees	Continuous; Top coded at 20,000	Dartmouth Atlas (2004)—Variables price, sex, age, and race adjusted
2011		
# of Medicare enrollees	Continuous; Top coded at 67,000	Dartmouth Atlas (2011)—Variables price, sex, age, and race adjusted
Medicare reimbursement (US dollars)		
2004		
Hospital & nursing facility	Continuous; natural log transformation used in analyses	Dartmouth Atlas (2004)—Variables price, sex, age, and race adjusted
Physician	Continuous; natural log transformation used in analyses	Dartmouth Atlas (2004)—Variables price, sex, age, and race adjusted
Hospice	Continuous; natural log transformation used in analyses	Dartmouth Atlas (2004)—Variables price, sex, age, and race adjusted
Home health agency	Continuous; natural log transformation used in analyses	Dartmouth Atlas (2004)—Variables price, sex, age, and race adjusted
2011		
Hospital & nursing facility	Continuous; natural log transformation used in analyses	Dartmouth Atlas (2011)—Variables price, sex, age, and race adjusted
Physician	Continuous; natural log transformation used in analyses	Dartmouth Atlas (2011)—Variables price, sex, age, and race adjusted
Hospice	Continuous; natural log transformation used in analyses	Dartmouth Atlas (2011)—Variables price, sex, age, and race adjusted
Home health agency	Continuous; natural log transformation used in analyses	Dartmouth Atlas (2011)—Variables price, sex, age, and race adjusted
US Census Bureau		
Age		
2000		
% 65 years of age and older	Continuous	Decennial Census (2000)
2010		
% 65 years of age and older	Continuous	Decennial Census (2010)
Disability		
2000		
% with a disability (all ages)	Continuous	Decennial Census (2000)
2010-2012		
% with a disability (all ages)	Continuous	US Census Bureau—American Community Survey (2010-2012)

	Coding structure	Variable details
Education		
2000		
% with higher education (at least a bachelor's degree)	Continuous	Decennial Census (2000)
2010-2012		
% with higher education (at least a bachelor's degree)	Continuous	American Community Survey (2010-2012)
Living alone		
2000		
% living alone	Continuous	Decennial Census (2000)
2010		
% living alone	Continuous	Decennial Census (2010)
Income		
2000		
Median household income (US dollars)	Continuous; natural log transformation used in analyses	Decennial Census (2000)
2010-2012		
Median household income (US dollars)	Continuous; natural log transformation used in analyses	American Community Survey (2010-2012)
Race/Ethnicity		
2000		
% Hispanic	Continuous; Top coded at 13%	Decennial Census (2000)
% Non-Hispanic White	Continuous; Bottom coded at 56%	Decennial Census (2000)
% Non-Hispanic Black	Continuous; Top coded at 19%	Decennial Census (2000)
% Non-Hispanic Other (includes Asian, Native American, Hawaiian, Other, and Multi-Racial)	Continuous; Top coded at 11%	Decennial Census (2000)
2010		
% Hispanic	Continuous; Top coded 21%	Decennial Census (2010)
% Non-Hispanic White	Continuous; Bottom coded at 48%	Decennial Census (2010)
% Non-Hispanic Black	Continuous; Top coded at 19%	Decennial Census (2010)
% Non-Hispanic Other (includes Asian, Native American, Hawaiian, Other, and Multi-Racial)	Continuous; Top coded at 9%	Decennial Census (2010)
Rurality		
2000		
% residing in rural area	Continuous	Decennial Census (2000)
2010		
% residing in rural area	Continuous	Decennial Census (2010)
Health insurance coverage		These data not available prior to 2010.
2010-2012		
% with health insurance (all ages)	Continuous	American Community Survey (2010-2012)
% with health insurance (all ages)	Continuous	American Community Survey (2010-2012)
Area Health Resource File		
Medical staffing and facility rates		

	Coding structure	Variable details
2005		
# of hospitals	Continuous; Top coded at 25	Area Health Resource File (2005)
# of nursing facilities	Continuous; Top coded at 60	Area Health Resource File (2005)
# of home health agencies	Continuous; Top coded at 20	Area Health Resource File (2005)
# of hospice agencies	Continuous; Top coded at 10	Area Health Resource File (2005)
# of general practitioners	Continuous; Top coded at 500	Area Health Resource File (2005)
# of medical specialists	Continuous; Top coded at 800	Area Health Resource File (2005)
2010		
# of hospitals	Continuous; Top coded at 25	Area Health Resource File (2010)
# of hospice agencies	Continuous; Top coded at 16	Area Health Resource File (2010)
# of general practitioners	Continuous; Top coded at 500	Area Health Resource File (2010)
# of medical specialists	Continuous; Top coded at 800	Area Health Resource File (2010)
2011		
# of nursing facilities	Continuous; Top coded at 60	Area Health Resource File (2011)
# of home health agencies	Continuous; Top coded at 27	Area Health Resource File (2011)

Table 3
Correlations Among Variables: Individual Variables (2004 Wave)

Religiosity/ spirituality[c]	Established relationship with physician	Have previous experience with death	Self-reported health[b]	Living alone	Parent	Household income[a]	Married	Years of education	Non-Hispanic White	Age	Female	**Individual variables**
.18***	.01	.04*	.00	.13***	-.01	-.13***	-.16***	-.16***	-.01	-.10***	1.00	Female
-.02	-.01	-.02	.08***	.02	-.01	-.04**	.00	-.11***	-.03*	1.00		Age
-.02	.02	.02	.01	-.02	.02	-.02	.03*	-.01	1.00			Non-Hispanic White
-.06***	-.02	.02	-.21***	.00	-.10***	.15***	.01	1.00				Years of education
.02	.06***	-.16***	-.06***	-.84***	.29***	.04**	1.00					Married
-.05**	.03*	.01	-.07***	-.04**	.03	1.00						Household income[a]
.00	-.01	.01	-.03	-.23***	1.00							Parent
-.01	-.06***	.14***	.06***	1.00								Living alone
-.02	.08***	-.02	1.00									Self-reported health[b]
.00	-.04**	1.00										Have previous experience with death
.02	1.00											Established relationship with physician
1.00												Religiosity/ spirituality[c]
												Social support
												Health insurance

Individual variables	Female	Age	Non-Hispanic White	Years of education	Married	Household income[a]	Parent	Living alone	Self-reported health[b]	Have previous experience with death	Established relationship with physician	Religiosity/ spirituality[c]	Social support	Health insurance
Social support	.10***	.00	-.02	-.02	.07***	.00	.06***	-.08***	-.04**	.00	.02	.07***	1.00	
Health insurance	-.03	.08***	.00	.05**	.09***	.05**	.01	-.04**	.01	-.01	.10***	-.05**	.00	1.00

Notes. *n* = 4,212.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
* p<.05. **p<.01. ***p<.001.

Table 4
Correlations Among Variables: Organizational Variables (2004 Wave)

Organizational variables	# of general practitioners	# of medical specialists	# of hospitals	# of home health agencies	# of hospice agencies	# of nursing facilities
# of general practitioners	1.00					
# of medical specialists	.86***	1.00				
# of hospitals	.84***	.85***	1.00			
# of home health agencies	.82***	.77***	.82***	1.00		
# of hospice agencies	.77***	.69***	.76***	.71***	1.00	
# of nursing facilities	.87***	.86***	.84***	.78***	.73***	1.00

Notes. $n = 420$.
* p<.05. **p<.01. ***p<.001.

Table 5

Correlations Among Variables: Community Variables (2004 Wave)

% living alone	% 65 years of age and older	% with higher education	Physician Medicare reimbursement[a]	Hospital and nursing facility Medicare reimbursement[a]	Hospice Medicare reimbursement[a]	Home health Medicare reimbursement[a]	# of Medicare enrollees	**Community variables**
.21***	.04	.28***	.55***	.22***	.00	.26***	1.00	# of Medicare enrollees
-.10	-.09	.06	.44***	.45***	.30***	1.00		Home health Medicare reimbursement[a]
-.14*	-.08	-.05	.14*	.16**	1.00			Hospice Medicare reimbursement[a]
-.06	-.07	-.16**	.51***	1.00				Hospital and nursing facility Medicare reimbursement[a]
-.06	.04	.20***	1.00					Physician Medicare reimbursement[a]
.11*	-.41***	1.00						% with higher education
.34***	1.00							% 65 years of age and older
1.00								% living alone
								% with a disability
								% Hispanic
								% Non-Hispanic White
								% Non-Hispanic Black
								% Non-Hispanic Other
								% with health insurance
								Median household income[a]
								% rural

% rural	Median household[a] income	% with health insurance coverage	% Non-Hispanic Other	% Non-Hispanic Black	% Non-Hispanic White	% Hispanic	% with a disability	**Community variables**
-.61***	.23***	-.14*	.26***	.40***	-.42***	.32***	.05	# of Medicare enrollees
-.17**	-.05	-.36***	.03	.30***	-.28***	.18***	.27***	Home health Medicare reimbursement[a]
-.03	-.06	-.27***	-.01	.18**	-.21***	.13*	.16**	Hospice Medicare reimbursement[a]
-.11	.23	-.07	-.18**	.39***	-.12*	-.06	.18**	Hospital and nursing facility Medicare reimbursement[a]
-.47***	.21***	-.28***	.03	.51***	-.38***	.26***	.15**	Physician Medicare reimbursement[a]
-.53***	.65***	.23***	.42***	.13*	-.21***	.22***	-.61***	% with higher education
.27***	-.46***	-.05	-.30***	-.16**	.30***	-.19***	.58***	% 65 years of age and older
-.21***	-.36***	.05	.02	.14*	-.02	-.14*	.24***	% living alone
.21***	-.72***	-.48***	-.14*	.23***	-.19***	.00	1.00	% with a disability
-.48***	.14*	-.46***	.39***	.11*	-.67***	1.00		% Hispanic
.52***	-.01	.49***	-.47***	-.65***	1.00			% Non-Hispanic White
-.36***	.04	-.22***	.11*	1.00				% Non-Hispanic Black
-.35***	.23***	-.12*	1.00					% Non-Hispanic Other
.09	.43***	1.00						% with health insurance
-.35***	1.00							Median household income[a]
1.00								% rural

Notes. $n = 325$.
[a]Natural log.
* p<.05. **p<.01. ***p<.001.

Table 6

Correlations Among Variables: Individual Variables (2011 Wave)

Self-reported health[b]	Living alone status	Parent	Household income[a]	Married	Years of education	Non-Hispanic White	Age	Female	**Individual variables**
-.01	.16***	.01	-.15***	-.19***	-.21***	.01	-.01	1.00	Female
.07***	.03	.02	-.09***	-.06***	-.16***	.00	1.00		Age
.02	-.01	.00	-.01	.02	.00	1.00			Non-Hispanic White
-.20***	-.06**	-.09***	.15***	.07***	1.00				Years of education
-.09***	-.84***	.26***	.04*	1.00					Married
-.04*	-.05**	.03	1.00						Household income[a]
-.04*	-.24***	1.00							Parent
.07***	1.00								Living alone status
1.00									Self-reported health[b]
									Have previous experience with death
									Established relationship with physician
									Religiosity/ spirituality[c]
									Have social support
									Health insurance

Individual variables	Have previous experience	Established relationship with physician	Religiosity/ spirituality[c]	Have social support	Health insurance
Female	.07***	.01	.21***	.09***	-.01
Age	.02	-.04*	-.03	-.04*	.00
Non-Hispanic White	.00	-.02	-.01	.00	-.01
Years of education	-.03	.03	-.09***	.02	.01
Married	-.22***	.03	.03	.06**	.02
Household income[a]	-.02	.05**	-.05*	.01	.09***
Parent	.00	.00	-.02	.10***	-.01
Living alone status	.19***	-.03	.00	-.06***	-.01
Self-reported health[b]	.02	.01	-.03	-.04*	.02
Have previous experience with death	1.00	-.01	.02	.00	-.01
Established relationship with		1.00	.00	.00	.06***
Religiosity/ spirituality[c]			1.00	.08***	.03
Have social support				1.00	.01
Health insurance					1.00

Notes. n = 3,272.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
*p < .05; **p < .01; ***p < .001.

Table 7

Correlations Among Variables: Organizational Variables (2011 Wave)

Organizational variables	# of general practitioners	# of medical specialists	# of hospitals	# of home health agencies	# of hospice agencies	# of nursing facilities
# of general practitioners	1.00					
# of medical specialists	.86***	1.00				
# of hospitals	.85***	.84***	1.00			
# of home health agencies	.78***	.75***	.77***	1.00		
# of hospice agencies	.69***	.63***	.71***	.66***	1.00	
# of nursing facilities	.86***	.86***	.87***	.78***	.68***	1.00

Notes. $n = 366$.

*p < .05; **p < .01; ***p < .001.

Table 8
Correlations Among Variables: Community Variables (2011 Wave)

% living alone	% 65 years of age and older	% with higher education	Physician Medicare reimbursement[a]	Hospital and nursing facility Medicare reimbursement[a]	Hospice Medicare reimbursement[a]	Home health Medicare reimbursement[a]	# of Medicare enrollees	**Community variables**
.09	-.12*	.42***	.60***	.36***	.09	.39***	1.00	# of Medicare enrollees
-.20***	-.12*	.10	.58***	.57***	.45***	1.00		Home health Medicare reimbursement[a]
-.18***	-.15**	-.02	.28***	.23***	1.00			Hospice Medicare reimbursement[a]
-.09	-.12*	-.09	.54***	1.00				Hospital and nursing facility Medicare reimbursement[a]
-.16**	-.01	.21***	1.00					Physician Medicare reimbursement[a]
.14*	-.37***	1.00						% with higher education
.28***	1.00							% 65 years of age and older
1.00								% living alone
								% with a disability
								% Hispanic
								% Non-Hispanic White
								% Non-Hispanic Black
								% Non-Hispanic Other
								% with health insurance
								Median household income[a]
								% rural

% rural	Median household income[a]	% with health insurance	% Non-Hispanic Other	% Non-Hispanic Black	% Non-Hispanic White	% Hispanic	% with a disability	**Community variables**
-.67***	.31***	-.15**	.47***	.43***	-.57***	.48***	-.27***	# of Medicare enrollees
-.29***	.00	-.42***	.09	.41***	-.41***	.35***	.08	Home health Medicare reimbursement[a]
-.15**	-.11*	-.26***	-.03	.24***	-.20***	.15**	.01	Hospice Medicare reimbursement[a]
-.28***	.01	-.12*	.01	.40***	-.21***	.09	.07	Hospital and nursing facility Medicare reimbursement[a]
-.50***	.20***	-.29***	.24***	.47***	-.48***	.40***	-.10	Physician Medicare reimbursement[a]
-.55***	.65***	.26***	.56***	.17**	-.26***	.18***	-.66***	% with higher
.42***	-.38***	.02	-.47***	-.24***	.38***	-.25***	.63***	% 65 years of age and older
-.09	-.36***	.17**	.04	.15*	.00	-.19***	.25***	% living alone
.48***	-.69***	-.21***	-.43***	-.07	.21***	-.22***	1.00	% with a disability
-.45***	.16**	-.47***	.44***	.16**	-.75***	1.00		% Hispanic
.57***	-.11*	.46***	-.55***	-.66***	1.00			% Non-Hispanic White
-.41***	.05	-.20***	.25***	1.00				% Non-Hispanic Black
-.60***	.40***	-.01	1.00					% Non-Hispanic Other
.00	.39***	1.00						% with health insurance
-.36***	1.00							Median household income[a]
1.00								% rural

Notes. $n = 348$.
[a]Natural log.
*p < .05; **p < .01; ***p < .001.

Table 9a

Variance Inflation Factors (2004 Wave)

	Any EOL Planning			Informal ACP	
	VIF	1/*VIF*		*VIF*	1/*VIF*
Number of Medicare enrollees	29.14	0.03	Number of Medicare enrollees	28.77	0.03
Number of medical specialists	19.23	0.05	Number of medical specialists	19.09	0.05
Number of general practitioners	17.08	0.06	Number of general practitioners	16.96	0.06
Number of hospitals	15.70	0.06	Number of hospitals	15.64	0.06
Number of skilled nursing facilities	13.63	0.07	Number of skilled nursing facilities	13.60	0.07
Number of home health agencies	11.36	0.09	Number of home health agencies	11.38	0.09
% with disability	9.32	0.11	% with disability	9.43	0.11
Median household income[a]	8.01	0.12	Median household income[a]	8.11	0.12
% with health insurance coverage	6.34	0.16	% with health insurance coverage	6.26	0.16
% with higher education	5.79	0.17	% with higher education	5.78	0.17
Number of hospice agencies	5.73	0.17	Number of hospice agencies	5.73	0.17
% living alone	5.58	0.18	% living alone	5.47	0.18
% 65 years of age and older	5.30	0.19	% 65 years of age and older	5.23	0.19
% residing in rural residence	4.71	0.21	% residing in rural residence	4.71	0.21
% Non-Hispanic Black	4.56	0.22	% Non-Hispanic Black	4.46	0.22
% Hispanic	4.27	0.24	% Hispanic	4.16	0.24
Physician reimbursement[a]	3.84	0.26	Physician reimbursement[a]	3.87	0.26
Married	3.61	0.28	Married	3.62	0.28
Living alone	3.41	0.29	Living alone	3.42	0.29
Home health reimbursement[a]	2.54	0.39	Home health reimbursement[a]	2.53	0.39
% Non-Hispanic Other race	2.40	0.42	% Non-Hispanic Other race	2.37	0.42
Hospital and nursing facility Medicare reimbursement[a]	1.99	0.50	Hospital and nursing facility Medicare reimbursement[a]	1.99	0.50
Hospice reimbursement[a]	1.54	0.65	Hospice reimbursement[a]	1.55	0.65
Years of education	1.23	0.81	Years of education	1.23	0.81
Female	1.14	0.88	Female	1.14	0.88
Parent	1.12	0.89	Parent	1.12	0.89
Self-reported health[b]	1.08	0.92	Self-reported health[b]	1.08	0.92
Religiosity/spirituality[c]	1.07	0.94	Religiosity/spirituality[c]	1.07	0.94
Household income[a]	1.06	0.94	Household income[a]	1.06	0.94
Age	1.05	0.95	Age	1.05	0.95
Health insurance status	1.04	0.96	Health insurance status	1.04	0.96
Established relationship with physician	1.04	0.96	Established relationship with physician	1.04	0.96
Have previous experience with death	1.04	0.97	Have previous experience with death	1.04	0.97
Have social support	1.03	0.97	Have social support	1.03	0.97
Non-Hispanic White	1.02	0.98	Non-Hispanic White	1.02	0.98
Mean VIF	5.63		**Mean VIF**	5.63	

Notes. [a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.

Table 9b
Variance Inflation Factors (2004 Wave)

Formal ACP			DPAHC Status			Two-Pronged Approach		
	VIF	1/*VIF*		*VIF*	1/*VIF*		*VIF*	1/*VIF*
Number of Medicare enrollees	28.71	0.03	Number of Medicare enrollees	28.77	0.03	Number of Medicare enrollees	28.7 7	0.03
Number of medical specialists	19.06	0.05	Number of medical specialists	19.07	0.05	Number of medical specialists	19.0 9	0.05
Number of general practitioners	16.94	0.06	Number of general practitioners	16.97	0.06	Number of general practitioners	16.9 6	0.06
Number of hospitals	15.61	0.06	Number of hospitals	15.64	0.06	Number of hospitals	15.64	0.06
Number of skilled nursing facilities	13.63	0.07	Number of skilled nursing facilities	13.60	0.07	Number of skilled nursing facilities	13.60	0.07
Number of home health agencies	11.36	0.09	Number of home health agencies	11.38	0.09	Number of home health agencies	11.37	0.09
% with disability	9.42	0.11	% with disability	9.45	0.11	% with disability	9.43	0.11
Median household income[a]	8.11	0.12	Median household income[a]	8.12	0.12	Median household income[a]	8.11	0.12
% with health insurance coverage	6.26	0.16	% with health insurance coverage	6.26	0.16	% with health insurance coverage	6.26	0.16
% with higher education	5.79	0.17	% with higher education	5.79	0.17	% with higher education	5.78	0.17
Number of hospice agencies	5.71	0.18	Number of hospice agencies	5.72	0.17	Number of hospice agencies	5.73	0.17
% living alone	5.47	0.18	% living alone	5.48	0.18	% living alone	5.47	0.18
% 65 years of age and older	5.23	0.19	% 65 years of age and older	5.23	0.19	% 65 years of age and older	5.23	0.19
% residing in rural residence	4.70	0.21	% residing in rural residence	4.70	0.21	% residing in rural residence	4.71	0.21
% Non-Hispanic Black	4.46	0.22	% Non-Hispanic Black	4.46	0.22	% Non-Hispanic Black	4.46	0.22
% Hispanic	4.15	0.24	% Hispanic	4.16	0.24	% Hispanic	4.16	0.24
Physician reimbursement[a]	3.86	0.26	Physician reimbursement[a]	3.86	0.26	Physician reimbursement[a]	3.87	0.26
Married	3.61	0.28	Married	3.62	0.28	Married	3.62	0.28
Living alone	3.42	0.29	Living alone	3.42	0.29	Living alone	3.42	0.29
Home health reimbursement[a]	2.53	0.39	Home health reimbursement[a]	2.53	0.39	Home health reimbursement[a]	2.53	0.39
% Non-Hispanic Other race	2.37	0.42	% Non-Hispanic Other race	2.37	0.42	% Non-Hispanic Other race	2.37	0.42
Hospital and nursing facility Medicare reimbursement[a]	1.99	0.50	Hospital and nursing facility Medicare reimbursement[a]	1.99	0.50	Hospital and nursing facility Medicare reimbursement[a]	1.99	0.50
Hospice reimbursement[a]	1.54	0.65	Hospice reimbursement[a]	1.55	0.65	Hospice reimbursement[a]	1.55	0.65
Years of education	1.23	0.81	Years of education	1.23	0.81	Years of education	1.23	0.81
Female	1.14	0.88	Female	1.14	0.87	Female	1.14	0.88
Parent	1.12	0.89	Parent	1.12	0.89	Parent	1.12	0.89
Self-reported health[b]	1.08	0.92	Self-reported health[b]	1.08	0.92	Self-reported health[b]	1.08	0.92
Religiosity/spirituality[c]	1.07	0.94	Religiosity/spirituality[c]	1.07	0.94	Religiosity/spirituality[c]	1.07	0.94
Household income[a]	1.06	0.94	Household income[a]	1.06	0.94	Household income[a]	1.06	0.94
Age	1.05	0.95	Age	1.05	0.95	Age	1.05	0.95
Health insurance status	1.05	0.96	Established relationship with physician	1.04	0.96	Health insurance status	1.04	0.96
Established relationship with physician	1.04	0.96	Health insurance status	1.04	0.96	Established relationship with physician	1.04	0.96
Have previous experience with death	1.04	0.97	Have previous experience with death	1.04	0.97	Have previous experience with death	1.04	0.97
Have social support	1.03	0.97	Have social support	1.03	0.97	Have social support	1.03	0.97
Non-Hispanic White	1.02	0.98	Non-Hispanic White	1.02	0.98	Non-Hispanic White	1.02	0.98
Mean VIF	5.62		**Mean VIF**	5.63		**Mean VIF**	5.63	

Notes. [a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*

Table 10a

Variance Inflation Factors (2011 Wave)

	Any EOL Planning			Informal ACP	
	VIF	1/*VIF*		*VIF*	1/*VIF*
Number of medical specialists	21.07	0.05	Number of medical specialists	21.07	0.05
Number of Medicare enrollees	19.46	0.05	Number of Medicare enrollees	19.45	0.05
Number of hospitals	16.01	0.06	Number of hospitals	16.02	0.06
Number of general practitioners	14.84	0.07	Number of general practitioners	14.78	0.07
Number of skilled nursing facilities	11.56	0.09	Number of skilled nursing facilities	11.56	0.09
Number of home health agencies	9.64	0.10	Number of home health agencies	9.64	0.10
Median household income[a]	8.60	0.12	Median household income[a]	8.62	0.12
% with higher education	7.12	0.14	% with higher education	7.12	0.14
Number of hospice agencies	6.66	0.15	Number of hospice agencies	6.67	0.15
% residing in rural residence	5.15	0.19	% residing in rural residence	5.14	0.19
% with health insurance coverage	5.07	0.20	% with health insurance coverage	5.07	0.20
% living alone	5.01	0.20	% living alone	5.01	0.20
Physician reimbursement[a]	4.63	0.22	Physician reimbursement[a]	4.62	0.22
% Hispanic	4.36	0.23	% Hispanic	4.36	0.23
% with a disability	4.30	0.23	% with a disability	4.31	0.23
% 65 years of age and older	4.30	0.23	% 65 years of age and older	4.29	0.23
% Non-Hispanic Black	3.96	0.25	% Non-Hispanic Black	3.96	0.25
Married	3.65	0.27	Married	3.64	0.27
Home health reimbursement[a]	3.54	0.28	Home health reimbursement[a]	3.54	0.28
Living alone	3.51	0.29	Living alone	3.49	0.29
Hospital and nursing facility Medicare reimbursement[a]	2.64	0.38	Hospital and nursing facility Medicare reimbursement[a]	2.64	0.38
% Non-Hispanic Other race	2.61	0.38	% Non-Hispanic Other race	2.61	0.38
Hospice reimbursement[a]	1.48	0.67	Hospice reimbursement[a]	1.48	0.67
Years of education	1.26	0.79	Years of education	1.26	0.79
Female	1.18	0.85	Female	1.18	0.85
Parent	1.13	0.89	Parent	1.13	0.89
Religiosity/spirituality[b]	1.09	0.92	Religiosity/spirituality[b]	1.09	0.92
Self-reported health[c]	1.07	0.93	Self-reported health[c]	1.07	0.93
Household income[a]	1.06	0.94	Household income[a]	1.07	0.94
Have previous experience with death	1.06	0.94	Have previous experience with death	1.06	0.94
Age	1.06	0.95	Age	1.06	0.95
Have social support	1.04	0.97	Have social support	1.04	0.97
Health insurance status	1.03	0.97	Health insurance status	1.03	0.97
Established relationship with physician	1.02	0.98	Established relationship with physician	1.02	0.98
Non-Hispanic White	1.02	0.98	Non-Hispanic White	1.02	0.99
Mean VIF	5.20		**Mean VIF**	5.20	

Notes. [a]Natural log. [b]1 = *not at all* to 4 = *very/extremely*. [c]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*.

Table 10b
Variance Inflation Factors (2011 Wave)

Formal ACP			DPAHC Status			Two-Pronged Approach		
	VIF	1/*VIF*		*VIF*	1/*VIF*		*VIF*	1/*VIF*
Number of medical specialists	21.15	0.05	Number of medical specialists	21.07	0.05	Number of medical specialists	21.07	0.05
Number of Medicare enrollees	19.52	0.05	Number of Medicare enrollees	19.46	0.05	Number of Medicare enrollees	19.45	0.05
Number of hospitals	16.05	0.06	Number of hospitals	16.01	0.06	Number of hospitals	16.02	0.06
Number of general practitioners	14.84	0.07	Number of general practitioners	14.84	0.07	Number of general practitioners	14.78	0.07
Number of skilled nursing facilities	11.63	0.09	Number of skilled nursing facilities	11.56	0.09	Number of skilled nursing facilities	11.56	0.09
Number of home health agencies	9.66	0.10	Number of home health agencies	9.64	0.10	Number of home health agencies	9.64	0.10
Median household income[a]	8.63	0.12	Median household income[a]	8.60	0.12	Median household income[a]	8.62	0.12
% with higher education	7.15	0.14	% with higher education	7.12	0.14	% with higher education	7.12	0.14
Number of hospice agencies	6.70	0.15	Number of hospice agencies	6.66	0.15	Number of hospice agencies	6.67	0.15
% residing in rural residence	5.16	0.19	% residing in rural residence	5.15	0.19	% residing in rural residence	5.14	0.19
% with health insurance coverage	5.08	0.20	% with health insurance coverage	5.07	0.20	% with health insurance coverage	5.07	0.20
% living alone	5.02	0.20	% living alone	5.01	0.20	% living alone	5.01	0.20
Physician reimbursement[a]	4.64	0.22	Physician reimbursement[a]	4.63	0.22	Physician reimbursement[a]	4.62	0.22
% Hispanic	4.37	0.23	% Hispanic	4.36	0.23	% Hispanic	4.36	0.23
% with a disability	4.31	0.23	% with a disability	4.30	0.23	% with a disability	4.31	0.23
% 65 years of age and older	4.30	0.23	% 65 years of age and older	4.30	0.23	% 65 years of age and older	4.29	0.23
% Non-Hispanic Black	3.96	0.25	% Non-Hispanic Black	3.96	0.25	% Non-Hispanic Black	3.96	0.25
Married	3.65	0.27	Married	3.65	0.27	Married	3.64	0.27
Living alone	3.50	0.29	Living alone	3.51	0.29	Living alone	3.49	0.29
Hospital and nursing facility Medicare reimbursement[a]	2.65	0.38	Hospital and nursing facility Medicare reimbursement[a]	2.64	0.38	Hospital and nursing facility Medicare reimbursement[a]	2.64	0.38
% Non-Hispanic Other race	2.62	0.38	% Non-Hispanic Other race	2.61	0.38	% Non-Hispanic Other race	2.61	0.38
Hospice reimbursement[a]	1.48	0.67	Hospice reimbursement[a]	1.48	0.67	Hospice reimbursement[a]	1.48	0.67
Years of education	1.26	0.79	Years of education	1.26	0.79	Years of education	1.26	0.79
Female	1.18	0.85	Female	1.18	0.85	Female	1.18	0.85
Parent	1.13	0.89	Parent	1.13	0.89	Parent	1.13	0.89
Religiosity/spirituality[b]	1.09	0.92	Religiosity/spirituality[b]	1.09	0.92	Religiosity/spirituality[b]	1.09	0.92

	Formal ACP			DPAHC Status			Two-Pronged Approach	
	VIF	1/*VIF*		*VIF*	1/*VIF*		*VIF*	1/*VIF*
Have previous experience with death	1.06	0.94	Have previous experience with death	1.06	0.94	Have previous experience with death	1.06	0.94
Age	1.06	0.95	Age	1.06	0.95	Age	1.06	0.95
Have social support	1.04	0.97	Have social support	1.04	0.97	Have social support	1.04	0.97
Health insurance status	1.03	0.97	Health insurance status	1.03	0.97	Health insurance status	1.03	0.97
Established relationship with physician	1.02	0.98	Established relationship with physician	1.02	0.98	Established relationship with physician	1.02	0.98
Non-Hispanic White	1.02	0.99	Non-Hispanic White	1.02	0.98	Non-Hispanic White	1.02	0.99
Mean VIF	5.22		**Mean VIF**	5.20		**Mean VIF**	5.20	

Notes. [a]Natural log. [b]1 = *not at all* to 4 = *very/extremely*. [c]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*.

Table 11
Waves 1 and 2 Sample Descriptives

	Wave 1 (2004)			Wave 2 (2011)			*t*-test
	n (%) or *M(SD)*	Range	Missing (%)	*n* (%) or *M(SD)*	Range	Missing (%)	
Individual variables							
Control variables							
Gender			0 (0)			0 (0)	-1.41
Female	2,030 (45.53)			2,559 (55.95)			
Male	2,429 (54.47)			2,015 (44.05)			
Age	64.33 (0.68)	63:66	0 (0)	71.20 (0.90)	70:73	0 (0)	-410.00***
Race			55 (1.23)			384 (8.40)	-0.51
Yes	4,375 (98.12)			4,166 (91.08)			
No	29 (0.65)			24 (0.52)			
Education	13.70 (2.31)	12:20	0 (0)	13.91 (2.41)	12:20	152 (3.32)	-4.0938***
Marital status			2 (0.04)			214 (4.68)	10.65***
Currently married	3,522 (78.99)			3,015 (65.92)			
Not currently married	935 (20.97)			1,345 (29.41)			
Parental status			0 (0)			145 (3.17)	1.66
Yes	4,160 (93.29)			4,147 (90.66)			
No	299 (6.71)			282 (6.17)			
Household income	68,572.16 (128,628.60)	0:5,272,488	32 (0.72)	63,829.63 (643814.10)	0:41,000,000	144 (3.15)	0.48
Health insurance			0 (0)			124 (2.71)	-12.14***
Yes	4,251 (95.34)			4,424 (96.72)			
No	208 (4.66)			26 (0.57)			
Living alone			0 (0)			121 (2.65)	-8.75***
Yes	737 (16.53)			1,066 (23.31)			
No	3,722 (83.47)			3,387 (74.05)			
Self-reported health			0 (0)			120 (2.62)	-5.64***
Excellent	1,142 (25.61)			904 (19.76)			
Very good	1,725 (38.69)			1,790 (39.13)			
Good / Fair / Poor	1,592 (35.70)			1,760 (38.48)			
Established relationship with physician			78 (1.75)			108 (2.36)	0.04
Yes	3,978 (89.21)			4,054 (88.63)			
No	403 (9.04)			412 (9.01)			
Religiosity/ spirituality			112 (2.51)			462 (10.10)	-4.75***
Not at all	1,161 (26.04)			1,107 (24.20)			
Not very	1,107 (24.83)			923 (20.18)			
Somewhat	1,360 (30.50)			1,044 (22.82)			
Extremely/Very	719 (16.12)			1,038 (22.69)			
Social support			64 (1.44)			422 (9.23)	1.66
Yes	4,128 (92.58)			3,863 (84.46)			
No	267 (5.99)			289 (6.32)			

	Wave 1 (2004)			Wave 2 (2011)			*t*-test
	n (%) or *M(SD)*	Range	Missing (%)	*n* (%) or *M(SD)*	Range	Missing (%)	
Previous experience with death			0 (0)			18 (0.39)	6.78***
Yes	1,346 (30.19)			1,087 (23.76)			
No	3,113 (69.81)			3,469 (75.84)			
ACP outcome measures							
Any EOL Planning			85 (1.91)			7 (0.15)	-10.80***
Yes	3,624 (81.27)			4,135 (90.45)			
No	750 (16.82)			432 (9.44)			
Informal ACP			75 (1.68)			2 (0.04)	-9.14***
Yes	3,254 (72.98)			3,756 (82.12)			
No	1,130 (25.34)			816 (17.84)			
Formal ACP			88 (1.97)			13 (0.28)	-18.86***
Yes	2,660 (59.65)			3,594 (78.57)			
No	1,711 (38.37)			967 (21.14)			
DPAHC Status			85 (1.91)			18 (0.39)	-21.05***
Yes	2,311 (51.83)			3,361 (73.48)			
No	2,063 (46.27)			1,195 (26.13)			
Two-Pronged Approach			74 (1.66)			1 (0.02)	-17.27***
Yes	2,346 (52.61)			3,242 (70.88)			
No	2,039 (45.73)			1,331 (29.10)			
Environmental variables							
Medicare enrollees							
# of Medicare enrollees	29,507.37 (31,267.47)	255:100,000	0 (0)	23,957.85 (22,923.50)	29:67,000	35 (0.77)	9.61***
Medicare reimbursement							
Hospital & nursing facility	3,358.51 (474.56)	1,716.46:6,592.29	2 (0.04)	4,142.68 (606.34)	2,255.72:6,242.40	38 (0.83)	-68.22***
Physician	1,739.41 (387.10)	901.94:3,628.35	0 (0)	2,189.26 (563.67)	1,111.22:4,793.62	35 (0.77)	-44.06***
Hospice	166.28 (64.29)	25.24:300	394 (8.84)	364.58 (139.43)	30.63:700	46 (1.01)	-74.26***
Home health agency	193.04 (86.90)	39.63:400	73 (1.64)	292.05 (160.34)	34.12:685	35 (0.77)	-36.09***
Age							
% 65 years of age and older	13.35 (3.49)	4.17:34.72	0 (0)	14.18 (3.72)	6.48:43.38	35 (0.77)	-10.88***
Disability							
% with a disability	16.61 (3.43)	8.27:32.05	0 (0)	11.16 (2.41)	4.79:25.35	242 (5.29)	85.99***
Education							
% with higher education	23.06 (8.80)	5.60:60.22	0 (0)	27.98 (9.74)	9.60:70.97	242 (5.29)	-24.83***
Living alone							
% living alone	25.80 (3.62)	11.15:43.79	0 (0)	27.32 (3.47)	11.60:46.29	35 (0.77)	-20.33***
Income							
Median household income	44,978.01 (9,064.46)	22,615:82,929	0 (0)	54,185.01 (11,300.99)	27,337:107,923	242 (5.29)	-42.20***
Race/Ethnicity							
% Hispanic	4.28 (3.96)	0.30:13	0 (0)	7.39 (6.27)	0.45:21	35 (0.77)	-28.09***
% Non-Hispanic White	85.89 (13.19)	56:98.74	0 (0)	80.98 (15.31)	48:98.13	35 (0.77)	16.27***
% Non-Hispanic Black	4.04 (5.73)	0.03:18	0 (0)	4.84 (6.04)	0.05:19	35 (0.77)	-6.46***
% Non-Hispanic Other	3.86 (2.54)	0.50:11	0 (0)	4.82 (2.39)	0.94:9	35 (0.77)	-18.42***

	Wave 1 (2004)			Wave 2 (2011)			*t*-test
	n (%) or *M(SD)*	Range	Missing (%)	*n* (%) or *M(SD)*	Range	Missing (%)	
Urban/Rural							
% residing in rural area	31.79 (28.09)	0.00-100.00	0 (0)	28.67 (27.14)	0:100	35 (0.77)	5.35***
Health insurance coverage							
% with any health insurance	89.40 (4.56)	54.27:96.59	224 (5.02)	89.41 (4.59)	54.27:96.23	242 (5.29)	-0.034
Medical staffing and facility rates							
# of general practitioners	121.73 (137.44)	0:500	0 (0)	129.17 (141.98)	0:500	35 (0.77)	-2.52*
# of medical specialists	233.91 (292.77)	0:800	0 (0)	250.91 (298.14)	0:800	35 (0.77)	-2.73**
# of hospitals	6.01 (6.91)	0:25	0 (0)	6.06 (6.41)	0:25	35 (0.77)	-0.30
# of hospice agencies	2.38 (2.87)	0:10	0 (0)	3.41 (4.38)	0:16	35 (0.77)	-13.18***
# of nursing facilities	14.77 (15.75)	0:60	0 (0)	15.23 (15.37)	0:60	35 (0.77)	-1.40
# of home health agencies	6.06 (6.83)	0:20	0 (0)	7.67 (9.41)	0:27	35 (0.77)	-9.27***

Notes. Wave 1 *N = 4,459;* Wave 2 *N=4,574.* *p < .05; **p < .01; ***p < .001.

Table 12a

Bivariate Correlations Between Predictor Variables and ACP outcomes

	Wave 1 (2004)				
	Any EOL	Informal ACP	Formal ACP	DPAHC Status	Two-Pronged Approach
Individual variables					
Female	0.02	0.08***	-0.02	0.02	0.03*
Age	-0.02	-0.04**	0.01	-0.01	-0.02
Non-Hispanic White	0.01	0.01	0.00	0.00	0.00
Years of education	0.07***	0.07***	0.08***	0.09***	0.09***
Married	0.05**	0.08***	0.03*	0.02	0.05**
Household income[a]	0.03*	0.05**	0.02	0.01	0.03*
Parent	0.06***	0.07***	0.04*	0.03*	0.05**
Living alone	-0.02	-0.06***	-0.01	-0.01	-0.03*
Self-reported health[b]	-0.04**	-0.04*	-0.05**	-0.04**	-0.05***
Have previous experience with death	0.03*	0.04**	0.05**	0.05**	0.05***
Established relationship with physician	0.05**	0.08***	0.05***	0.07***	0.07***
Religiosity/spirituality[c]	0.02	0.04*	0.00	0.01	0.02
Have social support	0.06***	0.07***	0.07***	0.07***	0.07***
Health insurance coverage	0.00	0.04**	0.03*	0.02	0.05***
Environmental variables					
# of general practitioners	0.02	0.03*	0.04*	0.05***	0.04**
# of medical specialists	0.02	0.03	0.04*	0.06***	0.04**
# of hospitals	0.02	0.03	0.02	0.04**	0.03
# of home health agencies	0.02	0.03*	0.03	0.05**	0.03*
# of hospice agencies	0.01	0.01	0.01	0.03	0.01
# of nursing facilities	0.02	0.03	0.03*	0.05**	0.04*
# of Medicare enrollees	0.03	0.03*	0.04**	0.06***	0.04**
Home health Medicare reimbursement[a]	0.03	0.03*	0.05**	0.06***	0.06***
Hospice Medicare reimbursement[a]	0.06***	0.06***	0.04**	0.03*	0.04**
Hospital and nursing facility Medicare reimbursement[a]	-0.01	0.01	-0.01	0.01	0.00
Physician reimbursement[a]	0.05**	0.05***	0.07***	0.07***	0.08***
% with higher education	0.03*	0.04*	0.06***	0.06***	0.07***
% 65 years of age and older	-0.02	-0.03	-0.02	-0.03	-0.03
% living alone	-0.02	-0.02	-0.03*	-0.01	-0.03*
% with a disability	0.01	0.00	-0.01	-0.01	-0.01
% Hispanic	0.04**	0.04**	0.06**	0.07***	0.06***
% Non-Hispanic White	-0.04*	-0.05**	-0.04*	-0.05**	-0.05**
% Non-Hispanic Black	0.01	0.02	0.01	0.03*	0.02
% Non-Hispanic Other	0.03*	0.03	0.03	0.03*	0.02
% with health insurance coverage	-0.03	-0.03	-0.02	-0.02	-0.01
Median household income[a]	0.03	0.02	0.06***	0.06***	0.06***
% residing in rural area	-0.04**	-0.05***	-0.07***	-0.08***	-0.08***

Notes. [a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
*p < .05; **p < .01; ***p < .001.

Table 12b

Bivariate Correlations Between Predictor Variables and ACP outcomes

	Wave 2 (2011)				
	Any EOL	Informal ACP	Formal ACP	DPAHC Status	Two-Pronged Approach
Individual variables					
Female	0.06***	0.07***	0.05**	0.05**	0.06***
Age	-0.04**	-0.05***	-0.04**	-0.05***	-0.05***
Non-Hispanic White	0.02	0.02	0.00	0.01	0.00
Years of education	0.05**	0.08***	0.06***	0.06***	0.08***
Married	0.02	0.05***	0.01	0.00	0.03*
Household income[a]	0.01	0.00	0.03*	0.04**	0.03
Parent	0.04**	0.05**	0.02	0.02	0.03*
Living alone	-0.01	-0.04*	0.01	0.01	-0.01
Self-reported health[b]	-0.02	-0.02	-0.04**	-0.04**	-0.04**
Have previous experience with death	0.05**	0.00	0.05**	0.05**	0.02
Established relationship with physician	0.08***	0.07***	0.06***	0.06***	0.06***
Religiosity/spirituality[c]	0.04*	0.04*	0.07***	0.07***	0.06***
Have social support	0.10***	0.13***	0.08***	0.07***	0.11***
Health insurance coverage	-0.01	0.01	-0.01	0.01	0.01
Environmental variables					
# of general practitioners	0.03	0.01	0.01	0.02	0.00
# of medical specialists	0.03	0.01	0.01	0.02	0.00
# of hospitals	0.03	0.00	0.01	0.02	0.00
# of home health agencies	0.01	-0.01	0.01	0.01	-0.01
# of hospice agencies	0.02	0.00	0.01	0.02	0.00
# of nursing facilities	0.03*	0.01	0.02	0.03	0.00
# of Medicare enrollees	0.03	0.00	0.03	0.03*	0.01
Home health Medicare reimbursement[a]	0.03*	0.01	0.03*	0.03*	0.02
Hospice Medicare reimbursement[a]	0.04**	0.04**	0.05***	0.05***	0.05***
Hospital and nursing facility Medicare reimbursement[a]	-0.01	-0.01	0.01	0.02	0.00
Physician reimbursement[a]	0.05**	0.02	0.04**	0.03*	0.03
% with higher education	0.03	0.02	0.02	0.03	0.02
% 65 years of age and older	0.00	-0.01	0.00	0.00	0.00
% living alone	-0.02*	-0.02	-0.03	-0.01	-0.01
% with a disability	-0.01	0.00	-0.01	-0.01	-0.01
% Hispanic	0.02	0.02	0.03*	0.03*	0.02
% Non-Hispanic White	-0.02	-0.01	-0.02	-0.02	-0.01
% Non-Hispanic Black	0.00	-0.01	0.01	0.02	0.00
% Non-Hispanic Other	0.01	0.01	0.01	0.01	0.01
% with health insurance coverage	0.00	0.00	0.01	0.01	0.01
Median household income[a]	0.02	0.02	0.03	0.03	0.02
% residing in rural area	-0.04**	-0.02	-0.04**	-0.04*	-0.03*

Notes. [a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.

*p < .05; **p < .01; ***p < .001.

Table 13
Intraclass Correlations

	ICC	*SE*	95% *CI*
Wave 1 (2004)			
Any EOL Planning	0.01	0.01	0.00:0.08
Informal ACP	0.00	0.01	0.00:1.00
Formal ACP	0.01	0.01	0.00:0.03
DPAHC Status	0.01	0.01	0.00:0.04
Two-Pronged Approach	0.01	0.01	0.00:0.03
Wave 2 (2011)			
Any EOL Planning	0.04	0.02	0.01:0.12
Informal ACP	0.01	0.01	0.00:0.06
Formal ACP	0.02	0.01	0.01:0.06
DPAHC Status	0.01	0.01	0.00:0.06
Two-Pronged Approach	0.01	0.01	0.00:0.04

Table 14a
Aim 1 Findings (2004 Wave)

	Any EOL Planning			Informal ACP			Formal ACP		
	B	*SE*	*OR*	*B*	*SE*	*OR*	*B*	*SE*	*OR*
Variables									
Fixed effects									
Individual variables									
Female	0.15	0.09	1.16	0.45***	0.08	1.56	-0.04	0.07	0.96
Age	-0.03	0.07	0.98	-0.07	0.06	0.93	0.03	0.05	1.03
Educational attainment	0.08***	0.02	1.08	0.07***	0.02	1.08	0.05**	0.02	1.06
Married	0.20	0.11	1.22	0.35**	0.10	1.41	0.09	0.09	1.10
Household income[a]	0.02	0.01	1.02	0.03*	0.01	1.03	0.01	0.01	1.01
Parent	0.42*	0.17	1.52	0.42**	0.15	1.52	0.23	0.14	1.26
Self-reported health[b]	-0.13*	0.06	0.88	-0.08	0.05	0.92	-0.08	0.05	0.92
Have previous experience with death	0.21*	0.10	1.24	0.25**	0.09	1.29	0.20**	0.08	1.22
Established relationship with physician	0.52***	0.14	1.68	0.62***	0.13	1.87	0.43***	0.12	1.54
Religiosity/ spirituality[c]	0.05	0.04	1.05	0.06	0.04	1.06	0.02	0.03	1.02
Have social support	0.47**	0.17	1.60	0.47**	0.15	1.59	0.47**	0.14	1.60
Health insurance coverage	-0.06	0.24	0.94	0.29	0.20	1.34	0.24	0.19	1.28
Environmental variables									
# home health agencies	0.01	0.02	1.01	0.02	0.01	1.02	0.00	0.01	1.00
# hospice agencies	-0.06	0.03	0.94	-0.06*	0.03	0.94	-0.02	0.02	0.98
Medicare home health reimbursement[a]	0.02	0.14	1.02	0.06	0.12	1.07	0.11	0.11	1.12
Medicare hospice reimbursement[a]	0.20	0.11	1.22	0.16	0.10	1.17	0.02	0.09	1.02
Medicare hospital and nursing facility reimbursement[a]	-0.70	0.46	0.50	-0.46	0.40	0.63	-0.82*	0.35	0.44
Medicare physician reimbursement[a]	-0.23	0.44	0.80	-0.14	0.39	0.87	0.49	0.34	1.63
% 65 years of age and older	0.01	0.02	1.01	0.01	0.02	1.01	0.02	0.02	1.02
% Hispanic	0.02	0.02	1.02	0.02	0.02	1.02	0.03	0.02	1.03
% Non-Hispanic Black	0.00	0.01	1.00	0.01	0.01	1.01	-0.01	0.01	0.99

	Any EOL Planning			Informal ACP			Formal ACP		
	B	*SE*	*OR*	*B*	*SE*	*OR*	*B*	*SE*	*OR*
% of population with health insurance coverage	0.00	0.02	1.00	0.02	0.02	1.02	0.02	0.02	1.02
Median household income[a]	-0.37	0.64	0.69	-1.08	0.56	0.34	-0.11	0.48	0.90
% residing in rural area	-0.01	0.00	0.99	-0.01	0.00	0.99	0.00	0.00	1.00
Random effects									
Level-2 variance	0.00	0.00	—	0.00	0.00	—	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.05			0.07			0.04		

Notes. Any EOL Planning *n* = 3,799; *county* = 499; Informal ACP *n* = 3,807; *county* = 499; Formal ACP *n* = 3,798; *county* = 499.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
*p < .05; **p < .01; ***p < .001.

Table 14b
Aim 1 Findings (2004 Wave)

	DPAHC Status			Two-Pronged Approach		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Variables						
Fixed effects						
Individual variables						
Female	0.12	0.07	1.13	0.20**	0.07	1.22
Age	0.00	0.05	1.00	-0.01	0.05	0.99
Educational attainment	0.06***	0.02	1.06	0.07***	0.02	1.07
Married	0.10	0.09	1.11	0.20*	0.09	1.22
Household income[a]	0.01	0.01	1.01	0.01	0.01	1.01
Parent	0.25	0.14	1.28	0.30*	0.14	1.35
Self-reported health[b]	-0.07	0.04	0.94	-0.07	0.04	0.93
Have previous experience with death	0.19*	0.07	1.21	0.24**	0.07	1.28
Established relationship with physician	0.54***	0.12	1.72	0.52***	0.12	1.69
Religiosity/spirituality[c]	0.01	0.03	1.01	0.03	0.03	1.03
Have social support	0.46**	0.14	1.58	0.46**	0.14	1.59
Health insurance coverage	0.21	0.19	1.23	0.46*	0.19	1.58
Environmental variables						
# home health agencies	0.01	0.01	1.01	0.00	0.01	1.00
# of hospice agencies	-0.04	0.02	0.96	-0.03	0.02	0.97
Medicare home health reimbursemen[a]	0.19	0.10	1.21	0.18	0.10	1.20
Medicare hospice reimbursement[a]	-0.01	0.08	0.99	0.03	0.08	1.03
Medicare hospital and nursing facility reimbursement[a]	-0.65	0.34	0.52	-0.73*	0.34	0.48
Medicare physician reimbursement [a]	0.38	0.33	1.46	0.38	0.33	1.46
% with higher education	0.00	0.01	1.00	0.01	0.01	1.01
% 65 years of age and older	0.01	0.02	1.01	0.02	0.02	1.02
% living alone	0.00	0.02	1.00	-0.03	0.02	0.97
% Hispanic	0.03	0.02	1.03	0.03	0.02	1.03
% Non-Hispanic Black	0.00	0.01	1.00	0.00	0.01	1.00
% Non-Hispanic Other	0.00	0.02	1.00	-0.01	0.02	0.99
% of population with health insurance coverage	0.03	0.02	1.03	0.03	0.02	1.03
Median household income[a]	0.20	0.46	1.23	-0.62	0.47	0.54
% residing in rural area	0.00	0.00	1.00	0.00	0.00	1.00
Random effects						
Level-2 variance	0.00	0.00	—	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.04			0.05		

Notes. DPAHC Status *n* = 3,799; *county* = 499; Two-Pronged Approach *n* = 3,808; *county* = 499.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
*p < .05; **p < .01; ***p < .001.

Table 15
Aim 1 Findings (2011 Wave)

	Any EOL Planning			Informal ACP			Formal ACP		
	B	*SE*	*OR*	*B*	*SE*	*OR*	*B*	*SE*	*OR*
Variables									
Fixed effects									
Individual variables									
Female	0.46**	0.13	1.58	0.47***	0.10	1.60	0.22*	0.09	1.24
Age	-0.08	0.07	0.92	-0.04	0.05	0.96	-0.04	0.05	0.96
Educational attainment	0.06*	0.03	1.07	0.11***	0.02	1.12	0.05**	0.02	1.06
Married	0.29*	0.14	1.33	0.33**	0.11	1.39	0.08	0.10	1.09
Household income[a]	0.00	0.03	1.00	-0.03	0.02	0.97	0.02	0.02	1.02
Parent	0.34	0.23	1.40	0.43*	0.17	1.54	0.19	0.17	1.21
Self-reported health[b]	0.07	0.09	1.07	0.10	0.06	1.10	-0.06	0.06	0.94
Have previous experience with death	0.48**	0.16	1.61	0.04	0.11	1.04	0.26*	0.11	1.30
Established relationship with physician	0.78***	0.18	2.18	0.44**	0.15	1.55	0.39**	0.14	1.48
Religiosity/spirituality[c]	0.04	0.06	1.04	0.05	0.04	1.05	0.14**	0.04	1.15
Have social support	0.70***	0.20	2.02	0.82***	0.16	2.27	0.43**	0.16	1.54
Health insurance coverage[d]	—	—	—	0.39	0.55	1.47	-1.96	1.04	0.14
Environmental variables									
# home health agencies	-0.01	0.02	0.99	-0.01	0.01	0.99	-0.01	0.01	0.99
# hospice agencies	0.03	0.03	1.03	0.01	0.02	1.01	0.02	0.02	1.02
Medicare home health reimbursement[a]	-0.09	0.19	0.91	-0.25	0.14	0.78	-0.01	0.13	0.99
Medicare hospice reimbursement[a]	-0.01	0.20	0.99	0.27	0.14	1.31	0.20	0.13	1.22
Medicare hospital and nursing facility reimbursement[a]	-0.31	0.67	0.73	0.19	0.49	1.21	-0.20	0.46	0.82
Medicare physician reimbursement[a]	0.08	0.55	1.09	0.07	0.41	1.07	-0.16	0.37	0.85
% with higher education	0.00	0.02	1.00	0.00	0.01	1.00	0.00	0.01	1.00
% 65 years of age and older	0.05	0.03	1.05	0.02	0.02	1.02	0.05*	0.02	1.06
% living alone	-0.06	0.04	0.94	0.00	0.03	1.00	-0.04	0.03	0.96
% Hispanic	0.01	0.02	1.01	0.01	0.02	1.01	0.01	0.01	1.01
% Non-Hispanic Black	0.00	0.02	1.00	-0.01	0.01	0.99	0.01	0.01	1.01
% Non-Hispanic Other	-0.03	0.04	0.97	-0.03	0.03	0.97	-0.03	0.03	0.97
% of population with health insurance coverage	0.03	0.03	1.04	-0.01	0.02	0.99	0.03	0.02	1.03
Median household income[a]	-0.95	0.86	0.39	0.06	0.65	1.06	-0.46	0.59	0.63
% residing in rural area	-0.01**	0.01	0.99	0.00	0.00	1.00	-0.01**	0.00	0.99
Random effects									
Level-2 variance	0.02	0.08	—	0.00	0.00	—	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.09			0.07			0.05		

Notes. Any EOL Planning *n* = 3,357; *county* = 507; Informal ACP *n* = 3,381; *county* = 511; Formal ACP *n* = 3,372; *county* = 509.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good*, *fair*, *or poor*. [c]1 = *not at all* to 4 = *very/extremely*. [d]Health insurance coverage (individual level) was omitted from this model because all participants in the sample had health insurance coverage.
*p < .05; **p < .01; ***p < .001.

Table 15b
Aim 1 Findings (2011 Wave)

	DPAHC Status			Two-Pronged Approach		
	B	*SE*	*OR*	*B*	*SE*	*OR*
Variables						
Fixed effects						
Individual variables						
Female	0.24**	0.09	1.27	0.30***	0.08	1.35
Age	-0.06	0.05	0.95	-0.04	0.05	0.96
Educational attainment	0.06**	0.02	1.06	0.09***	0.02	1.09
Married	0.07	0.09	1.08	0.15	0.09	1.17
Household income[a]	0.03	0.02	1.03	0.00	0.02	1.00
Parent	0.24	0.16	1.27	0.31*	0.16	1.37
Self-reported health[b]	-0.03	0.06	0.97	-0.01	0.05	0.99
Have previous experience with death	0.25*	0.10	1.28	0.07	0.09	1.07
Established relationship with physician	0.33*	0.13	1.39	0.27*	0.13	1.31
Religiosity/spirituality[c]	0.12**	0.04	1.13	0.11**	0.04	1.12
Have social support	0.40**	0.15	1.49	0.59***	0.14	1.81
Health insurance coverage[d]	-0.96	0.64	0.38	-0.07	0.51	0.93
Environmental variables						
# home health agencies	1.02	0.01	0.99	-0.01	0.01	0.99
# hospice agencies	0.01	0.02	1.01	0.01	0.02	1.01
Medicare home health reimbursement[a]	-0.04	0.12	0.96	-0.12	0.12	0.89
Medicare hospice reimbursement[a]	0.29*	0.12	1.34	0.28*	0.12	1.33
Medicare hospital and nursing facility reimbursement[a]	-0.07	0.42	0.93	0.07	0.41	1.07
Medicare physician reimbursement[a]	-0.15	0.35	0.86	-0.09	0.34	0.91
% with higher education	0.00	0.01	1.00	0.00	0.01	1.00
% 65 years of age and older	0.04*	0.02	1.04	0.04	0.02	1.04
% living alone	-0.03	0.02	0.97	-0.01	0.02	0.99
% Hispanic	0.02	0.01	1.02	0.01	0.01	1.01
% Non-Hispanic Black	0.01	0.01	1.01	0.01	0.01	1.01
% Non-Hispanic Other	-0.02	0.03	0.98	-0.03	0.03	0.97
% of population with health insurance coverage	0.04	0.02	1.04	0.00	0.02	1.00
Median household income[a]	-0.26	0.55	0.77	0.04	0.54	1.04
% residing in rural area	-0.01*	0.00	0.99	-0.01	0.00	0.99
Random effects						
Level-2 variance	0.00	0.00	—	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.05			0.05		

Notes. DPAHC Status *n* = 3,370; *county* = 510; Two-Pronged Approach *n* = 3,801; *county* = 511.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*. [d]Health insurance coverage (individual level) was omitted from this model because all participants in the sample had health insurance coverage.
*p < .05; **p < .01; ***p < .001.

Table 16a

Aim 2 Findings (2004 Wave)

	Any EOL Planning				Informal ACP		
	B	*SE*	*OR*		*B*	*SE*	*OR*
Variables				Variables			
Fixed effects				**Fixed effects**			
Individual variables				***Individual variables***			
Female	0.14	0.09	1.15	Female	0.44***	0.08	1.56
Age	-0.03	0.07	0.97	Age	-0.07	0.06	0.93
Educational attainment	1.58*	0.76	4.87	Educational attainment	2.40*	0.97	11.04
Married	0.20	0.11	1.22	Married	0.35**	0.10	1.41
Household income[a]	-1.30*	0.60	0.27	Household income[a]	0.00	0.02	1.00
Parent	0.44*	0.17	1.55	Parent	0.43**	0.15	1.53
Self- reported health[b]	-0.13*	0.06	0.88	Self- reported health[b]	-0.08	0.05	0.93
Have previous experience with death	0.21*	0.10	1.23	Have previous experience with death	0.25**	0.09	1.29
Established relationship with physician	0.52***	0.14	1.68	Established relationship with physician	0.62***	0.13	1.85
Religiosity/spirituality[c]	0.04	0.04	1.05	Religiosity/spirituality[c]	0.06	0.04	1.06
Have social support	0.47**	0.17	1.61	Have social support	0.48**	0.15	1.61
Health insurance coverage	-0.08	0.24	0.92	Health insurance coverage	0.28	0.20	1.33
Environmental variables				***Environmental variables***			
# home health agencies	0.01	0.02	1.01	# home health agencies	0.02	0.01	1.02
# hospice agencies	-0.06	0.03	0.94	# hospice agencies	-0.06*	0.03	0.94
Medicare home health reimbursement[a]	0.03	0.14	1.03	Medicare home health reimbursement[a]	0.04	0.12	1.04
Medicare hospice reimbursement[a]	0.18	0.11	1.20	Medicare hospice reimbursement[a]	0.15	0.10	1.16
Medicare hospital and nursing facility reimbursement[a]	-0.71	0.46	0.49	Medicare hospital and nursing facility reimbursement[a]	-0.44	0.40	0.64
Medicare physician reimbursement[a]	0.79	1.55	2.19	Medicare physician reimbursement[a]	-0.16	0.39	0.85
% with higher education	-0.01	0.01	0.99	% with higher education	0.00	0.01	1.00
% 65 years of age and older	0.00	0.02	1.00	% 65 years of age and older	0.01	0.02	1.01
% living alone	-0.03	0.03	0.97	% living alone	-0.05*	0.02	0.95
% Hispanic	0.02	0.02	1.02	% Hispanic	-0.04	0.04	0.96
% Non-Hispanic Black	0.00	0.01	1.00	% Non-Hispanic Black	0.01	0.01	1.01
% Non-Hispanic Other	0.00	0.03	1.00	% Non-Hispanic Other	0.01	0.02	1.01
% of population with health insurance coverage	0.00	0.02	1.00	% of population with health insurance coverage	0.02	0.02	1.02
Median household income[a]	-0.34	0.64	0.71	Median household income [a]	1.99	1.41	7.29
% residing in rural area	-0.01	0.00	0.99	% residing in rural area	0.00	0.00	1.00
Interactions with Household income				***Interactions with Household income***			
Physician reimbursement[a] × Household Income[a]	0.18*	0.08	1.19	% Hispanic × Household Income[a]	0.01*	0.00	1.01
Interactions with Educational attainment				***Interactions with Educational attainment***			
Physician reimbursement[a] × Educational attainment	-0.20*	0.10	0.82	Median household income[a] × Educational attainment	-0.22*	0.09	0.80
Random effects				**Random effects**			
Level-2 variance	0.00	0.00	—	Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R2	0.06			McKelvey & Zavoina's Pseudo R2	0.07		

Notes. Any EOL Planning n = 3,799; county = 499; Informal ACP n = 3,807; county = 499.

aNatural log. b1 = excellent, 2 = very good, and 3 = good, fair, or poor. c1 = not at all to 4 = very/extremely.

*p < .05; **p < .01; ***p < .001.

Table 16b
Aim 2 Findings (2004 Wave)

	Two-Pronged Approach		
	B	*SE*	*OR*
Variables			
Fixed effects			
Individual variables			
Female	0.20**	0.07	1.22
Age	-0.01	0.05	0.99
Educational attainment	0.00	0.03	1.00
Married	0.20*	0.09	1.22
Household income[a]	0.01	0.01	1.01
Parent	0.31*	0.14	1.36
Self- reported health[b]	-0.07	0.04	0.93
Have previous experience with death	0.25**	0.07	1.28
Established relationship with physician	0.52***	0.12	1.68
Religiosity/spirituality[c]	0.03	0.03	1.03
Have social support	0.46**	0.14	1.59
Health insurance coverage	0.45*	0.19	1.57
Environmental variables			
# home health agencies	0.00	0.01	1.00
# of hospice agencies	-0.03	0.02	0.97
Medicare home health reimbursement[a]	0.18	0.10	1.19
Medicare hospice reimbursement[a]	0.02	0.09	1.02
Medicare hospital and nursing facility reimbursement[a]	-0.66	0.34	0.52
Medicare physician reimbursement[a]	0.35	0.33	1.42
% with higher education	0.01	0.01	1.01
% 65 years of age and older	0.02	0.02	1.02
% living alone	-0.03	0.02	0.97
% Hispanic	0.03	0.02	1.03
% Non-Hispanic Black	-0.09*	0.04	0.92
% Non-Hispanic Other	-0.01	0.02	0.99
% of population with health insurance coverage	0.03	0.02	1.03
Median household income[a]	-0.59	0.47	0.56
% residing in rural area	-0.03*	0.01	0.97
Interactions with Educational attainment			
% Non-Hispanic Black × Educational attainment	0.01*	0.00	1.01
% residing in a rural area × Educational attainment	0.00*	0.00	1.00
Random effects			
Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.05		

Notes. Two-Pronged Approach *N* = 3,808; *county* = 499.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
*p < .05; **p < .01; ***p < .001.

Table 17a
Aim 2 Findings (2011 Wave)

	Any EOL Planning				Formal ACP		
	B	*SE*	*OR*		*B*	*SE*	*OR*
Variables				Variables			
Fixed effects				**Fixed effects**			
Individual variables				***Individual variables***			
Female	0.45**	0.13	1.57	Female	0.22*	0.09	1.25
Age	-0.08	0.07	0.92	Age	-0.04	0.05	0.97
Educational attainment	-0.05	0.06	0.95	Educational attainment	0.05**	0.02	1.05
Married	0.28*	0.14	1.33	Married	0.09	0.10	1.09
Household income[a]	0.00	0.03	1.00	Household income[a]	0.00	0.03	1.00
Parent	0.35	0.23	1.42	Parent	0.19	0.17	1.21
Self- reported health[b]	0.06	0.09	1.06	Self- reported health[b]	-0.06	0.06	0.94
Have previous experience with death	0.48**	0.16	1.62	Have previous experience with death	0.26*	0.11	1.30
Established relationship with physician	0.76***	0.18	2.15	Established relationship with physician	0.40**	0.14	1.49
Religiosity/spirituality[c]	0.04	0.06	1.05	Religiosity/spirituality[c]	0.13**	0.04	1.14
Have social support	0.70***	0.20	2.02	Have social support	0.43**	0.16	1.54
Health insurance coverage[d]	—	—	—	Health insurance coverage[d]	-2.05	1.05	0.13
Environmental variables				***Environmental variables***			
# home health agencies	-0.01	0.02	0.99	# home health agencies	-0.01	0.01	0.99
# hospice agencies	0.03	0.03	1.03	# hospice agencies	0.12*	0.05	1.13
Medicare home health reimbursement[a]	-0.09	0.19	0.92	Medicare home health reimbursement[a]	-0.01	0.13	0.99
Medicare hospice reimbursement[a]	0.03	0.20	1.03	Medicare hospice reimbursement[a]	0.21	0.13	1.23
Medicare hospital and nursing facility reimbursement[a]	-0.28	0.67	0.76	Medicare hospital and nursing facility reimbursement[a]	-0.20	0.46	0.82
Medicare physician reimbursement[a]	0.11	0.56	1.12	Medicare physician reimbursement[a]	-0.17	0.37	0.84
% with higher education	0.01	0.02	1.01	% with higher education	0.00	0.01	1.00
% 65 years of age and older	0.05	0.03	1.05	% 65 years of age and older	0.05*	0.02	1.06
% living alone	-0.06	0.04	0.94	% living alone	-0.04	0.03	0.96
% Hispanic	0.01	0.02	1.01	% Hispanic	-0.07	0.04	0.94
% Non-Hispanic Black	0.00	0.02	1.00	% Non-Hispanic Black	0.01	0.01	1.01
% Non-Hispanic Other	-0.35*	0.16	0.70	% Non-Hispanic Other	-0.04	0.03	0.96
% of population with health insurance coverage	0.04	0.03	1.04	% of population with health insurance coverage	0.03	0.02	1.03
Median household income[a]	-1.09	0.87	0.34	Median household income[a]	-0.49	0.60	0.61
% residing in rural area	-0.02**	0.01	0.99	% residing in rural area	-0.01**	0.00	0.99
Interactions with Educational attainment				***Interactions with Household income***			
% Non-Hispanic Other × Educational attainment	0.02*	0.01	1.02	# hospice agencies × Household Income[a]	-0.01*	0.01	0.99
				% Hispanic × Household Income[a]	0.01*	0.00	1.01
Random effects				**Random effects**			
Level-2 variance	0.02	0.08	—	Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.09			McKelvey & Zavoina's Pseudo R^2	0.06		

Notes. Any EOL Planning *n* = 3,357; *county* = 507; Formal ACP *n* = 3,372; *county* = 509.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*. [d]Health insurance coverage (individual level) was omitted from this model because all participants in the sample had health insurance coverage.
*p < .05; **p < .01; ***p < .001.

Table 17b
Aim 2 Findings (2011 Wave)

	DPAHC Status		
	B	*SE*	*OR*
Variables			
Fixed effects			
Individual variables			
Female	0.24**	0.09	1.28
Age	-0.06	0.05	0.94
Educational attainment	0.06**	0.02	1.06
Married	0.08	0.09	1.09
Household income[a]	-0.13	0.07	0.88
Parent	0.24	0.16	1.27
Self- reported health[b]	-0.04	0.06	0.96
Have previous experience with death	0.25*	0.10	1.29
Established relationship with physician	0.33*	0.13	1.39
Religiosity/spirituality[c]	0.12**	0.04	1.13
Have social support	0.40**	0.15	1.49
Health insurance coverage[d]	-0.85	0.65	0.43
Environmental variables			
# home health agencies	-0.01	0.01	0.99
# hospice agencies	0.01	0.02	1.01
Medicare home health reimbursement[a]	-0.06	0.12	0.95
Medicare hospice reimbursement[a]	0.30*	0.12	1.35
Medicare hospital and nursing facility reimbursement[a]	-0.06	0.42	0.94
Medicare physician reimbursement[a]	-0.14	0.35	0.87
% with higher education	0.00	0.01	1.00
% 65 years of age and older	-0.10	0.06	0.90
% living alone	-0.03	0.02	0.97
% Hispanic	0.02	0.01	1.02
% Non-Hispanic Black	0.01	0.01	1.01
% Non-Hispanic Other	-0.02	0.03	0.98
% of population with health insurance coverage	0.03	0.02	1.03
Median household income[a]	-0.25	0.55	0.78
% residing in rural area	0.01	0.01	1.01
Interactions with Household income			
% 65 years of age and older × Household Income[a]	0.01*	0.01	1.01
% residing in a rural area × Household Income[a]	0.00*	0.00	1.00
Random effects			
Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.05		

Notes. DPAHC Status *n* = 3,370; *county* = 510.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*. [d]Health insurance coverage (individual level) was omitted from this model because all participants in the sample had health insurance coverage.
*p < .05; **p < .01; ***p < .001.

Table 18
Sample Descriptives for Individuals That Participated in Both Waves

	Wave 1 (2004)			Wave 2 (2011)			*t*-test
	n (%) or M(SD)	Range	Missing (%)	n (%) or M(SD)	Range	Missing (%)	
Individual variables							
Control variables							
Gender			0 (0)			0 (0)	n/a
Female	1,630 (56.46)			1,630 (56.46)			
Male	1,257 (43.54)			1,257 (43.54)			
Age	64.29 (0.65)	63:66	0 (0)	71.14 (0.86)	70:73	0 (0)	-430***
Race			32 (1.11)			32 (1.11)	n/a
Yes	2,838 (98.30)			2,838 (98.30)			
No	17 (0.59)			17 (0.59)			
Education	13.94 (2.42)	12:20	0 (0)	13.95 (2.43)	12:20	96 (3.33)	-1.00
Marital status							
Currently married	2,245 (77.76)		2 (0.07)	1,927 (66.75)		142 (4.92)	12.66***
Not currently married	640 (22.17)			818 (28.33)			
Parental status			0 (0)			92 (3.19)	-1.89
Yes	2,715 (94.04)			2,631 (91.13)			
No	172 (5.96)			164 (5.68)			
Household income	74,689.94 (141,572.90)	0:5,272,488	9 (0.31)	55,233.42 (212,708.10)	0:10,100,000	95 (3.29)	4.60***
Health insurance			0 (0)			75 (2.60)	-9.12***
Yes	2,774 (96.09)			2,799 (96.95)			
No	113 (3.91)			13 (0.45)			
Living alone			0 (0)			78 (2.70)	-7.98***
Yes	506 (17.53)			644 (22.31)			
No	2,381 (82.47)			2,165 (74.99)			
Self-reported health			0 (0)			79 (2.74)	-10.54***
Excellent	821 (28.44)			595 (20.61)			
Very good	1,148 (39.76)			1,137 (39.38)			
Good/Fair/ Poor	918 (31.80)			1,076 (37.27)			
Established relationship with physician			27 (0.94)			71 (2.46)	0.73
Yes	2,616 (90.61)			2,561 (88.71)			
No	244 (8.45)			255 (8.83)			
Religiosity/ spirituality			50 (1.73)			265 (9.18)	-6.35***
Not at all	735 (25.46)			673 (23.31)			
Not very	713 (24.70)			580 (20.09)			
Somewhat	927 (32.11)			695 (24.07)			
Extremely/Very	462 (16.00)			674 (23.35)			

	Wave 1 (2004)			Wave (2011)			*t*-test
	n (%) or M(SD)	Range	Missing (%)	n (%) or M(SD)	Range	Missing (%)	
Social support			28 (0.97)			28 (0.97)	1.44
Yes	2,684 (92.97)			2,458 (85.14)			
No	175 (6.06)			181 (6.27)			
Previous experience with death			0 (0)			11 (0.38)	6.56***
Yes	882 (30.55)			654 (22.65)			
No	2,005 (69.45)			2,222 (76.97)			
ACP outcome measures							
Any EOL Planning			28 (0.97)			2 (0.07)	-11.25***
Yes	2,402 (83.20)			2,640 (91.44)			
No	457 (15.83)			245 (8.49)			
Informal ACP			21 (0.73)			1 (0.03)	-9.07***
Yes	2,174 (75.30)			2,401 (83.17)			
No	692 (23.97)			485 (16.80)			
Formal ACP			29 (1.00)			7 (0.24)	-23.33***
Yes	1,786 (61.86)			2,336 (80.91)			
No	1,072 (37.13)			544 (18.84)			
DPAHC Status			29 (1.00)			10 (0.35)	-29.05***
Yes	1,565 (54.21)			2,240 (77.59)			
No	2,293 (44.79)			637 (22.06)			
Two-Pronged Approach			21 (0.73)			0 (0)	-19.78***
Yes	1,594 (55.21)			2,111 (73.12)			
No	1,272 (44.06)			766 (26.88)			
Environmental variables							
Medicare enrollees							
# of Medicare enrollees	30,004.72 (31,321.06)	870:100,000	0 (0)	23,832.41 (23,025.19)	29:67,000	0 (0)	31.67***
Medicare reimbursement							
Hospital & nursing facility	3,360.26 (477.53)	2009.72:6592.29	0 (0)	4,138.66 (611.60)	2636.127:6242.40	2 (0.07)	-56.77***
Physician	1,747.27 (390.13)	994.15:3,628.35	0 (0)	2,185.11 (567.86)	1,111.22:4,793.62	0 (0)	-96.90***
Hospice	175.07 (92.73)	25.24:1,371.85	252 (8.73)	363.28 (141.84)	30.63:1,108.13	6 (0.21)	-88.68***
Home health agency	194.37 (87.81)	39.63:400	50 (1.73)	288.76 (160.57)	34.87:685	2 (0.07)	-56.77***
Age							
% 65 years of age and older	13.27 (3.47)	4.17:33.00	0 (0)	14.23 (3.80)	6.48:43.38	0 (0)	-37.29***
Disability							
% with a disability	16.56 (3.41)	8.27:32.05	0 (0)	11.18 (2.44)	4.79:25.01	136 (4.71)	134.11***
Education							
% with higher education	23.34 (8.90)	6.31:60.22	0 (0)	27.87 (9.77)	9.60:70.97	136 (4.71)	-130***
Living alone							
% living alone	25.77 (3.62)	11.15:43.79	0 (0)	27.32 (3.44)	11.60:44.03	0 (0)	-93.75***

	Wave 1 (2004)			Wave 2 (2011)			*t*-test
	n (%) or M(SD)	Range	Missing (%)	n (%) or M(SD)	Range	Missing (%)	
Income							
Median household income	45,188.52 (9,107.90)	24,863:82,929	0 (0)	54,031.22 (11,321.56)	30,695:107,923	136 (4.71)	-110***
Race/Ethnicity							
% Hispanic	4.35 (4.01)	0.31:13	0 (0)	7.18 (6.15)	0.45: 21	0 (0)	-67.38***
% Non-Hispanic White	85.60 (13.30)	56:98.66	0 (0)	81.10 (15.35)	48:98.13	0 (0)	91.89***
% Non-Hispanic Black	4.16 (5.77)	0.03:18	0 (0)	4.73 (5.97)	0.06:19	0 (0)	-39.26***
% Non-Hispanic Other	4.16 (5.77)	0.03:18	0 (0)	4.73 (5.97)	0.06:19	0 (0)	-39.26***
Urban/Rural							
% residing in rural area	31.16 (28.07)	0:100	0 (0)	29.22 (27.60)	0:100	0 (0)	32.76***
Health insurance coverage							n/a
% with any health insurance	89.37 (4.63)	54.27:96.23	136 (4.71)	89.37 (4.63)	54.27:96.23	136 (4.71)	
Medical staffing and facility rates							
# of general practitioners	124.30 (138.28)	0:500	0 (0)	129.05 (142.24)	0:500	0 (0)	-20.37***
# of medical specialists	240.37 (293.98)	0:800	0 (0)	251.20 (298.77)	0:800	0 (0)	-20.71***
# of hospitals	6.07 (6.91)	0:25	0 (0)	6.03 (6.42)	0:25	0 (0)	1.72
# of hospice agencies	2.40 (2.88)	0:10	0 (0)	3.40 (4.40)	0:16	0 (0)	-30.40***
# of nursing facilities	15.10 (15.95)	0:60	0 (0)	15.14 (15.39)	0:60	0 (0)	-1.34
# of home health agencies	6.16 (6.85)	0:20	0 (0)	7.66 (9.45)	0:27	0 (0)	-26.59***

Notes. n = 2,887.
*p < .05; **p < .01; ***p < .001.

Table 19
Aim 3 Findings: Any EOL Planning

	B	*SE*	*OR*
Variables			
Fixed effects			
Individual variables			
Wave 1 Any EOL Planning	2.95***	0.19	19.13
Female	0.51*	0.20	1.66
Age	0.05	0.11	1.06
Educational attainment	0.19*	0.09	0.83
Married	0.25	0.22	1.29
Household income[a]	0.03	0.04	0.97
Parent	0.02	0.37	1.02
Self- reported health[b]	0.02	0.13	1.02
Have previous experience with death	0.62*	0.24	1.86
Established relationship with physician	0.77**	0.27	2.15
Religiosity/spirituality[c]	0.07	0.09	1.07
Have social support	0.44	0.29	1.56
Health insurance coverage[d]	—	—	—
Environmental variables			
# of home health agencies	-0.01	0.02	0.99
# of hospice agencies	0.03	0.04	1.03
Medicare home health reimbursement[a]	-0.17	0.27	0.85
Medicare hospice reimbursement[a]	0.06	0.26	1.06
Medicare hospital and nursing facility reimbursement[a]	-0.25	0.92	0.78
Medicare physician reimbursement[a]	-0.32	0.80	0.73
% with higher education	0.03	0.02	1.03
% 65 years of age and older	0.05	0.05	1.05
% living alone	-0.15*	0.06	0.86
% Hispanic	0.01	0.03	1.01
% Non-Hispanic Black	0.00	0.03	1.00
% Non-Hispanic Other	-0.70**	0.24	0.50
% of population with health insurance coverage	0.07*	0.03	1.07
Median household income[a]	-2.57*	1.30	0.08
% residing in rural area	-0.01	0.01	0.99
Interactions with Educational attainment			
% Non-Hispanic Other × Educational attainment	0.05**	0.02	1.05
Random effects			
Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.33		

Notes. Individual n = 2,125; county n = 407.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*. [d]Health insurance coverage (individual level) was omitted from this model because all participants in the sample had health insurance coverage.
*p < .05; **p < .01; ***p < .001.

Table 20
Aim 3 Findings: Informal ACP

	B	*SE*	*OR*
Variables			
Fixed effects			
Individual variables			
Wave 1 Any EOL Planning	2.24***	0.14	9.37
Female	0.29*	0.14	1.34
Age	0.04	0.08	1.04
Educational attainment	0.09**	0.03	1.09
Married	0.29	0.15	1.34
Household income[a]	-0.05	0.03	0.95
Parent	0.29	0.26	1.33
Self- reported health[b]	0.07	0.09	1.07
Have previous experience with death	0.22	0.16	1.24
Established relationship with physician	0.42	0.21	1.52
Religiosity/spirituality[c]	0.00	0.06	1.00
Have social support	0.64**	0.22	1.90
Health insurance coverage	0.94	0.80	2.56
Environmental variables			
# of home health agencies	-0.01	0.02	0.99
# of hospice agencies	0.02	0.03	1.02
Medicare home health reimbursement[a]	-0.35	0.20	0.71
Medicare hospice reimbursement[a]	0.30	0.19	1.35
Medicare hospital and nursing facility reimbursemen[a]	0.60	0.70	1.83
Medicare physician reimbursement[a]	-0.04	0.58	0.96
% with higher education	0.00	0.02	1.00
% 65 years of age and older	0.00	0.03	1.00
% living alone	0.01	0.04	1.01
% Hispanic	0.01	0.02	1.01
% Non-Hispanic Black	-0.01	0.02	0.99
% Non-Hispanic Other	-0.02	0.04	0.98
% of population with health insurance coverage	-0.01	0.03	0.99
Median household income[a]	0.68	0.92	1.97
% residing in rural area	0.00	0.01	1.00
Random effects			
Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2	0.27		

Notes. Individual n = 2,142; county n = 409.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
*p < .05; **p < .01; ***p < .001.

Table 21
Aim 3 Findings: Formal ACP

	B	*SE*	*OR*
Variables			
Fixed effects			
Individual variables			
Wave 1 Any EOL Planning	3.73***	0.21	41.67
Female	0.21	0.15	1.24
Age	0.09	0.08	1.10
Educational attainment	0.03	0.03	1.03
Married	0.12	0.16	1.12
Household income[a]	0.01	0.05	1.01
Parent	-0.03	0.29	0.97
Self- reported health[b]	-0.03	0.10	0.97
Have previous experience with death	0.33	0.17	1.39
Established relationship with physician	0.38	0.24	1.47
Religiosity/spirituality[c]	0.17**	0.06	1.18
Have social support	0.52*	0.26	1.67
Health insurance coverage[d]	—	—	—
Environmental variables			
# of home health agencies	0.00	0.02	1.00
# of hospice agencies	0.18	0.12	1.20
Medicare home health reimbursement[a]	-0.12	0.21	0.89
Medicare hospice reimbursement[a]	0.13	0.20	1.14
Medicare hospital and nursing facility reimbursement[a]	0.30	0.72	1.35
Medicare physician reimbursement[a]	-1.46*	0.61	0.23
% with higher education	0.01	0.02	1.01
% 65 years of age and older	0.05	0.03	1.05
% living alone	-0.07	0.04	0.93
% Hispanic	-0.05	0.08	0.95
% Non-Hispanic Black	0.03	0.02	1.03
% Non-Hispanic Other	-0.06	0.05	0.94
% of population with health insurance coverage	0.05	0.03	1.05
Median household income[a]	-0.56	0.97	0.57
% residing in rural area	-0.01	0.01	0.99
Interactions with Household income			
# of hospice agencies × Household income[a]	-0.02	0.01	0.98
% Hispanic × Household income[a]	0.01	0.01	1.01
Random effects			
Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2		0.52	

Notes. Individual n = 2,122; county n = 407.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*. [d]Health insurance coverage (individual level) was omitted from this model because all participants in the sample had health insurance coverage.
*p < .05; **p < .01; ***p < .001.

Table 22
Aim 3 Findings: DPAHC Status

	B	*SE*	*OR*
Variables			
Fixed effects			
Individual variables			
Wave 1 Any EOL Planning	5.99***	0.59	398.60
Female	0.18	0.14	1.20
Age	0.11	0.08	1.11
Educational attainment	0.02	0.03	1.02
Married	0.13	0.16	1.14
Household income[a]	-0.18	0.14	0.84
Parent	0.14	0.28	1.14
Self- reported health[b]	0.03	0.09	1.03
Have previous experience with death	0.23	0.16	1.26
Established relationship with physician	0.21	0.24	1.24
Religiosity/spirituality[c]	0.14*	0.06	1.15
Have social support	0.72**	0.25	2.05
Health insurance coverage	-1.27	0.85	0.28
Environmental variables			
# of home health agencies	-0.04	0.02	0.97
# of hospice agencies	0.06	0.03	1.06
Medicare home health reimbursement[a]	-0.22	0.21	0.80
Medicare hospice reimbursement[a]	0.11	0.20	1.11
Medicare hospital and nursing facility reimbursement[a]	0.19	0.70	1.21
Medicare physician reimbursement[a]	-0.75	0.60	0.47
% with higher education	0.01	0.02	1.01
% 65 years of age and older	-0.13	0.12	0.88
% living alone	-0.04	0.04	0.96
% Hispanic	0.04	0.02	1.04
% Non-Hispanic Black	0.04*	0.02	1.04
% Non-Hispanic Other	-0.02	0.04	0.98
% of population with health insurance coverage	0.04	0.03	1.05
Median household income[a]	-0.14	0.94	0.87
% residing in rural area	0.01	0.02	1.01
Interactions with Household income			
% 65 years of age and older × Household income[a]	0.02	0.01	1.02
% Hispanic × Household income[a]	0.00	0.00	1.00
Random effects			
Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2		0.74	

Notes. Individual *n* = 2,128; county *n* = 408.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
*p < .05; **p < .01; ***p < .001.

Table 23
Aim 3 Findings: Two-Pronged Approach to ACP

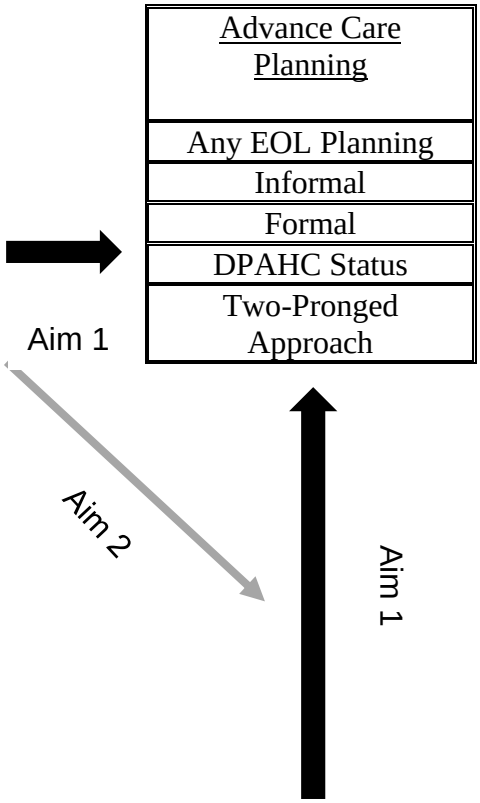
	B	*SE*	*OR*
Variables			
Fixed effects			
Individual variables			
Wave 1 Any EOL Planning	2.61***	0.13	13.66
Female	0.14	0.12	1.15
Age	0.03	0.07	1.03
Educational attainment	0.06*	0.03	1.06
Married	0.19	0.13	1.21
Household income[a]	0.00	0.03	1.00
Parent	0.25	0.24	1.29
Self- reported health[b]	0.01	0.08	1.01
Have previous experience with death	0.23	0.14	1.26
Established relationship with physician	0.15	0.20	1.16
Religiosity/spirituality[c]	0.09	0.05	1.09
Have social support	0.63**	0.21	1.87
Health insurance coverage	-0.10	0.72	0.91
Environmental variables			
# of home health agencies	-0.01	0.02	0.99
# of hospice agencies	0.01	0.03	1.01
Medicare home health reimbursement[a]	-0.29	0.18	0.75
Medicare hospice reimbursement[a]	0.31	0.17	1.37
Medicare hospital and nursing facility reimbursement[a]	0.61	0.61	1.84
Medicare physician reimbursement[a]	-0.77	0.50	0.46
% with higher education	-0.01	0.01	0.99
% 65 years of age and older	0.02	0.03	1.02
% living alone	0.01	0.03	1.01
% Hispanic	0.03	0.02	1.03
% Non-Hispanic Black	0.02	0.02	1.02
% Non-Hispanic Other	-0.02	0.04	0.98
% of population with health insurance coverage	0.00	0.03	1.00
Median household income[a]	0.95	0.80	2.59
% residing in rural area	0.00	0.01	1.00
Random effects			
Level-2 variance	0.00	0.00	—
McKelvey & Zavoina's Pseudo R^2		0.36	

Notes. Individual *n* = 2,142; county *n* = 409.
[a]Natural log. [b]1 = *excellent*, 2 = *very good*, and 3 = *good, fair, or poor*. [c]1 = *not at all* to 4 = *very/extremely*.
*p < .05; **p < .01; ***p < .001

APPENDIX B

FIGURES

Environmental Characteristics		
	Press	*Buffer*
Community	Medicare hospital & nursing facility, physician, and home health reimbursements	Medicare hospice reimbursement
	% with a disability	# Medicare enrollees
	% living alone	% with high educational attainment
	% Hispanic	Median household income
	% non-Hispanic Black	% 65 years of age and older
	% non-Hispanic Other race	% with health insurance
		% rural residency
Organizational		# healthcare providers
		# healthcare facilities



Individual Characteristics/Competencies	
Intrapersonal	Gender
	Race/ethnicity
	Age
	Education
	Household income
	Health insurance coverage
	Religiosity/spirituality
	Previous experience with death
Interpersonal	Marital status
	Parental status
	Established relationship with physician
	Social support

Figure 1. Conceptual Framework. This figure represents the conceptual framework used to guide this study.

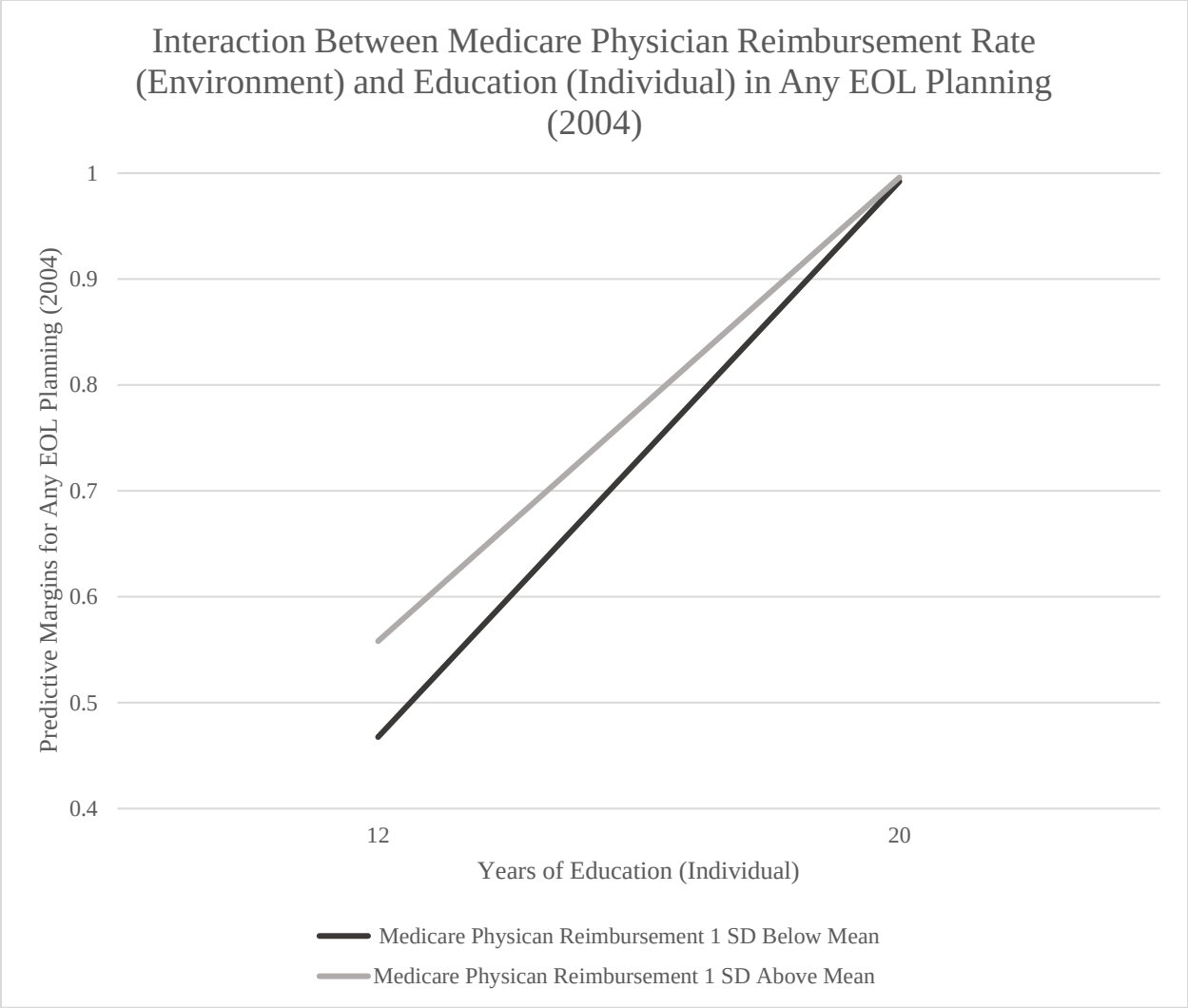


Figure 2. Interaction Between Medicare Physician Reimbursement Rate (Environment) and Education (Individual) in Any EOL Planning (2004). This figure illustrates the moderating effects of Medicare physician reimbursement rate on the association between individual educational attainment and Any EOL Planning in the 2004 WLS wave.

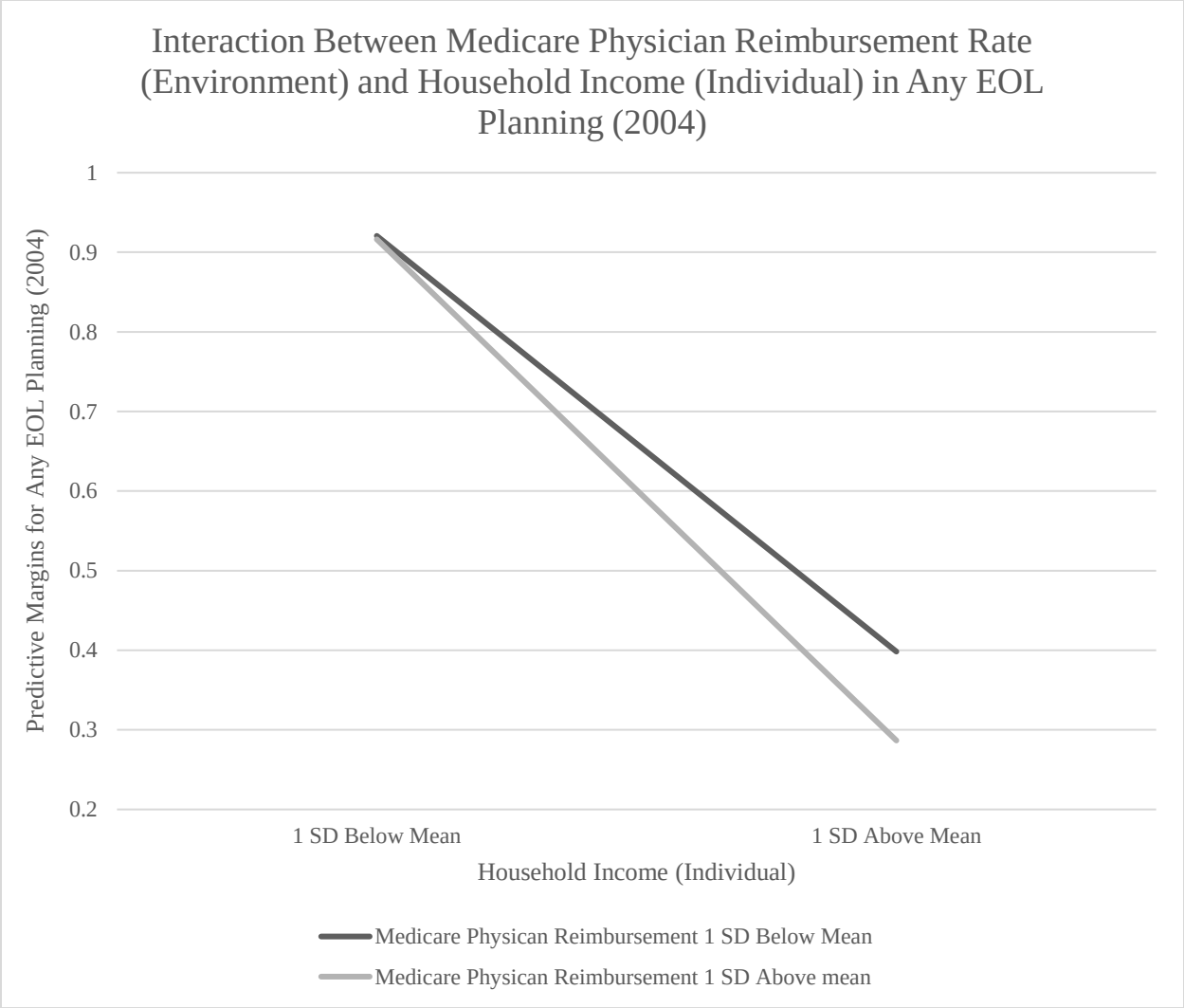


Figure 3. Interaction Between Medicare Physician Reimbursement Rate (Environment) and Household Income (Individual) in Any EOL Planning (2004). This figure illustrates the moderating effects of Medicare physician reimbursement rate on the association between individual household income and Any EOL Planning in the 2004 WLS wave.

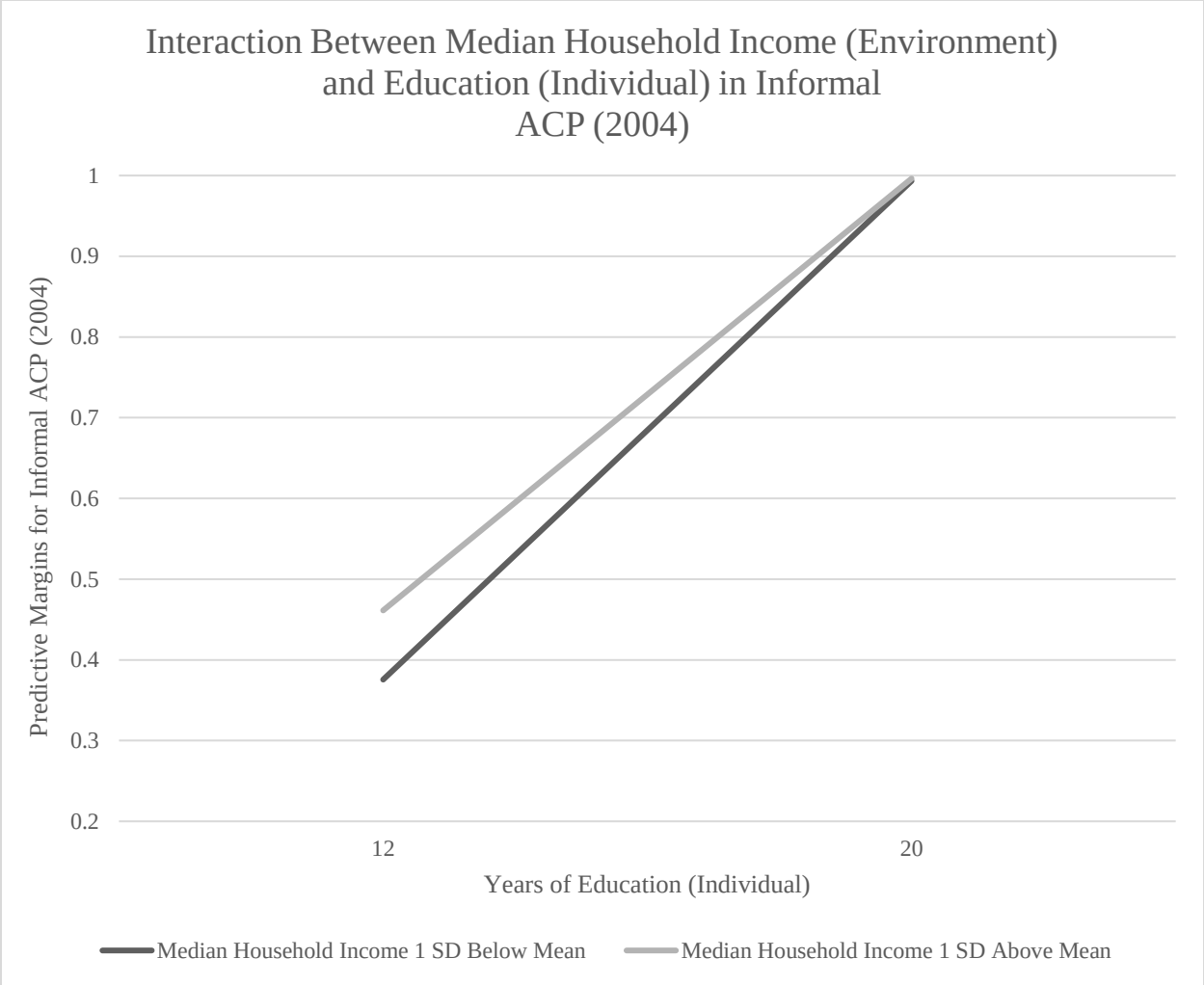


Figure 4. Interaction Between Median Household Income (Environment) and Education (Individual) in Informal ACP (2004). This figure illustrates the moderating effects of median household income on the association between individual educational attainment and Informal ACP in the 2004 WLS wave.

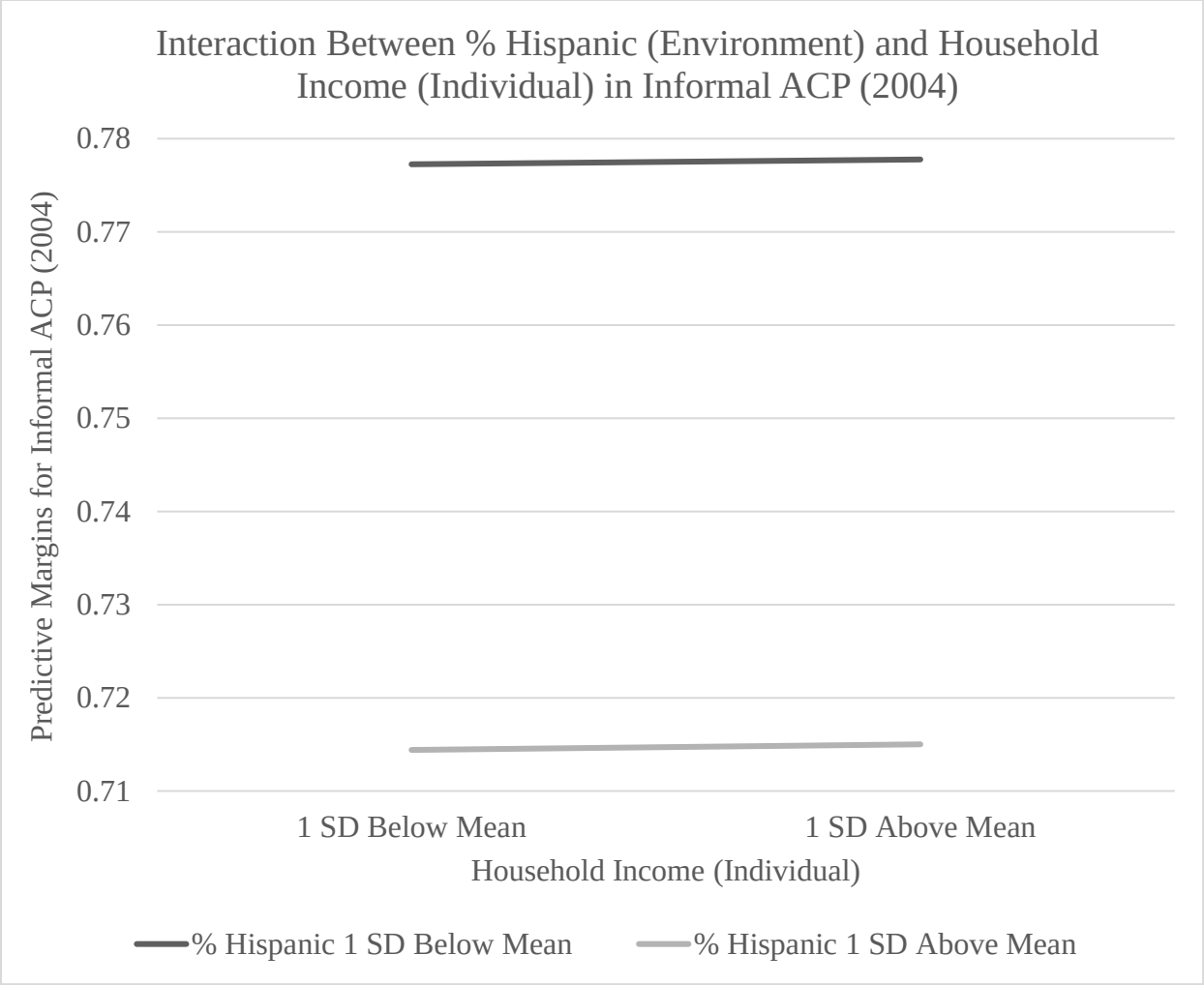


Figure 5. Interaction Between % Hispanic (Environment) and Household Income (Individual) in Informal ACP (2004). This figure illustrates the moderating effects of percent Hispanic on the association between individual household income and Informal ACP in the 2004 WLS wave.

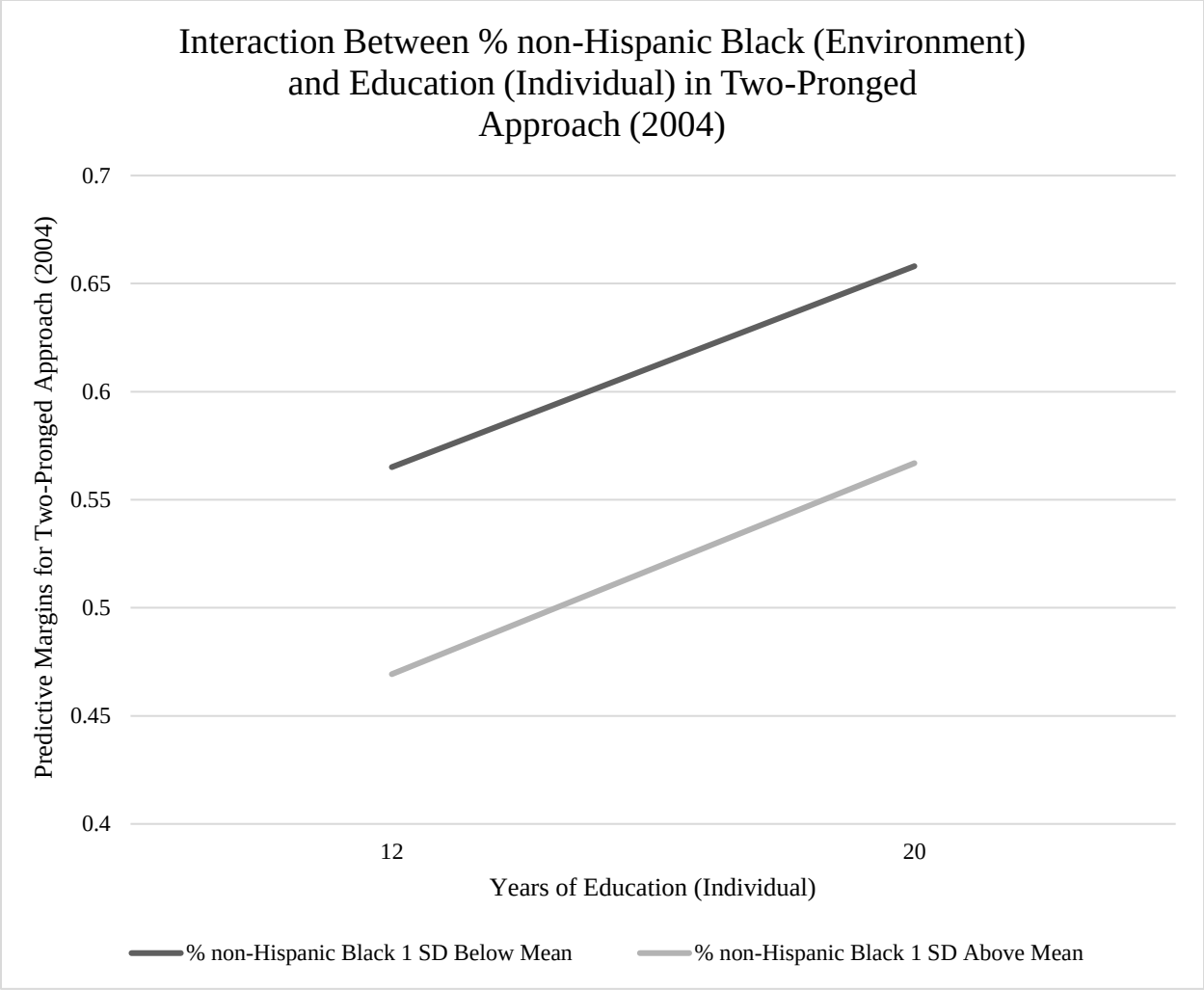


Figure 6. Interaction Between % non-Hispanic Black (Environment) and Education (Individual) in Two-Pronged Approach (2004). This figure illustrates the moderating effects of percent non-Hispanic Black on the association between individual educational attainment and Two-Pronged Approach in the 2004 WLS wave.

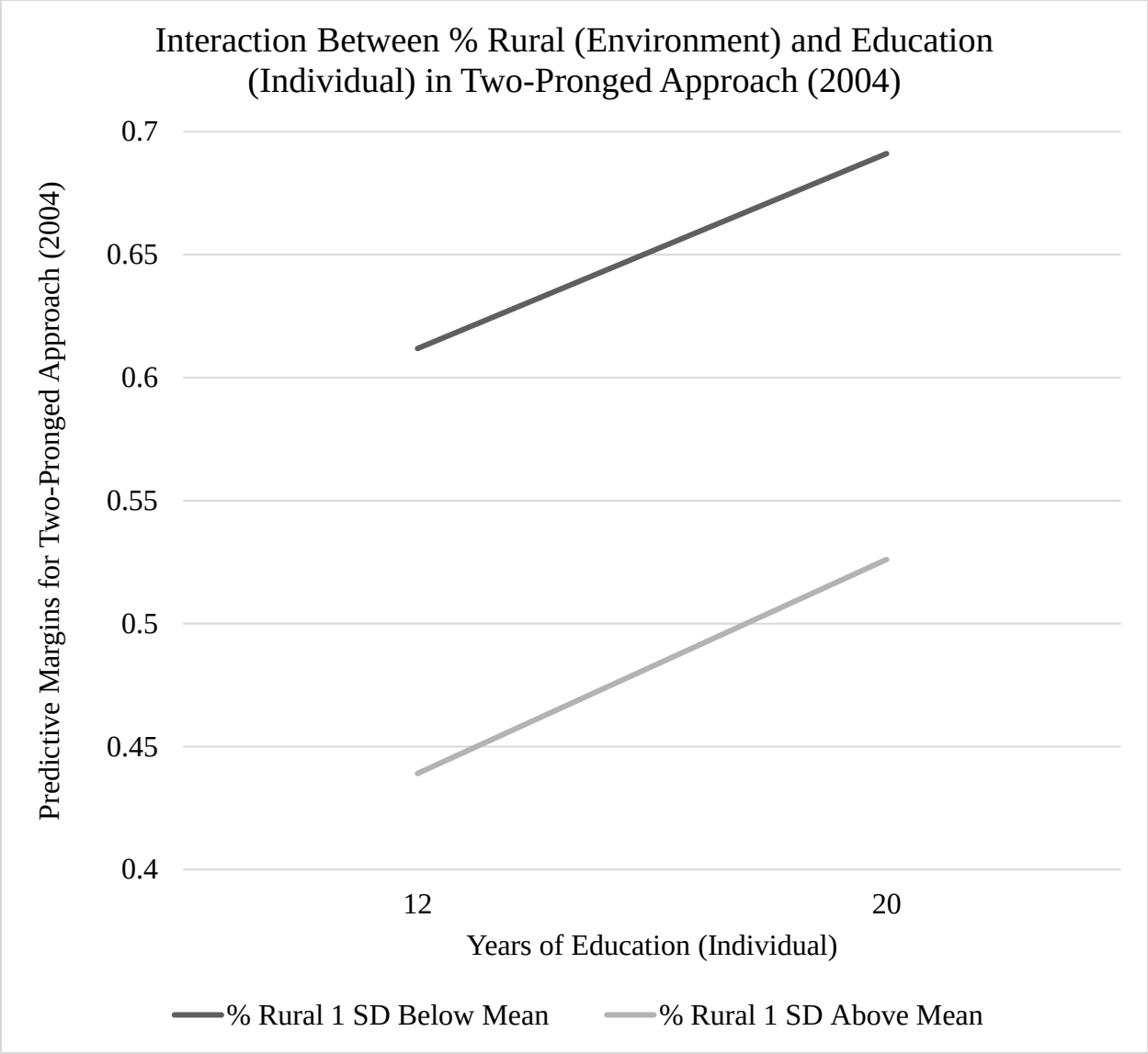


Figure 7. Interaction Between % Rural (Environment) and Education (Individual) in Two-Pronged Approach (2004). This figure illustrates the moderating effects of percent residing in a rural area on the association between individual educational attainment and Two-Pronged Approach in the 2004 WLS wave.

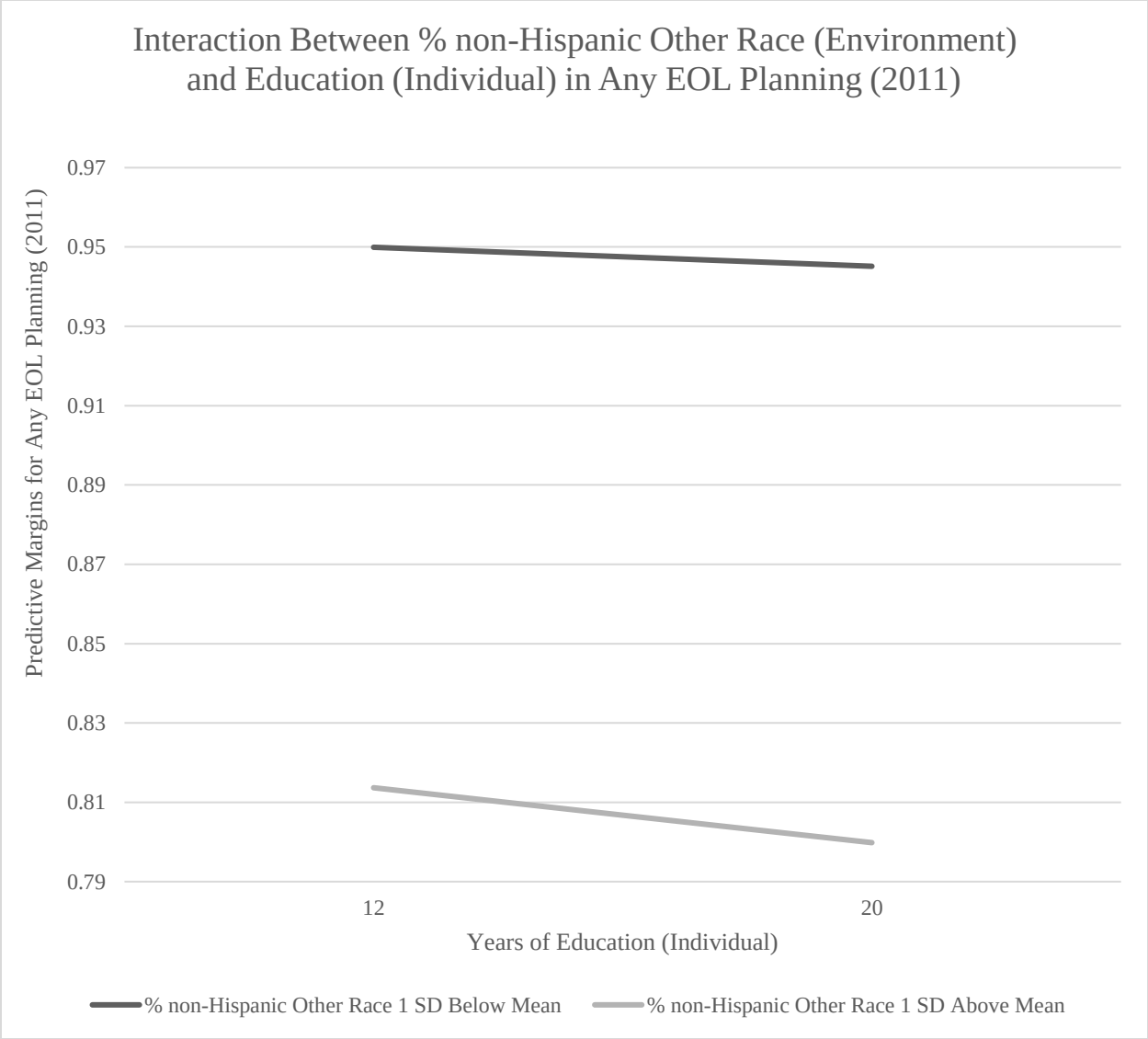


Figure 8. Interaction Between % non-Hispanic Other Race (Environment) and Education (Individual) in Any EOL Planning (2011). This figure illustrates the moderating effects of the percent representing the non-Hispanic other racial category on the association between individual educational attainment and Any EOL Planning in the 2011 WLS wave.

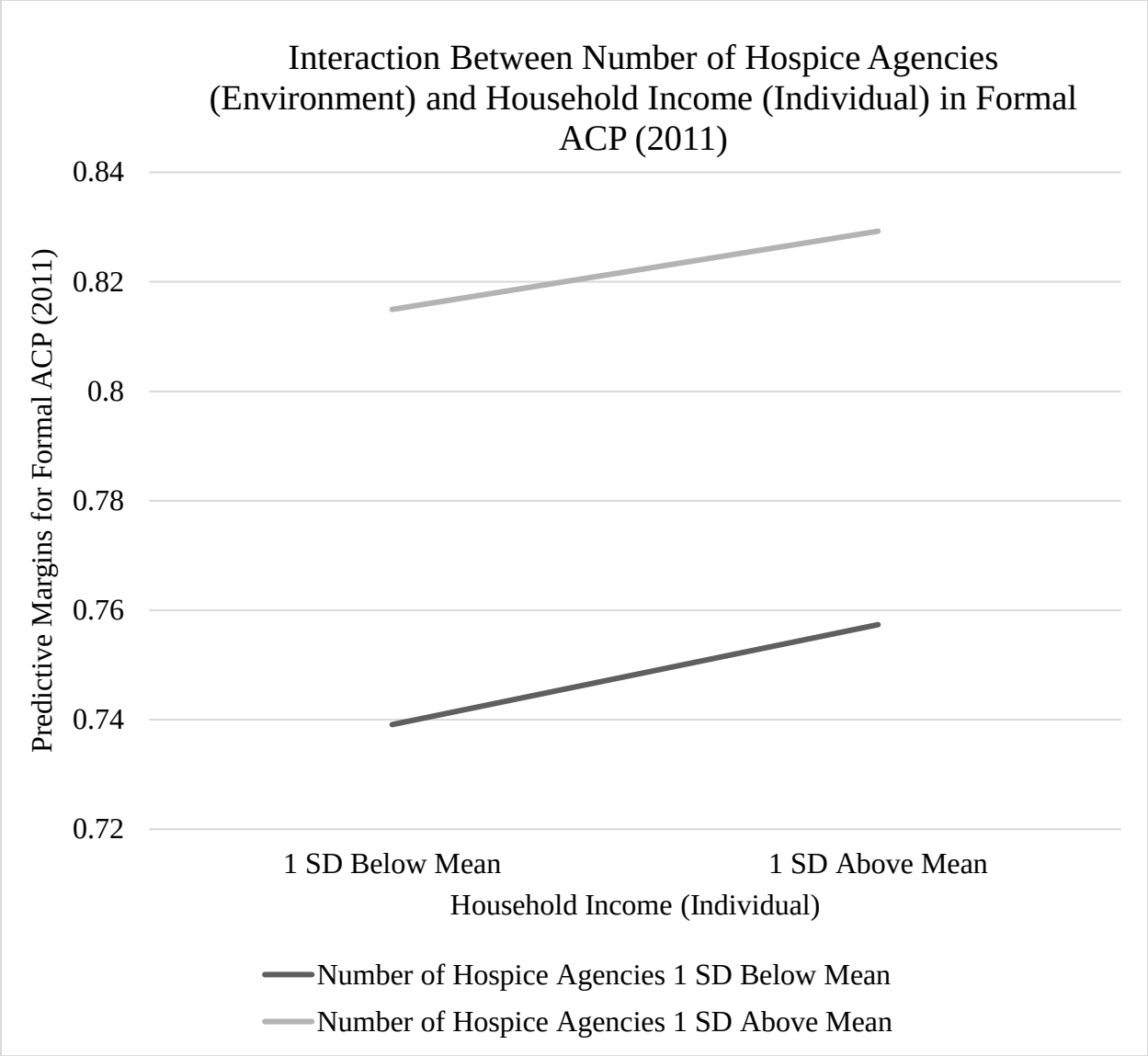


Figure 9. Interaction Between # of Hospice Agencies (Environment) and Household Income (Individual) in Formal ACP (2011). This figure illustrates the moderating effects of the number of hospice agencies on the association between individual household income and Formal ACP in the 2011 WLS wave.

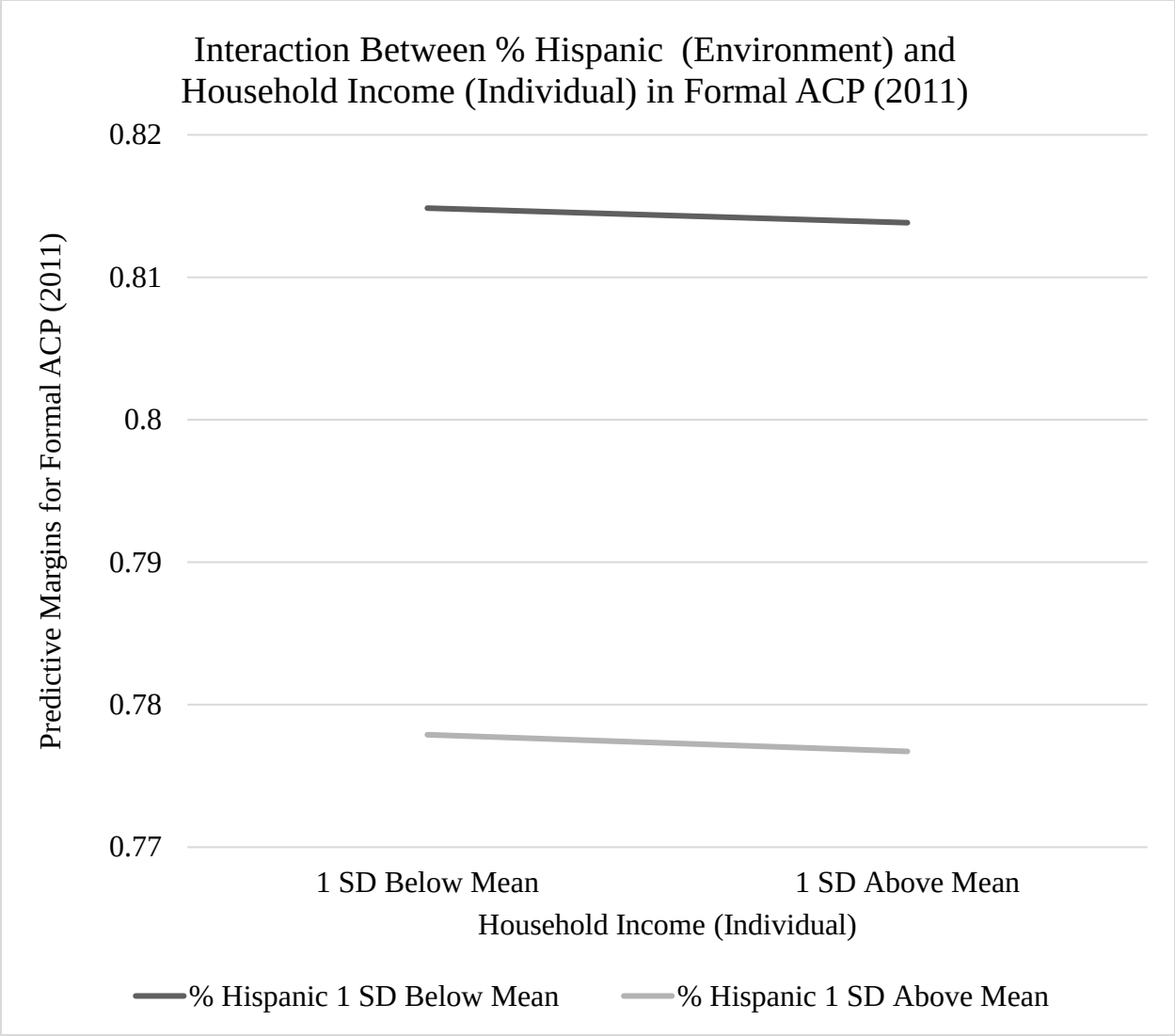


Figure 10. Interaction Between % Hispanic (Environment) and Household Income (Individual) in Formal ACP (2011). This figure illustrates the moderating effects of the percent Hispanic on the association between individual household income and Formal ACP in the 2011 WLS wave.

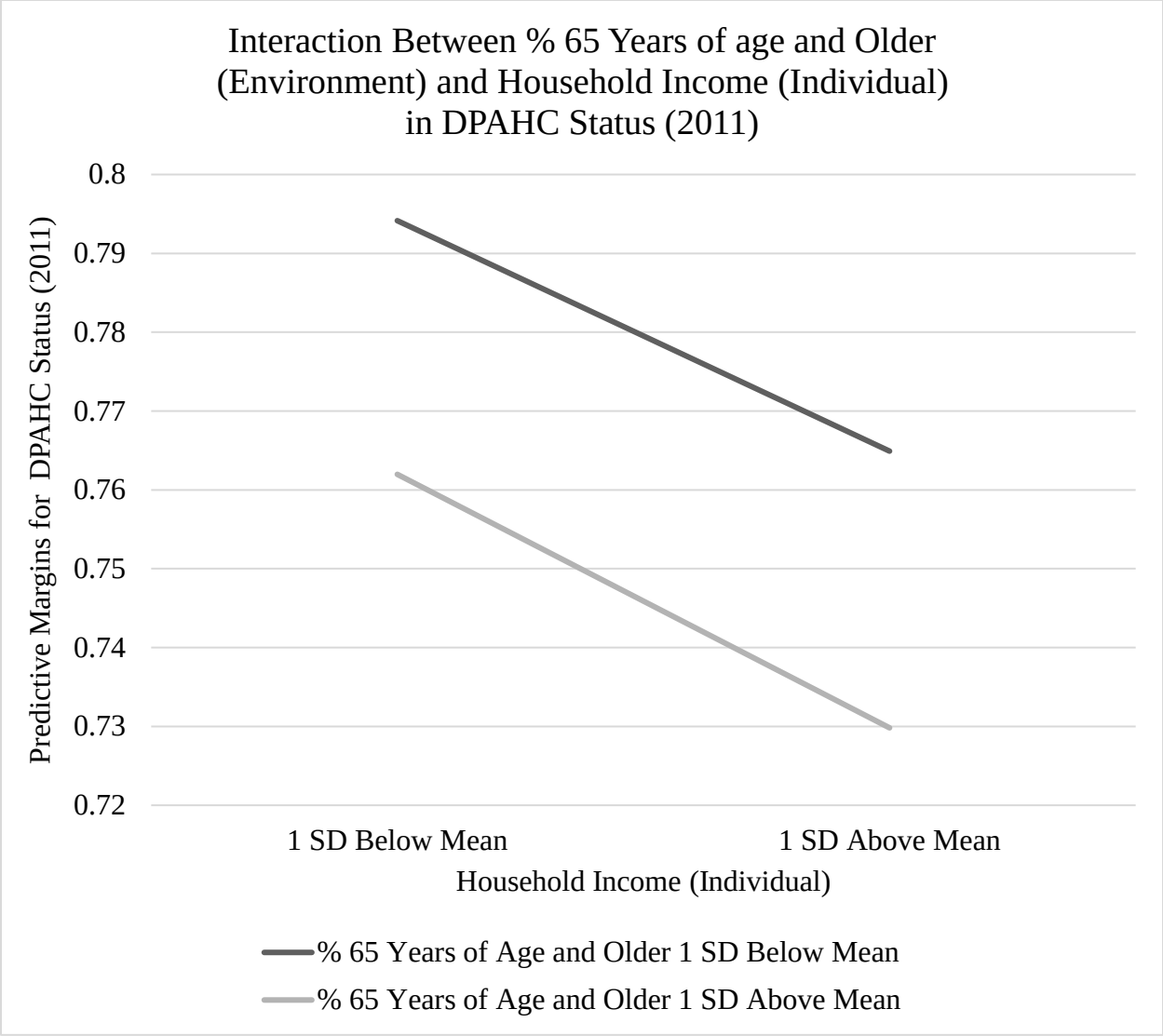


Figure 11. Interaction Between % 65 Years of age and Older (Environment) and Household Income (Individual) in DPAHC Status (2011). This figure illustrates the moderating effects of the percent 65 years of age and older on the association between individual household income and DPAHC Status in the 2011 WLS wave.

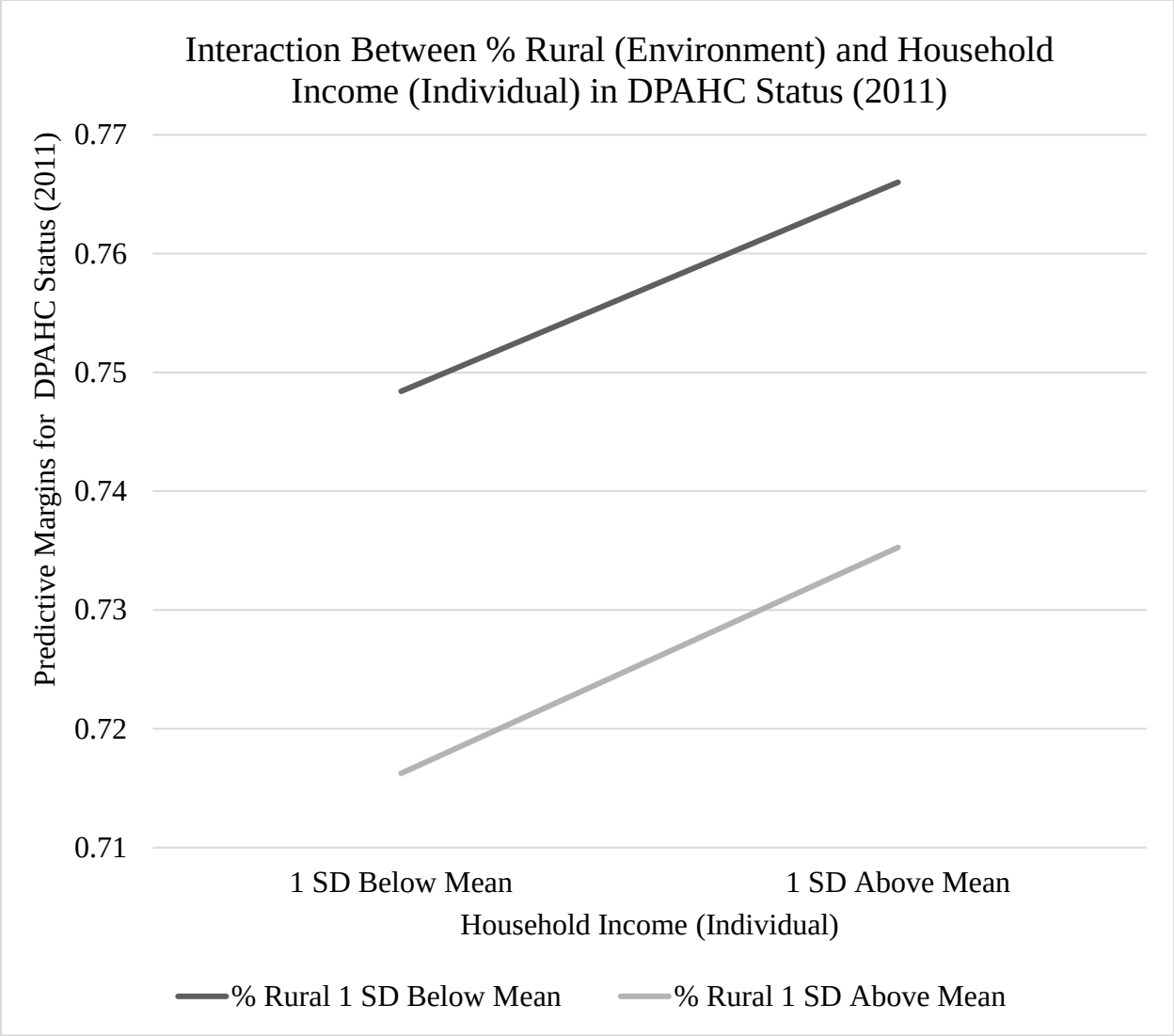


Figure 12. Interaction Between % Rural (Environment) and Household Income (Individual) in DPAHC Status (2011). This figure illustrates the moderating effects of the percent residing in a rural area on the association between individual household income and DPAHC Status in the 2011 WLS wave.

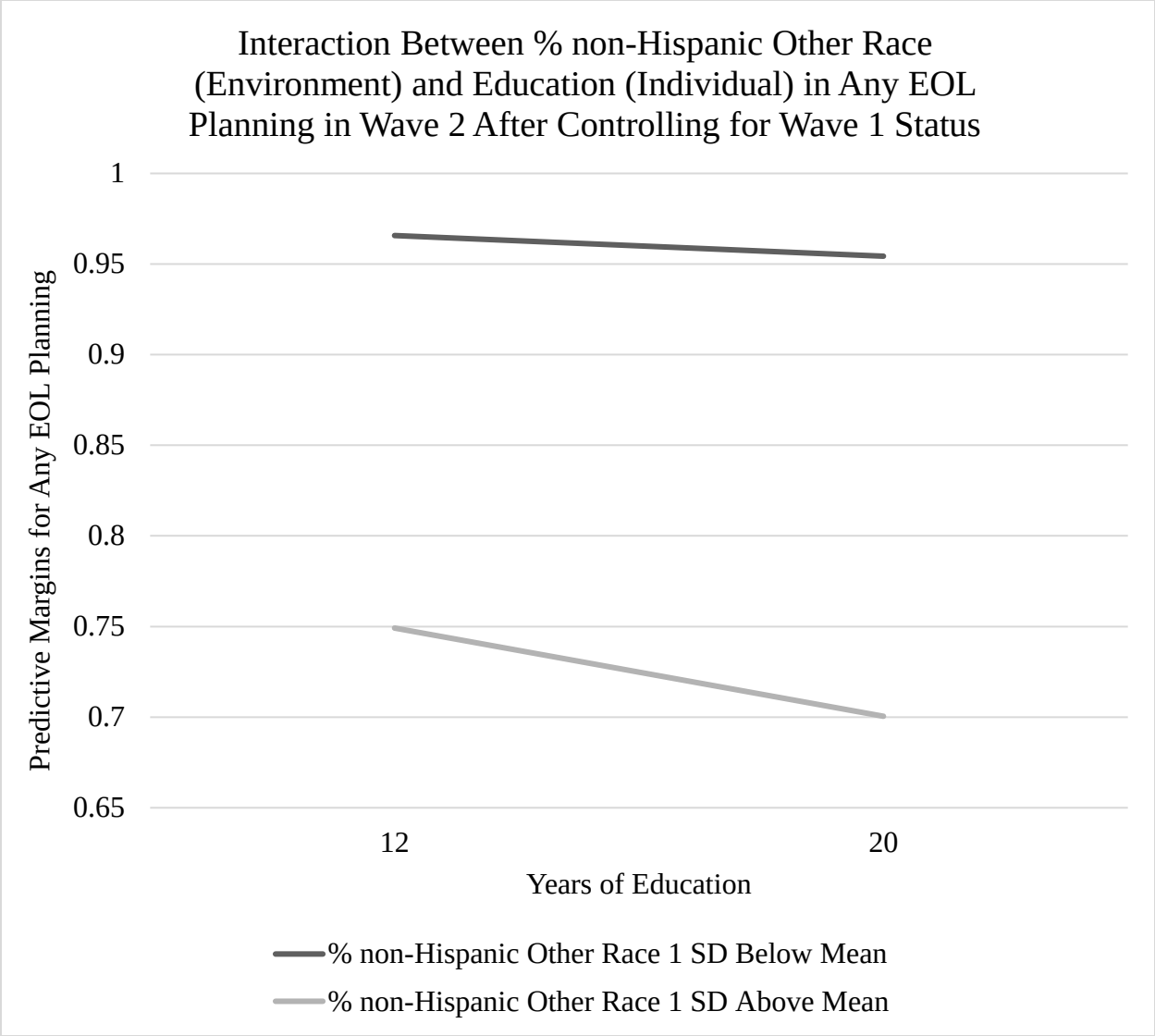


Figure 13. Interaction Between % non-Hispanic Other Race (Environment) and Education (Individual) in Any EOL Planning in Wave 2 After Controlling for Wave 1 Status. This figure illustrates the moderating effects of the percent representing the other racial category on the association between individual educational attainment and Any EOL Planning in the 2011 WLS wave after controlling for Any EOL Planning status in the 2004 WLS wave.

REFERENCES

Abel, J., Pring, A., Rich, A., Malik, T., & Verne, J. (2013). The impact of advance care planning of place of death, a hospice retrospective cohort study. *BMJ Supportive & Palliative Care*, *3*, 168-173.

Ai, A. L., Hopp, F., & Shearer, M. (2006). Getting affairs in order: Influences of social support and religious coping on end-of-life planning among open-heart surgery patients. *Journal of Social Work in End-of-Life & Palliative Care*, *2*, 71-94.

Alano, G. J., Pekmezaris, R., Tai, J. Y., Hussain, M. J., Jeune, J., Louis, B., ... & Wolf-Klein, G. P. (2010). Factors influencing older adults to complete advance directives. *Palliative and Supportive Care, 8*, 267-275.

Amjad, H., Towle, V., & Fried, T. (2014). Association of experience with illness and end-of-life care with advance care planning in older adults. *Journal of the American Geriatrics Society*, *62*, 1304-1309.

Aneshensel, C. S., Harig, F., & Wight, R. G. (2015). Aging, neighborhoods, and the built environment. In L. K. George & K. F Ferraro (Eds.), *Handbook of aging and the social sciences* (8th ed., pp. 315-335). New York, NY: Academic Press.

Ashcraft, A. S., & Owen, D. C. (2016). End-of-life planning in a rural elderly cohort. *Geriatric Nursing*, *37*, 71-74.

Balfour, J. L., & Kaplan, G. A. (2002). Neighborhood environment and loss of physical function in older adults: Evidence from the Alameda County Study. *American Journal of Epidemiology*, *155*, 507-515.

Barnato, A. E., Herndon, M. B., Anthony, D. L., Gallagher, P. M., Skinner, J. S., Bynum, J. P., & Fisher, E. S. (2007). Are regional variations in end-of-life care intensity explained by patient preferences? A study of the US Medicare population. *Medical Care, 45*, 386-393.

Beard, J. R., Cerdá, M., Blaney, S., Ahern, J., Vlahov, D., & Galea, S. (2009). Neighborhood characteristics and change in depressive symptoms among older residents of New York City. *American Journal of Public Health, 99*, 1308-1314.

Bischoff, K. E., Sudore, R., Miao, Y., Boscardin, W. J., & Smith, A. K. (2013). Advance care planning and the quality of end-of-life care in older adults. *Journal of the American Geriatrics Society, 61*, 209-214.

Black, K., Reynolds, S. L., & Osman, H. (2008). Factors associated with advance care planning among older adults in southwest Florida. *Journal of Applied Gerontology, 27*, 93-109.

Blackhall, L. J., Murphy, S. T., Frank, G., Michel, V., & Azen, S. (1995). Ethnicity and attitudes toward patient autonomy. *JAMA, 274*, 820-825.

Boerner, K., Carr, D., & Moorman, S. M. (2013). Family relationships and advance care planning: Do supportive and critical relations encourage or hinder planning? *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 68*, 246-256.

Brinkman-Stoppelenburg, A., Rietjens, J. A., & van der Heide, A. (2014). The effects of advance care planning on end-of-life care: A systematic review. *Palliative Medicine, 28*, 1000-1025.

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by design and nature*. Cambridge, MA: Harvard University Press.

Bronfenbrenner, U. (2005). *Making human beings human*. Thousand Oaks, CA: Sage.

Buchanan, R. J., Bolin, J., Wang, S., Zhu, L., & Kim, M. (2004). Urban/rural differences in decision making and the use of advance directives among nursing home residents at admission. *The Journal of Rural Health, 20*, 131-135.

Cagney, K. A., Browning, C. R., & Wen, M. (2005). Racial disparities in self-rated health at older ages: What difference does the neighborhood make? *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 60*, S181-S190.

Cantor, M. (1979). Neighbors and friends: An overlooked resource in the informal support system. *Research on Aging, 1*, 434-463.

Carr, D. (2012a). "I don't want to die like that…": The impact of significant others' death quality on advance care planning. *The Gerontologist, 52*, 770-781.

Carr, D. (2012b). Racial and ethnic differences in advance care planning: Identifying subgroup patterns and obstacles. *Journal of Aging and Health, 24*, 923-947.

Carr, D. (2012c). The social stratification of older adults' preparations for end-of-life health care. *Journal of Health and Social Behavior, 53*, 297-312.

Carr, D., & Khodyakov, D. (2007a). End-of-life health care planning among young-old adults: An assessment of psychosocial influences. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 62*, S135-S141.

Carr, D., & Khodyakov, D. (2007b). Health care proxies: Whom do young old adults choose and why? *Journal of Health and Social Behavior, 48*, 180-194.

Carr, D., Moorman, S. M., & Boerner, K. (2013). End-of-life planning in a family context: Does relationship quality affect whether (and with whom) older adults plan? *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *68*, 586-592.

Castle, N. G., & Mor, V. (1998). Advance care planning in nursing homes: Pre-and post-Patient Self-Determination Act. *Health Services Research*, *33*, 101-124.

Centers for Medicare and Medicaid. (2019). *Minimum Data Set 3.0 Public Reports.* Retrieved May 13, 2019, from, from https://www.cms.gov/research-statistics-data-and-systems/computer-data-and-systems/minimum-data-set-3-0-public-reports/index.html.

Chan, H. Y., & Pang, S. (2010). Let me talk: An advance care planning programme for frail nursing home residents. *Journal of Clinical Nursing*, *19*, 3073-3084.

Chang, D. W., & Brass, E. P. (2014) Patient and hospital-level characteristics associated with the use of do-not-resuscitate orders in patients hospitalized for sepsis. *Journal of General Internal Medicine*, *29*, 1256-1262.

Chuang, Y. C., Cubbin, C., Ahn, D., & Winkleby, M. A. (2005). Effects of neighbourhood socioeconomic status and convenience store concentration on individual level smoking. *Tobacco Control*, *14*, 337-337.

Clark, N. M., Lachance, L., Doctor, L. J., Gilmore, L., Kelly, C., Krieger, J., ... & Rosenthal, M. (2010). Policy and system change and community coalitions: Outcomes from allies against asthma. *American Journal of Public Health*, *100*, 904-912.

Cohen-Mansfield, J., & Lipson, S. (2008). Which advance directive matters? An analysis of end-of-life decisions made in nursing homes. *Research on Aging*, *30*, 74-92.

Culberson, J., Levy, C., & Lawhorne, L. (2005). Do not hospitalize orders in nursing homes: A pilot study. *Journal of the American Medical Directors Association, 6,* 22-26.

Daaleman, T. P., Williams, C. S., Preisser, J. S., Sloane, P. D., Biola, H., & Zimmerman, S. (2009). Advance care planning in nursing homes and assisted living communities. *Journal of the American Medical Directors Association, 10,* 243-251.

Dean, D., Martinez, M. S., & Newgard, C. D. (2015). Variability in early do not attempt resuscitation orders among patients with serious traumatic brain injury. *Academic Emergency Medicine, 22,* 54-60.

Detering, K.M., Hancock, A.D., Reader, M.C., & Silvester, W. (2010). The impact of advance care planning on end of life in elderly patients: Randomized controlled trial. *BMJ, 340,* c1345.

DeVries, H., Mudde, A., Leijs, I., Charlton, A., Vartianinen, E., Buijs, G., … Nebot, M. (2003). The European smoking prevention framework approach: An example of integral prevention. *Health Education Research, 18,* 611-626.

Diez-Roux, A. V. (2001). Investigating neighborhood and area effects on health. *American Journal of Public Health, 91,* 1783-1789.

Diez-Roux, A. V., Link, B. G., & Northridge, M. E. (2000). A multilevel analysis of income inequality and cardiovascular disease risk factors. *Social Science & Medicine, 50,* 673-687.

Duncan, C., Jones, K., & Moon, G. (1999). Smoking and deprivation: Are there neighbourhood effects? *Social Science & Medicine, 48,* 497-505.

Dunlay, S. M., Swetz, K. M., Mueller, P. S., & Roger, V. L. (2012). Advance directives in community patients with heart failure. *Circulation: Cardiovascular Quality and Outcomes, 5,* 283-289.

Elder, J. P., Lytle, L., Sallis, J. F., Young, D. R., Steckler, A., Simons-Morton, D., ... & Webber, L. (2006). A description of the social–ecological framework used in the trial of activity for adolescent girls (TAAG). *Health Education Research, 22,* 155-165.

Ennett, S. T., Flewelling, R. L., Lindrooth, R. C., & Norton, E. C. (1997). School and neighborhood characteristics associated with school rates of alcohol, cigarette, and marijuana use. *Journal of Health and Social Behavior, 38,* 55-71.

Eschbach, K., Ostir, G. V., Patel, K. V., Markides, K. S., & Goodwin, J. S. (2004). Neighborhood context and mortality among older Mexican Americans: Is there a barrio advantage? *American Journal of Public Health, 94,* 1807-1812.

Fang, J., Madhavan, S., Bosworth, W., & Alderman, M. H. (1998). Residential segregation and mortality in New York City. *Social Science & Medicine, 47,* 469-476.

Fendler, T. J., Spertus, J. A., Kennedy, K. F., Chan, P. S., the American Heart Association's Get With the Guidelines-Resuscitation Investigators. (2017). Association between hospital rates of early do-not-resuscitate orders and favorable neurological survival among survivors of inhospital cardiac arrest. *American Heart Journal, 193,* 108-116.

Franzini, L., Caughy, M., Spears, W., & Esquer, M. E. F. (2005). Neighborhood economic conditions, social processes, and self-rated health in low-income neighborhoods in Texas: A multilevel latent variables model. *Social Science & Medicine, 61,* 1135-1150.

Garrido, M. M., Idler, E. L., Leventhal, H., & Carr, D. (2012). Pathways from religion to advance care planning: Beliefs about control over length of life and end-of-life values. *The Gerontologist, 53,* 801-816.

Glass, T. A., & Balfour, J. L. (2003). Neighborhoods, aging, and functional limitations. *Neighborhoods and Health, 1,* 303-334.

Glavan, B.J., Engelberg, R.A., Downey, L., & Curtis, J.R. (2008). Using the medical record to evaluate the quality of end-of-life care in the intensive care unit. *Critical Care Medicine, 36,* 1138–1146.

Golden, S. D., & Earp, J. A. L. (2012). Social ecological approaches to individuals and their contexts: Twenty years of health education & behavior health promotion interventions. *Health Education & Behavior, 39,* 364-372.

Goldsmith, P. R. (2009). Schools or neighborhoods or both? Race and ethnic segregation and educational attainment. *Social Forces, 87,* 1913-1941.

Goldstein, N. E., Mehta, D., Teitelbaum, E., Bradley, E. H., & Morrison, R. S. (2008). "It's like crossing a bridge" complexities preventing physicians from discussing deactivation of implantable defibrillators at the end of life. *Journal of General Internal Medicine, 23,* 2-6.

Gubbels, J. S., Van Kann, D. H., de Vries, N. K., Thijs, C., & Kremers, S. P. (2014). The next step in health behavior research: The need for ecological moderation analyses-an application to diet and physical activity at childcare. *International Journal of Behavioral Nutrition and Physical Activity, 11,* 52.

Guo, G., & Zhao, H. (2000). Multilevel modeling for binary data. *Annual review of sociology, 26,* 441-462.

Hammes, B. J., Rooney, B. L., & Gundrum, J. D. (2010). A comparative, retrospective, observational study of the prevalence, availability, and specificity of advance care plans in a county that implemented an advance care planning microsystem. *Journal of the American Geriatrics Society, 58*, 1249-1255.

Hemphill, J. C., Newman, J., Zhao, S., & Johnston, S. C. (2004). Hospital usage of early do-not-resuscitate orders and outcome after intracerebral hemorrhage. *Stroke, 35*, 1130-1134.

Hill, T. D., Ross, C. E., & Angel, R. J. (2005). Neighborhood disorder, psychophysiological distress, and health. *Journal of Health and Social Behavior, 46,* 170-186.

Hirschman, K. B., Corcoran, A. M., Straton, J. B., & Kapo, J. M. (2010). Advance care planning and hospice enrollment: Who really makes the decision to enroll? *Journal of Palliative Medicine*, *13,* 519-523.

House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science, 241*, 540-545.

Inoue, M. (2016). The influence of sociodemographic and psychosocial factors on advance care planning. *Journal of Gerontological Social Work, 59,* 401-422.

Institute on Aging. (2017). *Living alone.* Retrieved July 12, 2017, from https://www.ioaging.org/aging-in-america.

Jeurkar, N., Farrington, S., Craig, T. R., Slattery, J., Harrold, J. K., Oldanie, B., ... & Casarett, D. J. (2012). Which hospice patients with cancer are able to die in the setting of their choice? Results of a retrospective cohort study. *Journal of Clinical Oncology, 30,* 2783-2787.

Johnson, K. S., Kuchibhatla, M., & Tulsky, J. A. (2008). What explains racial differences in the use of advance directives and attitudes toward hospice care? *Journal of the American Geriatrics Society, 56*, 1953-1958.

Karpati, A. M., Bassett, M. T., & McCord, C. (2006). Neighbourhood mortality inequalities in New York City, 1989–1991 and 1999–2001. *Journal of Epidemiology & Community Health, 60*, 1060-1064.

Keary, S., & Moorman, S. M. (2015). Patient–physician end-of-life discussions in the routine care of Medicare beneficiaries. *Journal of Aging and Health, 27*, 983-1002.

Khandelwal, N., Kross, E. K., Engelberg, R. A., Coe, N. B., Long, A. C., & Curtis, J. R. (2015). Estimating the effect of palliative care interventions and advance care planning on ICU utilization: A systematic review. *Critical Care Medicine, 43*, 1102.

Kiely, D. K., Mitchell, S. L., Marlow, A., Murphy, K. M., & Morris, J. N. (2001). Racial and state differences in the designation of advance directives in nursing home residents. *Journal of the American Geriatrics Society, 49*, 1346-1352.

Kim, J. (2010). Neighborhood disadvantage and mental health: The role of neighborhood disorder and social relationships. *Social Science Research*, *39*, 260-271.

Kirby, J. B., & Kaneda, T. (2005). Neighborhood socioeconomic disadvantage and access to health care. *Journal of Health and Social Behavior, 46*, 15-31.

Ko, E., & Berkman, C. S. (2012). Advance directives among Korean American older adults: Knowledge, attitudes, and behavior. *Journal of Gerontological Social Work, 55*, 484-502.

Ko, E., & Lee, J. (2009). End-of-life communication: Ethnic differences between Korean American and non-Hispanic White older adults. *Journal of Aging and Health, 21*, 967-984.

Ko, E., & Lee, J. (2014). Completion of advance directives among low-income older adults: Does race/ethnicity matter? *American Journal of Hospice and Palliative Medicine, 31*, 247-253.

Koss, C. S. (2017). Does Religiosity Account for Lower Rates of Advance Care Planning by Older African Americans? *Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 73,* 687-695.

Kossman, D. A. (2014). Prevalence, views, and impact of advance directives among older adults. *Journal of Gerontological Nursing, 40,* 44-50.

Kramer, B. J., Boelk, A. Z., & Auer, C. (2006). Family conflict at the end of life: Lessons learned in a model program for vulnerable older adults. *Journal of Palliative Medicine, 9*, 791-801.

Levin, J. R., Wenger, N. S., Ouslander, J. G., Zellman, G., Schnelle, J. F., Buchanan, J. L., ... & Levy, C. R., Fish, R., & Kramer, A. (2005). Do-not-resuscitate and do-not-hospitalize directives of persons admitted to skilled nursing facilities under the Medicare benefit. *Journal of the American Geriatrics Society, 53,* 2060-2068.

Lewin, K. (1951). Field theory in social science. New York: Harper.

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly, 15,* 351-377.

Mendes de Leon, C. F., Cagney, K. A., Bienias, J. L., Barnes, L. L., Skarupski, K. A., Scherr, P. A., & Evans, D. A. (2009). Neighborhood social cohesion and disorder in relation to walking in community-dwelling older adults: A multilevel analysis. *Journal of Aging and Health, 21*, 155-171.

Mitchell, S. L., Teno, J. M., Intrator, O., Feng, Z., & Mor, V. (2007). Decisions to forgo hospitalization in advanced dementia: A nationwide study. *Journal of the American Geriatrics Society, 55*, 432-438.

Morrison, R. S., Morrison, E. W., & Glickman, D. F. (1994). Physician reluctance to discuss advance directives: An empiric investigation of potential barriers. *Archives of Internal Medicine, 154*, 2311-2318.

Morrison, R. S., Zayas, L. H., Mulvihill, M., Baskin, S. A., & Meier, D. E. (1998). Barriers to completion of health care proxies: An examination of ethnic differences. *Archives of Internal Medicine, 158*, 2493-2497.

Moorman, S. M. (2011). Older adults' preferences for independent or delegated end-of-life medical decision making. *Journal of Aging and Health, 23*, 135-157.

Moorman, S. M., & Boerner, K. (2017). How social network size and quality affect end-of-life surrogate preferences. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 73*, 704-712.

Moorman S. M., & Carr D. (2008). Spouses' effectiveness as end-of-life health care surrogates: Accuracy, uncertainty, and errors of overtreatment or undertreatment. *The Gerontologist, 48*, 811–819.

Moorman, S. M., Carr, D., & Boerner, K. (2014). The role of relationship biography in advance care planning. *Journal of Aging and Health, 26*, 969-992.

Nicholas, L. H., Langa, K. M., Iwashyna, T. J., & Weir, D. R. (2011). Regional variation in the association between advance directives and end-of-life Medicare expenditures. *JAMA, 306,* 1447-1453.

OSHPD, Office of Statewide Health Planning and Development. Patient Data-Hospital Inpatient Discharge Reports. Retrieved on December 12, 2017 at https://www.oshpd.ca.gov/HID/.

Patel, K. V., Eschbach, K., Rudkin, L. L., Peek, M. K., & Markides, K. S. (2003). Neighborhood context and self-rated health in older Mexican Americans. *Annals of Epidemiology*, *13*, 620-628.

Pericak, A. (2011). Increased autonomy for nurse practitioners as a solution to the physician shortage. *Journal of the New York State Nurses Association, 42*.

Phadke, A., & Heidenreich, P. A. (2016). Differences and trends in DNR among California inpatients with heart failure. *Journal of Cardiac Failure, 22,* 312-315.

Pollack, K. M., Morhaim, D., & Williams, M. A. (2010). The public's perspectives on advance directives: Implications for state legislative and regulatory policy. *Health Policy*, *96,* 57-63.

Pruitt, S. L., Lee, S. J. C., Tiro, J. A., Xuan, L., Ruiz, J. M., & Inrig, S. (2015). Residential racial segregation and mortality among Black, White, and Hispanic urban breast cancer patients in Texas, 1995 to 2009. *Cancer,* 121, 1845-1855.

Resnick, H. E., Hickman, S., & Foster, G. L. (2012). Documentation of advance directives among home health and hospice patients: United States, 2007. *American Journal of Hospice and Palliative Medicine, 29,* 26-35.

Resnick, H. E., Schuur, J. D., Heineman, J., Stone, R., & Weissman, J. S. (2008). Advance directives in nursing home residents aged≥ 65 years: United States 2004. *American Journal of Hospice and Palliative Medicine, 25,* 476-482.

Rhodes, R. L., Elwood, B., Lee, S. C., Tiro, J. A., Halm, E. A., & Skinner, C. S. (2017). The desires of their hearts: The multidisciplinary perspectives of African Americans on end-of-life care in the African American community. *American Journal of Hospice and Palliative Medicine, 34,* 510-517.

Richardson, D. K., Zive, D., Daya, M., & Newgard, C. D. (2012). The impact of early DNR orders on patient care and outcomes following resuscitation from out of hospital cardiac arrest. *Academic Emergency Medicine, 19,* S94.

Richardson, D. K., Zive, D. M., & Newgard, C. D. (2013). End-of-life decision-making for patients admitted through the emergency department: Hospital variability, patient demographics, and changes over time. *Academic Emergency Medicine, 20,* 381-387.

Robert, S. A., & Li, L. W. (2001). Age variation in the relationship between community socioeconomic status and adult health. *Research on Aging, 23,* 234-259.

Robert, S. A., & Ruel, E. (2006). Racial segregation and health disparities between black and white older adults. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 61,* S203-S211.

Ross, C. E., & Mirowsky, J. (2001). Neighborhood disadvantage, disorder, and health. *Journal of Health and Social Behavior, 42*, 258-276.

Salazar, L. F., Bradley, E. L., Younge, S. N., Daluga, N. A., Crosby, R. A., Lang, D. L., & DiClemente, R. J. (2009). Applying ecological perspectives to adolescent sexual health in the United States: Rhetoric or reality? *Health Education Research, 25*, 552-562.

Sallis, J. F., Owen, N., & Fisher, E. (2015). Ecological models of health behavior. Health behavior: theory, research, and practice. 5th ed. San Francisco: Jossey-Bass, 43-64.

Sanders, J. J., Robinson, M. T., & Block, S. D. (2016). Factors impacting advance care planning among African Americans: Results of a systematic integrated review. *Journal of Palliative Medicine, 19*, 202-227.

Sharp, S., Carr, D., & MacDonald, C. (2012). Religion and end-of-life treatment preferences: Assessing the effects of religious denomination and beliefs. *Social Forces, 91*, 275-298.

Shepardson, L. B., Youngner, S. J., Speroff, T., O'Brien, R. G., Smyth, K. A., & Rosenthal, G. E. (1997). Variation in the use of do-not-resuscitate orders in patients with stroke. *Archives of Internal Medicine, 157*, 1841-1847.

Silveira, M.J., Kim, S.Y., & Langa, K.M. (2010). Advance directives and outcomes of surrogate decision making before death. *New England Journal of Medicine, 362,* 1211-1218.

Smith, A. K., McCarthy, E. P., Paulk, E., Balboni, T. A., Maciejewski, P. K., Block, S. D., & Prigerson, H. G. (2008). Racial and ethnic differences in advance care planning among patients with cancer: Impact of terminal illness acknowledgment, religiousness, and treatment preferences. *Journal of Clinical Oncology, 26*, 4131-4137.

Snyder, S., Hazelett, S., Allen, K., & Radwany, S. (2013). Physician knowledge, attitude, and experience with advance care planning, palliative care, and hospice: Results of a primary care survey. *American Journal of Hospice and Palliative Medicine, 30,* 419-424.

Sudano, J. J., Perzynski, A., Wong, D. W., Colabianchi, N., & Litaker, D. (2013). Neighborhood racial residential segregation and changes in health or death among older adults. *Health & Place, 19,* 80-88.

Temel, J. S., Greer, J. A., Muzikansky, A., Gallagher, E. R., Admane, S., Jackson, V. A., Dahlin., C.M., Blinderman, C.D., Jacobsen, J., Pirl, W.F., Billings, J.A., and Lynch, T.J. (2010). Early palliative care for patients with metastatic non–small-cell lung cancer. *New England Journal of Medicine, 363,* 733-742.

Teno, J. M., Branco, K. J., Mor, V., Phillips, C. D., Hawes, C., Morris, J., & Fries, B. E. (1997). Changes in advance care planning in nursing homes before and after the Patient Self-Determination Act: Report of a 10-state survey. *Journal of the American Geriatrics Society, 45,* 939-944.

Teno, J. M., Gruneir, A., Schwartz, Z., Nanda, A., & Wetle, T. (2007). Association between advance directives and quality of end-of-life care: A national study. *Journal of the American Geriatrics Society, 55,* 189-194.

Tilden, V. P., Tolle, S. W., Nelson, C. A., & Fields, J. (2001). Family decision-making to withdraw life-sustaining treatments from hospitalized patients. *Nursing Research, 50,* 105-115.

Trim, R. S., & Chassin, L. (2008). Neighborhood socioeconomic status effects on adolescent alcohol outcomes using growth models: Exploring the role of parental alcoholism. *Journal of Studies on Alcohol and Drugs, 69*, 639-648.

Troyer, J. L., & McAuley, W. J. (2006). Environmental contexts of ultimate decisions: Why white nursing home residents are twice as likely as African American residents to have an advance directive. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 61*, S194-S202.

Umberson, D., Crosnoe, R., & Reczek, C. (2010). Social relationships and health behavior across the life course. *Annual Review of Sociology, 36*, 139-157.

Waite, K. R., Federman, A. D., McCarthy, D. M., Sudore, R., Curtis, L. M., Baker, D. W.,Wilson, E.A.H., Hasnain-Wynia, R., Wolf, M.S., & Paasche-Orlow, M. K. (2013). Literacy and race as risk factors for low rates of advance directives in older adults. *Journal of the American Geriatrics Society, 61*, 403-406.

Wallace, M. P., Weiner, J. S., Pekmezaris, R., Almendral, A., Cosiquien, R., Auerbach, C., & Wolf-Klein, G. (2007). Physician cultural sensitivity in African American advance care planning: A pilot study. *Journal of Palliative Medicine, 10*, 721-727.

Wenger, N. S., Pearson, M. L., Desmond, K. A., Harrison, E. R., Rubenstein, L. V., Rogers, W. H., & Kahn, K. L. (1995). Epidemiology of do-not-resuscitate orders: Disparity by age, diagnosis, gender, race, and functional impairment. *Archives of Internal Medicine, 155*, 2056-2062.

West, S. K., & Hollis, M. (2012). Barriers to completion of advance care directives among African Americans ages 25–84: A cross-generational study. *Journal of Death and Dying, 65*, 125-137.

Wight, R. G., Aneshensel, C. S., Miller-Martinez, D., Botticello, A. L., Cummings, J. R., Karlamangla, A. S., & Seeman, T. E. (2006). Urban neighborhood context, educational attainment, and cognitive function among older adults. *American Journal of Epidemiology, 163,* 1071-1078.

Woosley, A., Danes, S. M., & Stum, M. (2017). Utilizing a family decision-making lens to examine adults' end-of-life planning actions. *Journal of Family and Economic Issues, 38,* 33-44.

Zhang, B., Wright, A. A., Huskamp, H. A., Nilsson, M. E., Maciejewski, M. L., Earle, C. C., ... & Prigerson, H. G. (2009). Health care costs in the last week of life: Associations with end-of-life conversations. *Archives of Internal Medicine, 169,* 480-488.

Zhou, Y., Bemanian, A., & Beyer, K. M. (2017). Housing discrimination, residential racial segregation, and colorectal cancer survival in southeastern Wisconsin. *Cancer, Epidemiology, Biomarkers & Prevention,* 26, 561-568.

Zingmond, D. S., & Wenger, N. S. (2005). Regional and institutional variation in the initiation of early do-not-resuscitate orders. *Archives of Internal Medicine, 165,* 1705-1712.