Advancing Social Connection as a Public Health Priority in the United States

Julianne Holt-Lunstad
Brigham Young University

Theodore F. Robles
University of California, Los Angeles

David A. Sbarra
University of Arizona

A robust body of scientific evidence has indicated that being embedded in high-quality close relationships and feeling socially connected to the people in one's life is associated with decreased risk for all-cause mortality as well as a range of disease morbidities. Despite mounting evidence that the magnitude of these associations is comparable to that of many leading health determinants (that receive significant public health resources), government agencies, health care providers and associations, and public or private health care funders have been slow to recognize human social relationships as either a health determinant or health risk marker in a manner that is comparable to that of other public health priorities. This article evaluates current evidence (on social relationships and health) according to criteria commonly used in determining public health priorities. The article discusses challenges for reducing risk in this area and outlines an agenda for integrating social relationships into current public health priorities.

Keywords: social networks, social support, public health, health promotion, intervention

Supplemental materials: http://dx.doi.org/10.1037/amp0000103.supp

> The secret of getting ahead is getting started.
>
> Attributed to Mark Twain

Broad-based epidemiological studies have provided clear and compelling evidence that social relationship status and functioning predict an array of important health outcomes and risk for premature mortality (Holt-Lunstad, Smith, & Layton, 2010; House, Landis, & Umberson, 1988; Robles, Slatcher, Trombello, & McGinn, 2014; Sbarra, Law, & Portley, 2011; Shor & Roelfs, 2015). There is also a rich literature documenting the potential mechanisms that con-

nect relationships to health outcomes (e.g., Uchino, 2006). Academics in interdisciplinary fields (e.g., epidemiology, psychology, sociology) have known about these findings for decades, but this work and its implications have only recently begun to trickle into the discussions of major health organizations. Most notably, the World Health Organization (WHO) now lists "social support networks" as a determinant of health (WHO, n.d.), and the United Kingdom's (U.K.) minister of health has established loneliness as a health priority (U.K. Department for Work & Pensions, 2015). Despite these laudable efforts, social relationships remain notably missing from the lists of currently accepted determinants of health for most major U.S. government agencies, health care providers and associations, and public or private health care funders[1] (e.g., Centers for Disease Control [CDC], Healthy People 2020, American Heart Association) and largely unrecognized or underappreciated by the general public. These facts raise important questions: Why are social relationships not adequately acknowledged, and what steps may be necessary to update national public health priorities in a manner that is more consistent with the

Authors' note.   Julianne Holt-Lunstad, Department of Psychology, Brigham Young University; Theodore F. Robles, Department of Psychology, University of California, Los Angeles; David A. Sbarra, Department of Psychology, University of Arizona.

Correspondence concerning this article should be addressed to Julianne Holt-Lunstad, Department of Psychology, Brigham Young University, 1024 Spencer W. Kimball Tower, Provo, UT 84602. E-mail: julianne_holt-lunstad@byu.edu

[1] Consistent with the WHO, we view this as a global health priority; however, we focus primarily on public health prioritization in the United States.

**Julianne
Holt-Lunstad**

empirical research in this area? This article addresses these questions and outlines an agenda for integrating social relationships into current public health priorities moving forward.

Many people—from psychologists to public health officials— will assume that public health prioritization refers to large-scale interventions and/or social engineering that somehow legislates "better relationships" for all; understandably, this perspective may lead to reactance and concerns that any public health focus on social relationships is premature, naïve, or a form of unnecessary government involvement in matters of personal choice. However, quite simply, greater public health prioritization refers to directing "resources, time, and energy to those issues that are deemed most critical and practical to address" Centers for Disease Control and Prevention (CDC, 2013). Such resources can be directed toward education; basic and applied research; surveillance; containment and prevention efforts; public health policy; interventions; and even, if the data supports it, social engineering.

Criteria for Establishing Public Health Priorities

How are public health priorities established? With an increasing range of pressing health issues and limited resources, public and private health organizations must establish priorities according to an established method that is fair, reasonable, and relatively easy to calculate. Although a number of methods exist, this article relies on the *Basic Priority Rating System* (BPRS; Vilnius & Dandoy, 1990) and the CDC's (2013) *Prioritizing Public Health Problems,* which is consistent with the WHO's (2016) *Health Impact Assessment*. The primary criteria used to prioritize public

health concerns are the *size* and *seriousness* of the problem. According to these criteria, there is sufficient evidence to prioritize social relationships in public health. Of course, the body of evidence in this area has been neither complete nor perfect—it has been fraught with gaps in the literature, issues of multiple causality, and disappointing interventions. However, similar challenges exist for other behavioral risk factors that receive considerable public health prioritization, including diet, physical activity, tobacco use, and so forth. Thus, despite these challenges, the analysis provided next articulates key evidence suggesting prioritization is both justified and necessary to improve public health.

Defining the Problem

When it comes to social relationships, what exactly is the problem? Having too few relationships? Lacking social contact, interaction, or perceived support? Being lonely? Lacking a close intimate partner or someone in the home to rely on in times of need? Having strained or unsupportive relationships? Even from this incomplete list, it is clear that the multifactorial conceptualization and measurement of social relationships may be a barrier to prioritization.

One way to address this barrier is to define the problem as lacking social connection. The umbrella term *social connection* (or *social connectedness*) represents a multifactorial construct that includes structural, functional, and qualitative aspects of social relationships (see Table 1), all of which contribute to risk and protection. Epidemiological research has generally focused on the structural (e.g., social network size or density, marital status, living arrangements) or functional (e.g., received and perceived social support, perceived loneliness) aspects of social relationships, and some work has included multidimensional approaches (i.e., a combination of structural and functional aspects; Berkman, Glass, Brissette, & Seeman, 2000). Further, researchers have examined the positive and negative qualities of the relationships above and beyond the functions they serve (e.g., Robles et al., 2014). Of importance, measures in each of these domains independently predict morbidity and mortality, and, given weak correlations among them, each may influence health through different pathways (Cohen, Underwood, & Gottlieb, 2000). Thus, as an organizing construct, social connection encompasses the variety of ways one can connect to others socially—through physical, behavioral, social–cognitive, and emotional channels.

The Size of the Problem

For a problem to become a public health priority, an accurate estimate of its size is needed. What percentage of the population lacks social connection? Although precise prevalence estimates are difficult because of the multifac-

**Theodore F.
Robles**

torial nature of the construct, lack of social connection may be indicated in any of the domains outlined in Table 1. Relevant social indicators are regularly collected as part of census data. For example, more than a quarter of the U.S. population (27%) lives alone, over half the U.S. adult population is unmarried, and one in five have never married (U.S. Census Bureau, 2013). The divorce rate in the United States continues to hover around 40% of first marriages (U.S. Census Bureau, 2011). Although caution must be used in suggesting single, widowed, or divorced adults are less socially connected than are those who are married, these structural dimensions provide robust indications of health risk, as does variability in relationship quality and perceptions of embeddedness within one's community. Between 20% and 43% of U.S. adults over age 60 experience *frequent or intense loneliness*—higher than the prevalence of merely living alone (Perissinotto, Stijacic Cenzer, & Covinsky, 2012). Among married couples, three in 10 relationships are *severely discordant* (Whisman, Beach, & Snyder, 2008). In a now classic analysis, Putnam (2000) argued that social disconnection was a defining feature of contemporary American life, and recent analyses have suggested that widespread smartphone use has diminished the quality of interpersonal exchanges, so much so that the problem of being *alone together* has emerged as a meaningful cultural reference (Turkle, 2011). At this juncture, the extant data have indicated that social disconnection is highly prevalent; however, the full scope of the problem will remain unclear until public health surveillance systems begin tracking indictors of social disconnection in a systematic and representative way.

The Seriousness of the Problem

Higher public health prioritization has also been given to more serious health issues. The seriousness is determined by the *urgency, severity,* and *economic loss* associated with the problem. When these criteria are applied, social connection demonstrates a level of seriousness comparable to other "leading health determinants," and other social determinants of health.

Urgency. Seriousness is influenced by whether the problem is getting worse or may get worse over time. The average size of core social networks has declined by one third since 1985, and networks have become less diverse; they are less likely to include nonkin (Hampton, Sessions Goulet, Her, & Rainie, 2009). Average household size has decreased, and there has been a 10% increase in single-occupant households (U.S. Census Bureau, 2011). Census data have also revealed trends in decreased marriage rates, fewer children per household, and increased rates of childlessness (U.S. Census Bureau, 2011). Taken together with an aging population, smaller families and greater mobility reduces the ability to draw upon familial sources of informal support in old age (Rook, 2009). Decreased community involvement is evidenced by falling rates of volunteerism (U.S. Department of Labor, Bureau of Statistics, 2016) and an increasing percentage of Americans reporting no religious affiliation (Pew Research Center, 2015). Given that the incidence of loneliness is known to increase with age (Dykstra, van Tilburg, & de Jong Gierveld, 2005) and that social (particularly friendship) networks shrink with age (Wrzus, Hänel, Wagner, & Neyer, 2013), the prevalence of loneliness is estimated to increase with increased population aging. Taken together, these trends suggest that Americans are becoming less socially connected.

Severity. Across measurement approaches (structural, functional, multidimensional), being socially connected is associated with a 50% reduced risk of early death (Holt-Lunstad et al., 2010), demonstrating that social disconnection is indeed a severe problem. Meta-analytic data for specific indicators of social connections and their effect on mortality risk are shown in Table 1. Although the relative effect varies across social indicators, there is a consistent and significant effect on mortality risk. Of note, measurement approaches that consider multiple aspects of relationships are the strongest predictors of mortality risk. These findings also account for potential confounds (e.g., age and initial health status) and thus also rule out reverse causality. Consistent across measurement approaches, gender, age, and country of origin, those who are less socially connected are at greater risk for earlier mortality.

The effect of social relationships can be benchmarked against other well-established lifestyle risk factors. As shown in Figure 1A, the magnitude of effect of social connection on mortality risk is comparable, and in many

David Sbarra
Photo by
Christina Dunn

cases exceeds, that of other well-accepted risk factors. Prevalence rates, or the proportion of the population affected, are also comparable with well-established risk factors (see Figure 1B). In evaluating these statistics, it is important to note that structural and functional measures are weakly correlated (20%–30% shared variance) suggesting that (a) these measures tap into different aspects of relationships with potentially different pathways to health, (b) there may be a larger prevalence of those who lack social connectedness on at least one dimension, and (c) those who lack social connectedness on multiple dimensions may carry greater risk. Thus, current estimates of severity are conservative, and assessing the risk conferred by lack of social connections should be done in a multifactorial manner.

Economic loss. Clearly, economics play a major role in determining how best to allocate limited resources. Despite the mixed success of social support interventions, both informal social support and programmatic interventions may be associated with economic benefits. For example, in addition to improving quality of life, total health care costs were significantly lower among breast cancer patients randomized to psychosocial support in addition to standard care compared to those who received only standard care (Arving, Brandberg, Feldman, Johansson, & Glimelius, 2014; Gillespie, O'Shea, Paul, O'Dowd, & Smith, 2012). Similarly, comprehensive postpartum social support interventions have resulted in lower normal newborn readmission rates and lower costs (Barilla, Marshak, Anderson, & Hopp, 2010). Considering informal social support, being more socially connected (higher family cohesion, marital status, and living with someone else) is associated with greater adherence to medical recommendations (Di-

Matteo, 2004), which results in better treatment outcomes and lowered medical costs. Of importance, social connections influence a number of health-relevant behaviors that are already widely recognized for their economic costs to the individual, family, and the broader health care system. However, large-scale estimates of the economic cost associated with lacking social connection are still needed.

Prioritization Summary

In sum, a significant portion of the U.S. population lack social connections, which places them at greater risk for premature mortality and underlying morbidity—and the magnitude of this risk is comparable to that of currently recognized leading health determinants. It is important to note that although social relationships are closely related to existing health priorities (i.e., close relationships shape important health behaviors), most epidemiological evidence controls for these effects—suggesting that being socially connected contributes to risk independent of these other health determinants. Examining potential moderating factors (e.g., gender, age, country of origin) reveals remarkably consistent and widespread effects across the human population (Holt-Lunstad, Smith, & Layton, 2010). Changes in U.S. demographic trends further point to an exacerbation of social disconnection, suggesting an increasing urgency. Thus, based on these commonly accepted BPRS core criteria, there is sufficient evidence to support prioritizing social connection in public health.

Targeting Social Relationships to Promote Public Health

The CDC has identified "public health priorities with large-scale impact on health and known effective strategies to address them" as *winnable battles* (CDC, 2016a). Currently, the list includes tobacco; nutrition, physical activity, and obesity; food safety; health care–associated infections; motor vehicle injuries; teen pregnancy; and HIV. Does the evidence point to the need for adding social connection to the winnable battles list? There appear to be two criteria: (a) a large-scale impact on health and (b) known effective strategies to address the problem. As reviewed earlier, the data are quite clear that social relationships have a "large-scale impact on health." Moreover, social relationships shape interpersonal interactions and intrapersonal experiences that alter health-relevant physiology across the lifespan (Hostinar, Sullivan, & Gunnar, 2014; Uchino, 2006) and provide a context for many important health behaviors, including other recognized health determinants (Umberson, Crosnoe, & Reczek, 2010). In this way, a public health focus on social relationships has the potential to make the CDC's winnable battles more winnable. However, when

Table 1
Definitions of Social Connection Components and Their Effect on Reduced Risk for Mortality

Social Connection

The extent to which an individual is socially connected takes a multifactorial approach including (1) connections to others via the existence of relationships and their roles; (2) a sense of connection that results from actual or perceived support or inclusion; and (3) the sense of connection to others that is based on positive and negative qualities.

Domains & Definitions	Measure, and description	Effect size based on meta-analytic data[a]		
		k	OR/HR	95% CI
(1) **Structural**	The existence and interconnections among differing social ties and roles			
	Marital status			
	Married vs. divorced	104[b]	1.30 (HR)	[1.27, 1.49]
	Married vs. widowed	123[c]	1.23 (HR)	[1.19, 1.28]
	Married vs. never married	96[d]	1.24 (HR)	[1.19, 1.30]
	Social networks			
	Network density or size, number of social contacts	71[e]	1.45	[1.32, 1.59]
	Social integration			
	Participation in a broad range of social relationships; includes active engagement in a variety of social activities or relationships, and sense of communality and identification with one's social roles	45[e]	1.52	[1.36, 1.69]
	Social contact frequency	91[f]	1.13 (HR)	
	Living alone vs. living with others	25[g]	1.32	[1.14, 1.53]
	Social isolation (Inversed)			
	Pervasive lack of social contact, communication, participation in social activities, or confidant	14[g]	1.29	[1.06, 1.56]
(2) **Functional**	Functions provided or perceived to be available by social relationships			
	Received support			
	Self-reported receipt of emotional, informational, tangible, or belonging support	9[e]	1.22	[.91, 1.63]
	Perceptions of social support			
	Perception of availability of emotional, informational, tangible, or belonging support if needed	73[e]	1.35	[1.22, 1.49]
	Perception of loneliness (Inversed)			
	Feelings of isolation, disconnectedness, and not belonging	13[g]	1.26	[1.04, 1.53]
(3) **Quality**	Perceptions of positive and negative aspects of social relationships			
	Marital quality			
	Subjective ratings of satisfaction, adjustment, cohesion in couples	7[h]	1.49	[1.16, 1.94]
	Relationship strain			
	Subjective ratings of conflict, distress, or ambivalence	—	—	—
Multi-Dimensional	1, 2, and 3			
	Complex measures of social integration			
	A single measure that assesses multiple components of social integration such as marital status, network size, and network participation	30[e]	1.91	[1.63, 2.23]
	Multiple measures obtained that assess more than one of the above conceptualizations	148	1.50	[1.42, 1.59]

Note. Major Social Connection components are bold. Dashes indicate meta-analytic data is unavailable. k = number of studies; OR = Odds ratio; HR = hazards ratio; CI = confidence interval.
[a] 1 indicates no difference, and >1 indicates increased survival. [b] Shor, Roelfs, Bugyi, and Schwartz (2012). [c] Shor, Roelfs, Curreli, and Schwartz (2012). [d] Roelfs, Shor, Kalish, and Yogev (2011). [e] Holt-Lunstad, Smith, and Layton (2010). [f] Shor, Roelfs, Curreli, Clemow, Burg, and Schwartz (2012). [g] Holt-Lunstad, Smith, Baker, Harris, and Stephenson (2015). [h] Computed from Robles, Slatcher, Trombello, and McGinn (2014).

considering whether social connections have "known effective strategies to address them," the data are mixed and less compelling, largely because attention remains relatively limited.

Drawing parallels to other established health priorities can help determine whether the evidence warrants elevating social connection as a public health priority. Many of the winnable battles are multiply determined, and identifying modifiable causal pathways is often difficult; the gap between provocative observational science findings and the implementation of successful (experimental) interventions is large; early prevention is key for health promotion; and,

ultimately, behavior change exists in an ecological context and must occur across multiple levels of analysis, from social policies to individual action. Moreover, lessons learned in more visible public health initiatives can be applied to the study of social connection. This section briefly discusses each of these topics and draws parallels to nutrition, physical activity, and obesity as public health exemplars that help highlight ways forward. A key undercurrent of this analysis is that the challenges for elevating social connection as a public health priority are not wholly different from the challenges faced in advancing other currently identified winnable battles.

A   Comparison of Decreased Mortality across Social Connection and Leading Health Indicators
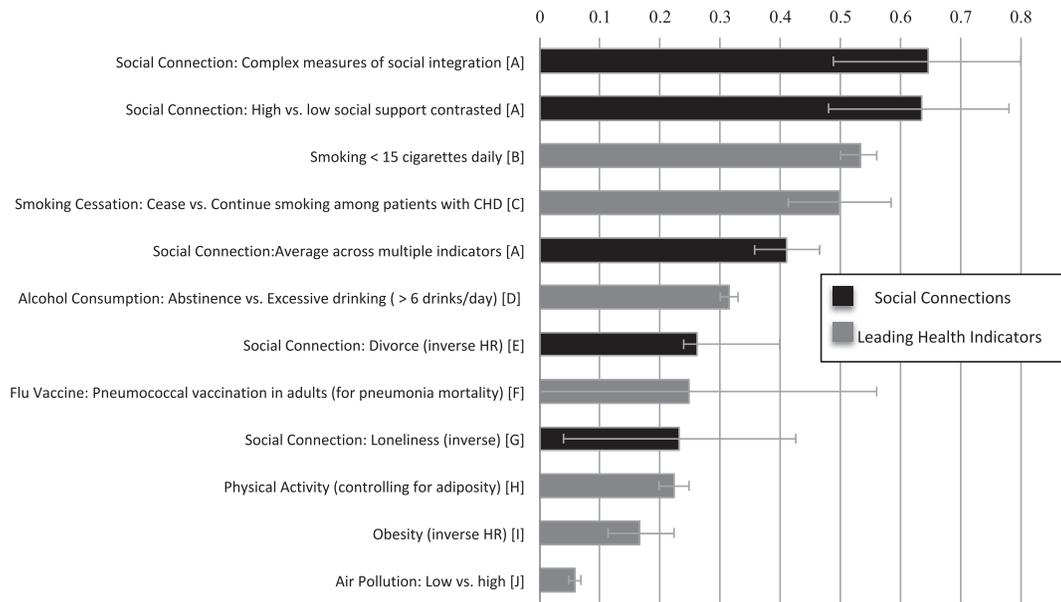
B   Prevalance of Social and Health Conditions in U.S. Adult Population
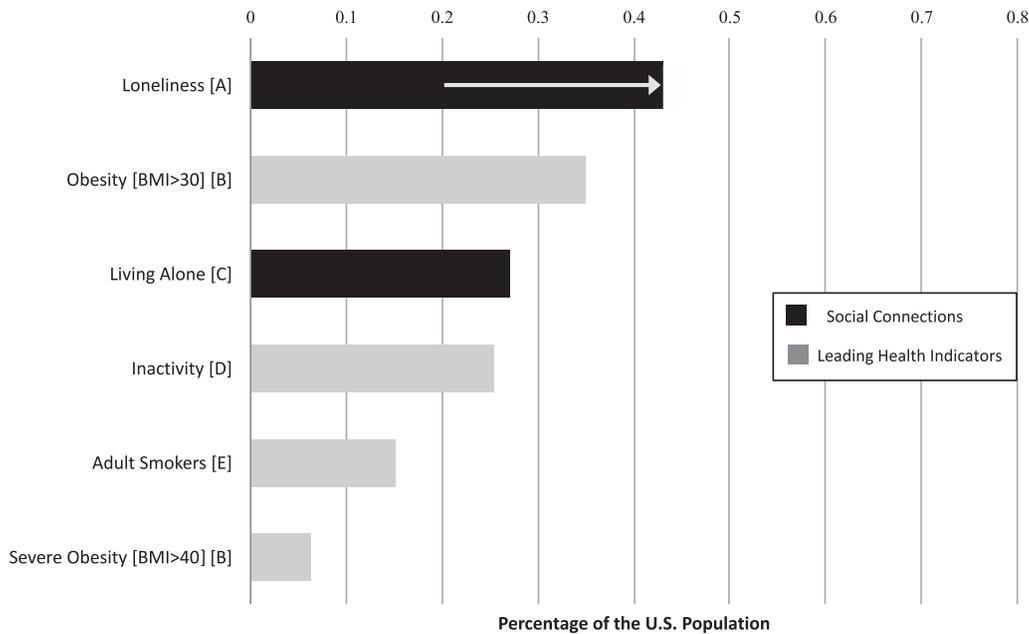

Percentage of the U.S. Population

Figure 1. Panel A: Benchmarking social connection with leading health indicators on decreased odds for mortality. An effect size of zero indicates no effect. The effect sizes were estimated from meta-analyses. 95% Confidence Interval. *OR* = Odds ratio; HR = hazards ratio; A = Holt-Lunstad, Smith, and Layton (2010); B = Shavelle, Paculdo, Strauss, and Kush (2008); C = Critchley and Capewell (2003); D = Holman, English, Milne, and Winter (1996); E = Shor, Roelfs, Bugyi, and Schwartz (2012); F = Fine et al. (1994); G = Holt-Lunstad et al. (2015); H = Katzmarzyk, Janssen, and Ardern (2003); I = Flegal, Kit, Orpana, and Graubard (2013); J = Schwartz (1994). Panel B: Benchmarking social connection with leading health indicators on prevalence in the population. BMI = body mass index; A = Perissinotto, Stijacic Cenzer, and Covinsky (2012; other sources estimate loneliness prevalence as 20%–42%); B = Ogden, Carroll, Fryar, & Flegal (2015); C = U.S. Census Bureau (2011); D = Centers for Disease Control (2014); E = Centers for Disease Control (2016).

Multiply Determined Risk Factors

The CDC (2016b) has listed "Nutrition, Physical Activity, and Obesity" under a single umbrella heading as a winnable battle, and similar to social connection, these are interrelated constructs, each of which is independently linked to risk or protection. Obesity is the outcome of a series of health behaviors (poor nutrition and decreases in physical activity) that act in combination with a range of biological predispositions. Each risk factor is multiply determined, and ultimately, only some are potentially modifiable targets for public health intervention (Ebbeling, Pawlak, & Ludwig, 2002). For example, genetics and early life experience (e.g., undernutrition) can result in physiological changes that increase obesity. Furthermore, saturated and trans fat intake, refined carbohydrate consumption, portion size, and highly available "fast" and "junk" food are deeply intertwined with sociocultural variables (e.g., food deserts, school lunches) that make the presence of high-calorie and nutritionally limited food intake more likely (Ebbeling et al., 2002). Thus, poor nutrition as a causal risk factor for obesity is multiply determined, and some risk factors are largely immutable (e.g., early life experiences and genetics). Indeed, there is no single causal mechanism to easily intervene upon.

Social connection (low social integration, loneliness, and relational distress) is multiply determined as well. For example, the heritability of loneliness is roughly 40% (Goossens et al., 2015), suggesting genetics play a large role in sensitivity to perceptions of social standing. Psychologically, there appear to be multiple pathways toward chronic loneliness, including intimate, relational, and collective loneliness, each of which attends to a different dimension of one's social standing (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015). Social isolation may result from intrapersonal, behavioral, or environmental factors. From this brief analysis, it quickly becomes apparent that a key task for elevating the status of social connection as a public health priority is demonstrating that a portion of these risk factors are modifiable and can be targeted for effective intervention; a growing literature has indicated that this is indeed the case (e.g., Cacioppo et al., 2015).

Identifying modifiable causal pathways. Identifying intervention targets to improve health via promoting and improving relationships has proven difficult (Cohen & Janicki-Deverts, 2009). Critical to this task is identifying *causal* risk factors that can be modified through targeted intervention (see Kraemer et al., 1997). Similar to obesity, some pathways may be more easily modifiable than others. Part of the difficulty is that as intervention targets, social relationships may *appear* too far upstream to exert causal effects on health-relevant physiology. Indeed, links between physical activity and health are easier to see because physical activity *seems* to influence health-relevant processes more directly. This perspective, however, relies on an outdated, dualistic mind–body model. Clear *experimental evidence,* particularly in animal models, has shown that social connections are causally associated with health-relevant biological pathways at multiple levels, from gene expression to neural functioning (Cacioppo et al., 2015).

One way to study causal effects of human relationships on health is to experimentally manipulate some aspect of social functioning in the laboratory, then track corresponding changes in cardiovascular, neuroendocrine, or immune functioning (Hostinar et al., 2014). The general finding is that the presence of a supportive person or even thinking about supportive others can attenuate cardiovascular and neuroendocrine responses to stress. A parallel line of work has indicated social rejection has damaging effects for psychological and physical well-being through biologically plausible pathways (Slavich & Irwin, 2014). This line of experimental research is conceptually similar to the controlled laboratory research that contributed to and underpins current physical activity recommendations (Blair, LaMonte, & Nichaman, 2004).

Randomized controlled trials (RCTs). To demonstrate that altering social relationships can ultimately improve health, RCTs are the gold standard (Cohen & Janicki-Deverts, 2009). A large meta-analysis of psychosocial interventions for chronic illness that target family relationships (Martire, Lustig, Schulz, Miller, & Helgeson, 2004) found small to moderate effects for depressive symptoms but inconsistent effects on disease outcomes. A similar, yet more recent meta-analysis involving over 8,000 patients with chronic illness reported moderate effect sizes for both patients' physical and mental health (Hartmann, Bäzner, Wild, Eisler, & Herzog, 2010). The pooled effect for family member interventions relative to treatment as usual reflect a 72%–84% chance of improved mental or physical health compared to treatment as usual.

Given that social connection encompasses both the interpersonal and intrapersonal, "relationship interventions" can exist on many levels (see Cacioppo et al., 2015; Ickovics et al., 2011); however, current evidence is primarily restricted to individual, dyadic, and group levels, with societal-level interventions almost nonexistent. This is important to note, given that efforts aimed at smoking and obesity treatment and prevention have been far more successful at a societal level than have individual-level approaches (e.g., Lemmens, Oenema, Knut, & Brug, 2008). Further, interventions that target one component of social connection (e.g., social isolation) may not be effective in reducing risk across components (e.g., perceived loneliness or relationship quality). Indeed, it is widely known within public health that effective intervention must operate across multiple levels of analysis in an integrated and systematic way (Glasgow, Vogt, & Boles, 1999); such work is sorely needed in promoting social connection.

Because social relationships influence many different health-relevant pathways, attempts to reduce broader effects to a single causal pathway are shortsighted at best and ill informed at worst. Overall, the experimental research—from animal studies to human RCTs—is clear in demonstrating that several dimensions of social relationships can be targeted and altered; however, because of the mixed success of interventions, it is also clear that additional work is needed to establish effective public health solutions. As the field grapples with these issues, one way forward in this area is to heed the lessons of prior intervention efforts.

From Observational Science to Intervention Science

Translating observational findings into interventions that can reliably prevent or lessen the risk is notoriously challenging in public health. Most causal chains in public health—especially around social determinants of health—are complex (Victora, Habicht, & Bryce, 2004). For example, across numerous observational studies, greater physical activity has shown a robust association with decreased cardiovascular mortality (e.g., Nocon et al., 2008); yet, implementing successful physical activity interventions, especially with children and adolescents, has proven exceptionally difficult (Metcalf, Henley, & Wilkin, 2012). Given that translation and implementation difficulties bedevil many areas of public health intervention, how might the field proceed when it comes to the study of social connection? One approach is to study and distill useful lessons from past intervention efforts. The Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) study, for example, was a large RCT designed to increase perceived social support and treat depression following acute myocardial infarction (Berkman et al., 2003). A major rationale for ENRICHD was correlational data demonstrating that the absence of social support was a risk factor for poor outcomes, including death, among patients with coronary heart disease. The trial randomly assigned over 2,000 adults (within 6 months of a myocardial infarction) to either usual care or cognitive–behavioral therapy targeting depression and strengthening social network ties. Intervention patients reported increased social support and decreased depression compared to control patients, but the intervention failed to increase event-free survival (Berkman et al., 2003).

In retrospect, the ENRICHD trial was based largely on a top-down logic of building an intervention around correlational findings without first demonstrating that strengthening social network ties was causally tied to the clinical markers of interest in experimental studies. Systematic bottom-up approaches may be more ideal for relationship scientists interested in translating basic findings into interventions. For example, the multiphase optimization strategy starts with conducting a series of well-planned experiments testing specific intervention components (Collins et al., 2011). Those experiments are followed by factorial designs combining different components, and the results inform development of a multicomponent treatment that is built from the bottom up based on basic research. Recent examples of experimental studies testing specific intervention components have included work on friendship formation, relationship distress prevention, and social belonging (summarized in Walton, 2014).

Early Intervention and Prevention Are Critical for Health Promotion

The U.S. health system relies largely on tertiary prevention—that is, interventions that reduce the worsening of *existing* morbidities, as is the case with the ENRICHD trial. However, the importance of primary prevention and early intervention are increasingly recognized (Anderson et al., 2003), especially as the participants in the first early intervention studies reach adulthood. For example, the Carolina Abecedarian Project indicates that improvement in cognitive and social stimulation in early life (birth to age 5), along with early intervention in school, reduces the likelihood of cardiovascular and metabolic diseases in the mid-30s (Campbell et al., 2014). Research on the prevention of childhood obesity via school-based interventions (promoting physical activity and improved diet) has suggested that multifaceted interventions lasting 1–4 years and involving parents can yield meaningful differences in children's body mass (Sobol-Goldberg, Rabinowitz, & Gross, 2013). Although effect sizes are generally small (e.g., a standardized mean difference in body mass index equals −.076 for intervention relative to control group across more than 50,000 children), major public health campaigns are designed around increasing physical activity in schools (Sobol-Goldberg, Rabinowitz, & Gross, 2013). This point buttresses the notion that other areas of public health have a more developed evidence base and are thus riper for large-scale interventions than is social connection. The available evidence does not support this conclusion.

One of the more robust early intervention programs to target social relationships (parenting) is the Nurse-Family Partnership (NFP) program. The NFP provides monthly nurse home visits to low-income and unmarried pregnant women from the prenatal period across the first 2 years of their children's lives and is widely recognized as influencing several important maternal and child outcomes, including reductions in child abuse and neglect (Coalition for Evidence-Based Policy, 2014). Of importance, the NFP has suggested that targeting early social relationships (e.g., promoting parent–child bonding consistent with attachment

theory) while bolstering the social support mothers receive from family and friends can have durable effects on both maternal and child health outcomes (Coalition for Evidence-Based Policy, 2014). Thus, a key lesson of the NFP is that theoretically informed prevention programs that target social relationships directly can show considerable promise for promoting public health. Furthermore, when it comes to early intervention and prevention, the NFP and Abecedarian Project targeted at-risk groups suggesting that *who* is targeted may be as important as *what* is targeted.

Ecological and Multilevel Models for Increasing Social Connections

For multiply determined health behaviors, ecological models have the potential to integrate diverse theoretical perspectives, and this is certainly the case for multiple health risk factors, including physical activity (Bauman et al., 2012). This perspective

> uses a comprehensive framework . . . proposing that determinants at all levels—individual, social, environmental, and policy—are contributors. A key principle is that knowledge about all types of influence can inform development of multilevel interventions to offer the best chance of success. (Bauman et al., 2012, p. 258)

From this perspective, large-scale intervention efforts that focus on a single level of analysis are likely to be hampered from the start. Figure 2A depicts the state of relationship and health science and attempts to translate that science in the context of Bronfenbrenner's social–ecological model of health that is frequently used by the CDC and other agencies to understand health determinants like violence, tobacco, and obesity (Sallis, Owen, & Fisher, 2008). The final section of the article applies ecological thinking—which has proven successful in multiple areas of public health—to make recommendations for elevating the status and study of social relationships within a public health framework.

Recommendations and Future Policies

What objectives must be accomplished to achieve the overall goal of elevating social connections into the realm of a public health priority, and what specific resources and activities are needed to facilitate these objectives[2]? Continuing the analogy with nutrition and physical activity, the history of CDC efforts to address obesity (Dietz, 2015) provides a useful framework for identifying specific objectives for advancing social connection as a public health priority. Early efforts involved generating *evidence-based recommendations* and *implementing and improving surveillance* that ultimately identified *risk factors* for poor health. Interventions became increasingly targeted to *specific settings* (schools, workplaces, communities). Throughout, coalitions were assembled at multiple levels, from local health departments to large nonprofit foundations (e.g., Robert Wood Johnson Foundation) to government agencies (e.g., Institute of Medicine) to *assemble the capability* to mount large-scale policy and environmental changes.

Evidence-Based Recommendations

Guidelines lay the foundation for goals, such as increasing the percentage of adults meeting physical activity guidelines from 43.5% to 47.9% in Healthy People 2020 (U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, n.d.). Recommendations of specific levels of relationship quantity and quality would be naturally subject to criticism ranging from concerns about causality to public skepticism toward the social and behavioral sciences. Efforts to formulate recommendations for physical activity, which were primarily informed by prospective observational studies (whereas controlled intervention studies informed activity types and dose), faced and overcame similar challenges. Despite concerns about the validity of self-reported physical activity and the multiple determining factors such as built environment and genetic factors (Blair et al., 2004), the first guidelines were released in 1975, with periodic revisions ever since (Haskell et al., 2007). For social connections and health, a similar consensus process (involving experts and stakeholders across disciplines) is needed to evaluate the literature and to make recommendations for the broader population and specific risk groups, all of which can be subject to periodic revision based on new evidence.

Surveillance: Toward a Social Connection "Risk Score"

Population-level surveillance serves three important functions: (a) determining progress toward goals; (b) developing "risk scores" that can be used to forecast risk of future problems; and (c) identifying at-risk populations based on demographics, health status, and location. Recent efforts to identify psychosocial "vital signs" for inclusion in electronic health records (EHRs; Institute of Medicine, 2014; Matthews, Adler, Forrest, & Stead, 2016) have provided a template for selecting social connection measures. A multidisciplinary committee evaluated several domains (social integration, social support, loneliness) and, based on evidence and appropriateness for inclusion in *all* EHRs, recommended the four-item Berkman-Syme Social Network Index (Pantell et al., 2013). The measure received the *same* highest ratings on readiness and priority for inclusion in EHRs and useful-

---

[2] Readers with a public health background will recognize that the terms in this sentence come from a basic "logic model" used to depict the steps involved in planning, implementing, and improving public health programs (W. K. Kellogg Foundation, 2006).

Figure 2. Panel A: The state of relationships and health science embedded in a social ecological model. Text boxes are positioned in their respective levels of analysis (individual, relationship, organization or community, society or policy), and some boxes span multiple levels (i.e., individual and relationship). WHO = World Health Organization; UK = United Kingdom; AARP = American Association of Retired Persons. Panel B: Recommendations for researchers, government agencies, health care providers and associations, and public or private health care funders to integrate social relationships into current public health priorities.

ness for clinical, research, and population-monitoring purposes as did race or ethnicity, education, physical activity, tobacco use, and neighborhood characteristic measures. The same process could help identify measures in other domains, because brief scales assessing social connection–related constructs that are suitable for epidemiological studies are now available (Cyranowski et al., 2013; Hahn et al., 2010).

Accurately forecasting risk is critical for prevention efforts. For example, evidence-based "risk estimation scores" that incorporate multiple risk factors help guide cardiovascular disease (CVD) prevention and treatment. The Framingham risk score, European Society of Cardiology Systematic Coronary Risk Evaluation, and WHO/International Society of Hypertension scores are used by clinicians to predict the likelihood of a patient's developing CVD over the next 10 years (reviewed in Goff et al., 2014a, 2014b). The scores incorporate clinical testing (total cholesterol, systolic blood pressure) *and* self-report information (age, gender, smoking status), and several have risk calculators

available online. Similar efforts could be implemented with existing social epidemiology data and would be greatly enhanced by population-level surveillance data (which notably, was not used to develop cardiovascular risk estimation scores). For readers skeptical that social connection data are useful for predicting health risk, a European Society of Cardiology task force reviewed the evidence for all purported CVD risk factors and recommended that psychosocial risk factors, including social isolation, should be assessed as a risk factor for future CVD (Piepoli et al., 2016). Notably, the weight of evidence for psychosocial risk factors was (a) stronger than evidence for genetic testing and inflammatory biomarkers (neither were recommended) and (b) as strong as evidence for preclinical vascular damage assessments like carotid artery scanning.

Population surveillance, particularly when combined with "big data" from social media and smartphone apps, can help identify specific populations who may benefit from targeted interventions. Targeted interventions require knowing not only *who* is at risk in terms of demographics (age, gender,

ethnicity, socioeconomic status) and/or health status but *where they are* in terms of settings (school, work) and geographical location. At the same time, targeting requires adapting interventions for different cultures (Campos & Kim, 2017; see Johnson, 2012 for an example of failing to adapt). Such efforts, coupled with partnering with community stakeholders (e.g., advocacy groups, governmental agencies), can sharpen the focus of interventions (Sabir et al., 2009).

Assembling the Capability for Large-Scale Changes

Partnering with community stakeholders allows for bridging gaps along the "pipeline" translating basic research to widespread practice (Glasgow, Green, Taylor, & Stange, 2012). Health settings are opportune environments to test and refine relationship interventions (Martire & Helgeson, 2017). Returning to obesity, building coalitions with nonprofits resulted in funding and development of population-level interventions (e.g., community-based eating interventions supported by Kaiser Permanente) and partnerships that worked together on formulating policy recommendations (Dietz, 2015) and developing media campaigns. Such coalitions can also provide political capital needed to formulate and implement policy recommendations. For researchers, a key policy change will involve overcoming obstacles that impede large-scale funding for relationship science. One obstacle is funding priorities that focus on *specific* mental and physical health problems rather than broad risk factors like social connection. Another hurdle is disappointing results from large intervention trials, including ENRICHD and the federal Healthy Marriages Initiative (large effectiveness trials of relationship education, reviewed in Johnson, 2012). The latter was considered "a major setback for the funding of such programs, regard for their efficacy . . . and funding for future research" (Lebow, 2013, p. 352).

Combatting loneliness is a recent target for large-scale media campaigns (e.g., The Campaign to End Loneliness in older adults in the United Kingdom, Oprah Winfrey's "Just Say Hello" campaign, and the American Association of Retired Persons Foundation's efforts to combat social isolation). Such campaigns have the *potential* to change behavior through several means, including changing cognitions and beliefs, helping people recognize unhealthy social norms, and recognizing that positive emotions can come from changing behavior (Wakefield, Loken, & Hornik, 2010). Moreover, campaigns can increase the amount of discussion about the issue within social networks and may actually change social norms, leading to changes in behavior without necessarily changing individual attitudes or beliefs directly. As media campaigns are rolled out to prevent isolation or loneliness, a critical step for sponsors (from local and national governments to nonprofit community-service organizations) and scientists will be evaluating what

works, in what contexts, and for whom. When it comes to media campaigns, and even health-oriented legislative changes, an obvious concern for prioritizing social connection is jumping to action ahead of the available data. Although such changes are laudable, meaningful public health benefits will be realized only when the existing intervention efforts—from individual-level changes to community and societal action—are deeply rooted in science and the pursuit of translatable research findings.

Conclusion

Humans need others to survive. Regardless of one's sex, country or culture of origin, or age or economic background, social connection is crucial to human development, health, and survival. The evidence (summarized in Figures 1 and 2A) supporting this contention is unequivocal. When considering the umbrella term *social connection* and its constituent components, there are perhaps no other factors that can have such a large impact on both length and quality of life—from the cradle to the grave. Yet, social connection is largely ignored as a health determinant because public and private stakeholders are not entirely sure how to act. In addition, the pace of developing effective social relationship interventions is considerably slow; however, this is unlikely to change until social connection receives greater public health prioritization—in terms of both attention and resources.

Scientific progress is made through sustained efforts to find effective solutions, and the solutions for "how to act" are summarized in Figure 2B. Ultimately, to understand risk or protection, the causal mechanisms involved, and how to intervene to reduce risk and improve both physical and mental health, one must acknowledge influences (and conduct empirical research) at all levels of analysis. Just as the factors that contribute to multifaceted public health problems ranging from violence to obesity have become better understood, now it is important to consider the micro-level (e.g., genetic markers of susceptibility, gene–environment interactions) to macro-level (e.g., cultural norms, neighborhood characteristics) processes through which social relationships influence physical health, as well as the pathways by which one may intervene to reduce risk and improve public health.

References

Anderson, L. M., Shinn, C., Fullilove, M. T., Scrimshaw, S. C., Fielding, J. E., Normand, J., . . . the Task Force on Community Preventive Services. (2003). The effectiveness of early childhood development programs: A systematic review. *American Journal of Preventive Medicine, 24*(3, Suppl.), 32–46. http://dx.doi.org/10.1016/S0749-3797(02)00655-4

Arving, C., Brandberg, Y., Feldman, I., Johansson, B., & Glimelius, B. (2014). Cost-utility analysis of individual psychosocial support interventions for breast cancer patients in a randomized controlled study. *Psycho-Oncology, 23,* 251–258. http://dx.doi.org/10.1002/pon.3411

Barilla, D., Marshak, H. H., Anderson, S. E., & Hopp, J. W. (2010). Postpartum follow-up: Can psychosocial support reduce newborn admissions? *MCN: The American Journal of Maternal Child Nursing, 35,* 33–39. http://dx.doi.org/10.1097/01.NMC.0000366808.75079.cc

Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J. F., & Martin, B. W. (2012, July 21). Correlates of physical activity: Why are some people physically active and others not? *Lancet, 380,* 258–271. http://dx.doi.org/10.1016/S0140-6736(12)60735-1

Berkman, L. F., Blumenthal, J., Burg, M., Carney, R. M., Catellier, D., Cowan, M. J., . . . Schneiderman, N. (2003). Effects of treating depression and low perceived social support on clinical events after myocardial infarction: The Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) randomized trial. *JAMA: Journal of the American Medical Association, 289,* 3106–3116. http://dx.doi.org/10.1001/jama.289.23 .3106

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine, 51,* 843–857. http://dx.doi.org/10.1016/S0277-9536(00)00065-4

Blair, S. N., LaMonte, M. J., & Nichaman, M. Z. (2004). The evolution of physical activity recommendations: How much is enough? *American Journal of Clinical Nutrition, 79,* 913S–920S.

Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. *Perspectives on Psychological Science, 10,* 238–249. http://dx.doi.org/10.1177/ 1745691615570616

Campbell, F., Conti, G., Heckman, J. J., Moon, S. H., Pinto, R., Pungello, E., & Pan, Y. (2014, March 28). Early childhood investments substantially boost adult health. *Science, 343,* 1478–1485. http://dx.doi.org/10 .1126/science.1248429

Campos, B., & Kim, H. S. (2017). Incorporating the cultural diversity of family and close relationships into the study of health. *American Psychologist, 72,* 543–554. http://dx.doi.org/10.1037/amp0000122

Centers for Disease Control and Prevention (CDC). (2013). *Prioritizing public health problems.* Retrieved from https://www.cdc.gov/nphpsp/ documents/prioritization.pdf

Centers for Disease Control and Prevention (CDC). (2014). State Indicator Report on Physical Activity, 2014. Atlanta, GA: U.S. Department of Health and Human Services.

Centers for Disease Control and Prevention (CDC). (2016a). *Winnable battles.* Retrieved from http://www.cdc.gov/winnablebattles/

Centers for Disease Control and Prevention (CDC). (2016b). *Prioritization.* Retrieved from https://www.cdc.gov/nphpsp/documents/prioritization-section-from-apexph-in-practice.pdf

Coalition for Evidence-Based Policy. (2014). *Top Tier Evidence Initiative: Evidence summary for the Nurse-Family Partnership.* Retrieved from http://evidencebasedprograms.org/1366-2/nurse-family-partnership

Cohen, S., & Janicki-Deverts, D. (2009). Can we improve our physical health by altering our social networks? *Perspectives on Psychological Science, 4,* 375–378. http://dx.doi.org/10.1111/j.1745-6924.2009 .01141.x

Cohen, S., Underwood, L. G., & Gottlieb, B. H. (Eds.). (2000). *Social support measurement and intervention: A guide for health and social scientists.* http://dx.doi.org/10.1093/med:psych/9780195126709.001 .0001

Collins, L. M., Baker, T. B., Mermelstein, R. J., Piper, M. E., Jorenby, D. E., Smith, S. S., . . . Fiore, M. C. (2011). The multiphase optimization strategy for engineering effective tobacco use interventions. *Annals of Behavioral Medicine, 41,* 208–226. http://dx.doi.org/10.1007/s12160-010-9253-x

Critchley, J. A., Capewell, S., (2003) Mortality risk reduction associated with smoking cessation in patients with coronary heart disease: A systematic review. *JAMA, 290,* 86–97.

Cyranowski, J. M., Zill, N., Bode, R., Butt, Z., Kelly, M. A. R., Pilkonis, P. A., . . . Cella, D. (2013). Assessing social support, companionship, and distress: National Institute of Health (NIH) Toolbox Adult Social Relationship Scales. *Health Psychology, 32,* 293–301. http://dx.doi.org/ 10.1037/a0028586

Dietz, W. H. (2015). The response of the US Centers for Disease Control and Prevention to the obesity epidemic. *Annual Review of Public Health, 36,* 575–596. http://dx.doi.org/10.1146/annurev-publhealth-031914-122415

DiMatteo, M. R. (2004). Social support and patient adherence to medical treatment: A meta-analysis. *Health Psychology, 23,* 207–218. http://dx .doi.org/10.1037/0278-6133.23.2.207

Dykstra, P. A., van Tilburg, T. G., & de Jong Gierveld, J. (2005). Changes in older adult loneliness: Results from a seven-year longitudinal study. *Research on Aging, 27,* 725–747. http://dx.doi.org/10.1177/01640275 05279712

Ebbeling, C. B., Pawlak, D. B., & Ludwig, D. S. (2002, August 10). Childhood obesity: Public-health crisis, common sense cure. *Lancet, 360,* 473–482. http://dx.doi.org/10.1016/S0140-6736(02)09678-2

Fine, M. J., Smith, M. A., Carson, C. A., Meffe, F., Sankey, S. S., & Kapoor, W. N. (1994). Efficacy of pneumococcal vaccination in adults. *A meta-analysis of randomized controlled trials. Archives of Internal Medicine, 154,* 2666–2677.

Flegal, K. M., Kit, B. K., Orpana, H., & Graubard, B. I. (2013). Association of all-cause mortality with overweight and obesity using standard body mass index categories: A systematic review and meta-analysis. *JAMA, 309,* 71–82. http://dx.doi.org/10.1001/jama.2012.113905

Gillespie, P., O'Shea, E., Paul, G., O'Dowd, T., & Smith, S. M. (2012). Cost effectiveness of peer support for type 2 diabetes. *International Journal of Technology Assessment in Health Care, 28,* 3–11. http://dx .doi.org/10.1017/S0266462311000663

Glasgow, R. E., Green, L. W., Taylor, M. V., & Stange, K. C. (2012). An evidence integration triangle for aligning science with policy and practice. *American Journal of Preventive Medicine, 42,* 646–654. http://dx .doi.org/10.1016/j.amepre.2012.02.016

Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: The RE-AIM framework. *American Journal of Public Health, 89,* 1322–1327. http://dx.doi .org/10.2105/AJPH.89.9.1322

Goff, D. C., Jr., Lloyd-Jones, D. M., Bennett, G., Coady, S., D'Agostino, R. B., Sr., Gibbons, R., . . . Wilson, P. W. F. (2014a). 2013 ACC/AHA guideline on the assessment of cardiovascular risk: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Journal of the American College of Cardiology, 63*(25 Pt. B), 2935–2959. http://dx.doi.org/10.1016/j.jacc .2013.11.005

Goff, D. C., Jr., Lloyd-Jones, D. M., Bennett, G., Coady, S., D'Agostino, R. B., Sr., Gibbons, R., . . . Wilson, P. W. F. (2014b). Correction to "2013 ACC/AHA guideline on the assessment of cardiovascular risk: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines". *Journal of the American College of Cardiology, 63*(25 Pt. B), 3026. http://dx.doi.org/10.1016/j .jacc.2014.03.006

Goossens, L., van Roekel, E., Verhagen, M., Cacioppo, J. T., Cacioppo, S., Maes, M., & Boomsma, D. I. (2015). The genetics of loneliness: Linking evolutionary theory to genome-wide genetics, epigenetics, and social science. *Perspectives on Psychological Science, 10,* 213–226. http://dx .doi.org/10.1177/1745691614564878

Hahn, E. A., Devellis, R. F., Bode, R. K., Garcia, S. F., Castel, L. D., Eisen, S. V., . . . Cella, D. (2010). Measuring social health in the patient-reported outcomes measurement information system (PROMIS): Item bank development and testing. *Quality of Life Research, 19,* 1035–1044. http://dx.doi.org/10.1007/s11136-010-9654-0

Hampton, K., Sessions Goulet, L., Her, E. J., & Rainie, L. (2009). *Social isolation and new technology*. Washington, DC: Pew Research Center.

Hartmann, M., Bäzner, E., Wild, B., Eisler, I., & Herzog, W. (2010). Effects of interventions involving the family in the treatment of adult patients with chronic physical diseases: A meta-analysis. *Psychotherapy and Psychosomatics, 79,* 136–148. http://dx.doi.org/10.1159/000286958

Haskell, W. L., Lee, I. M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., . . . Bauman, A. (2007). Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation, 116,* 1081–1093. http://dx.doi.org/10.1161/CIRCULATIONAHA.107.185649

Holman, C. D., English, D. R., Milne, E., & Winter, M. G. (1996). Meta-analysis of alcohol and all-cause mortality: A validation of NHMRC recommendations. *Medical Journal of Australia, 164,* 141–145.

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine, 7*(7), e1000316. http://dx.doi.org/10.1371/journal.pmed.1000316

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and Social Isolation as Risk Factors for Mortality: A Meta-Analytic Review. *Perspectives on Psychological Science, 10,* 227–237. http://dx.doi.org/10.1177/1745691614568352

Hostinar, C. E., Sullivan, R. M., & Gunnar, M. R. (2014). Psychobiological mechanisms underlying the social buffering of the hypothalamic-pituitary-adrenocortical axis: A review of animal models and human studies across development. *Psychological Bulletin, 140,* 256–282. http://dx.doi.org/10.1037/a0032671

House, J. S., Landis, K. R., & Umberson, D. (1988, July 29). Social relationships and health. *Science, 241,* 540–545. http://dx.doi.org/10.1126/science.3399889

Ickovics, J. R., Reed, E., Magriples, U., Westdahl, C., Schindler Rising, S., & Kershaw, T. S. (2011). Effects of group prenatal care on psychosocial risk in pregnancy: Results from a randomised controlled trial. *Psychology and Health, 26,* 235–250.

Institute of Medicine. (2014). *Capturing social and behavioral domains and measures in electronic health records: Phase 2*. http://dx.doi.org/10.17226/18951

Johnson, M. D. (2012). Healthy marriage initiatives: On the need for empiricism in policy implementation. *American Psychologist, 67,* 296–308. http://dx.doi.org/10.1037/a0027743

Jonathan Vespa, Jamie M. Lewis, and Rose M. Kreider, 2013, *America's Families and Living Arrangements: 2012, Current Population Reports,* P20-570, U.S. Census Bureau, Washington, DC.

Katzmarzyk, P. T., Janssen, I., & Ardern, C. I. (2003). Physical inactivity, excess adiposity and premature mortality. *Obesity Reviews, 4,* 257–290.

Kraemer, H. C., Kazdin, A. E., Offord, D. R., Kessler, R. C., Jensen, P. S., & Kupfer, D. J. (1997). Coming to terms with the terms of risk. *Archives of General Psychiatry, 54,* 337–343. http://dx.doi.org/10.1001/archpsyc.1997.01830160065009

Lebow, J. L. (2013). Editorial: Programs for strengthening families. *Family Process, 52,* 351–354. http://dx.doi.org/10.1111/famp.12046

Lemmens, V., Oenema, A., Knut, I. K., & Brug, J. (2008). Effectiveness of smoking cessation interventions among adults: A systematic review of reviews. *European Journal of Cancer Prevention, 17,* 535–544. http://dx.doi.org/10.1097/CEJ.0b013e3282f75e48

Martire, L. M., & Helgeson, V. S. (2017). Close relationships and the management of chronic illness: Associations and interventions. *American Psychologist, 72,* 601–612. http://dx.doi.org/10.1037/amp0000066

Martire, L. M., Lustig, A. P., Schulz, R., Miller, G. E., & Helgeson, V. S. (2004). Is it beneficial to involve a family member? A meta-analysis of psychosocial interventions for chronic illness. *Health Psychology, 23,* 599–611. http://dx.doi.org/10.1037/0278-6133.23.6.599

Matthews, K. A., Adler, N. E., Forrest, C. B., & Stead, W. W. (2016). Collecting psychosocial "vital signs" in electronic health records: Why now? What are they? What's new for psychology? *American Psychologist, 71,* 497–504. http://dx.doi.org/10.1037/a0040317

Metcalf, B., Henley, W., & Wilkin, T. (2012). Effectiveness of intervention on physical activity of children: Systematic review and meta-analysis of controlled trials with objectively measured outcomes (EarlyBird 54). *BMJ: British Medical Journal, 345,* e5888. http://dx.doi.org/10.1136/bmj.e5888

Nocon, M., Hiemann, T., Müller-Riemenschneider, F., Thalau, F., Roll, S., & Willich, S. N. (2008). Association of physical activity with all-cause and cardiovascular mortality: A systematic review and meta-analysis. *European Journal of Preventive Cardiology, 15,* 239–246. http://dx.doi.org/10.1097/HJR.0b013e3282f55e09

Ogden, C. L., Carroll, M. D., Fryar, C. D., Flegal, K. M. (2015) Prevalence of obesity among adults and youth: United States, 2011–2014. NCHS data brief, no 219. Hyattsville, MD: National Center for Health Statistics.

Pantell, M., Rehkopf, D., Jutte, D., Syme, S. L., Balmes, J., & Adler, N. (2013). Social isolation: A predictor of mortality comparable to traditional clinical risk factors. *American Journal of Public Health, 103,* 2056–2062. http://dx.doi.org/10.2105/AJPH.2013.301261

Perissinotto, C. M., Stijacic Cenzer, I., & Covinsky, K. E. (2012). Loneliness in older persons: A predictor of functional decline and death. *Archives of Internal Medicine, 172,* 1078–1083. http://dx.doi.org/10.1001/archinternmed.2012.1993

Pew Research Center. (2015). *America's changing religious landscape: Christians decline sharply as share of population: Unaffiliated and other faiths continue to grow*. Washington, DC: Author.

Piepoli, M. F., Hoes, A. W., Agewall, S., Albus, C., Brotons, C., Catapano, A. L., . . . Zamorano, J. L. (2016). 2016 European guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts): Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *European Journal of Preventive Cardiology, 23,* NP1–NP96. http://dx.doi.org/10.1177/2047487316653709

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of the American community*. http://dx.doi.org/10.1145/358916.361990

Robles, T. F., Slatcher, R. B., Trombello, J. M., & McGinn, M. M. (2014). Marital quality and health: A meta-analytic review. *Psychological Bulletin, 140,* 140–187. http://dx.doi.org/10.1037/a0031859

Roelfs, D. J., Shor, E., Kalish, R., & Yogev, T. (2011). The rising relative risk of mortality for singles: Meta-analysis and meta-regression. *American Journal of Epidemiology, 174,* 379–389. http://dx.doi.org/10.1093/aje/kwr111

Rook, K. S. (2009). Gaps in social support resources in later life: An adaptational challenge in need of further research. *Journal of Social and Personal Relationships, 26,* 103–112. http://dx.doi.org/10.1177/0265407509105525

Sabir, M., Wethington, E., Breckman, R., Meador, R., Reid, M. C., & Pillemer, K. (2009). A community-based participatory critique of social isolation intervention research for community-dwelling older adults. *Journal of Applied Gerontology, 28,* 218–234. http://dx.doi.org/10.1177/0733464808326004

Sallis, J. F., Owen, N., & Fisher, E. B. (2008). Ecological models of health behavior. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (4th ed., pp. 465–486). San Francisco, CA: Wiley.

Sbarra, D. A., Law, R. W., & Portley, R. M. (2011). Divorce and death: A meta-analysis and research agenda for clinical, social, and health psy-

chology. *Perspectives on Psychological Science, 6,* 454–474. http://dx .doi.org/10.1177/1745691611414724

Schwartz, J. (1994). Air pollution and daily mortality: A review and meta analysis. *Environmental Research, 64,* 36–52.

Shavelle, R. M., Paculdo, D. R., Strauss, D. J., & Kush, S. J. (2008). Smoking habit and mortality: A meta-analysis. *Journal of Insurance Medicine, 40,* 170–178.

Shor, E., & Roelfs, D. J. (2015). Social contact frequency and all-cause mortality: A meta-analysis and meta-regression. *Social Science & Medicine, 128,* 76–86. http://dx.doi.org/10.1016/j.socscimed.2015.01.010

Shor, E., Roelfs, D. J., Curreli, M., Clemow, L., Burg, M. M., & Schwartz, J. E. (2012). Widowhood and mortality: A meta-analysis and meta-regression. *Demography, 49,* 575–606. http://dx.doi.org/10.1007/ s13524-012-0096-x

Shor, E., Roelfs, D. J., Bugyi, P., & Schwartz, J. E. (2012). Meta-analysis of marital dissolution and mortality: Reevaluating the intersection of gender and age. *Social Science & Medicine, 75,* 46–59. http://dx.doi .org/10.1016/j.socscimed.2012.03.010

Slavich, G. M., & Irwin, M. R. (2014). From stress to inflammation and major depressive disorder: A social signal transduction theory of depression. *Psychological Bulletin, 140,* 774–815. http://dx.doi.org/10 .1037/a0035302

Sobol-Goldberg, S., Rabinowitz, J., & Gross, R. (2013). School-based obesity prevention programs: A meta-analysis of randomized controlled trials. *Obesity, 21,* 2422–2428. http://dx.doi.org/10.1002/oby.20515

Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other.* New York, NY: Basic Books.

Uchino, B. N. (2006). Social support and health: A review of physiological processes potentially underlying links to disease outcomes. *Journal of Behavioral Medicine, 29,* 377–387. http://dx.doi.org/10.1007/s10865- 006-9056-5

U.K. Department for Work & Pensions. (2015). *2010 to 2015 government policy: Older people.* Retrieved from https://www.gov.uk/government/ publications/2010-to-2015-government-policy-older-people/2010-to- 2015-government-policy-older-people

Umberson, D., Crosnoe, R., & Reczek, C. (2010). Social relationships and health behavior across the life course. *Annual Review of Sociology, 36,* 139–157. http://dx.doi.org/10.1146/annurev-soc-070308-120011

U.S. Census Bureau. (2011). *Changing American households.*

U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (n.d.). Healthy People 2020. Retrieved from http://www.healthypeople.gov/

U.S. Department of Labor, Bureau of Statistics. (2016). *Volunteering in the United States, 2015.* Retrieved from http://www.bls.gov/news.release/ volun.nr0.htm

Vespa, J., Lewis, J. M, & Kreider, R. M. (2013). America's Families and Living Arrangements: 2012, Current Population Reports, P20-570, U.S. Census Bureau, Washington, DC.

Victora, C. G., Habicht, J. P., & Bryce, J. (2004). Evidence-based public health: Moving beyond randomized trials. *American Journal of Public Health, 94,* 400–405. http://dx.doi.org/10.2105/AJPH.94.3.400

Vilnius, D., & Dandoy, S. (1990). A priority rating system for public health programs. *Public Health Reports, 105,* 463–470.

Wakefield, M. A., Loken, B., & Hornik, R. C. (2010, October 9). Use of mass media campaigns to change health behaviour. *Lancet, 376,* 1261– 1271. http://dx.doi.org/10.1016/S0140-6736(10)60809-4

Walton, G. M. (2014). The new science of wise psychological interventions. *Current Directions in Psychological Science, 23,* 73–82. http:// dx.doi.org/10.1177/0963721413512856

Whisman, M. A., Beach, S. R. H., & Snyder, D. K. (2008). Is marital discord taxonic and can taxonic status be assessed reliably? Results from a national, representative sample of married couples. *Journal of Consulting and Clinical Psychology, 76,* 745–755. http://dx.doi.org/10.1037/ 0022-006X.76.5.745

W. K. Kellogg Foundation. (2006). *W. K. Kellogg Foundation logic model development guide.* Retrieved from https://www.wkkf.org/resource- directory/resource/2006/02/wk-kellogg-foundation-logic-model- development-guide

World Health Organization. (n.d.). *The determinants of health.* Retrieved from http://www.who.int/hia/evidence/doh/en/

World Health Organization. (2016). *Health Impact Assessment.* Retrieved from http://apps.who.int/iris/bitstream/10665/250221/36/9789241549745- chapter4-eng.pdf?ua=1

Wrzus, C., Hänel, M., Wagner, J., & Neyer, F. J. (2013). Social network changes and life events across the life span: A meta-analysis. *Psychological Bulletin, 139,* 53–80. http://dx.doi.org/10.1037/a0028601