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Elevated Physical Health Risk Among Gay Men Who Conceal Their Homosexual Identity

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This study examined the incidence of infectious and neoplastic diseases among 222 HIV-seronegative gay men who participated in the Natural History of AIDS Psychosocial Study. Those who concealed the expression of their homosexual identity experienced a significantly higher incidence of cancer (odds ratio = 3.18) and several infectious diseases (pneumonia, bronchitis, sinusitis, and tuberculosis; odds ratio = 2.91) over a 5-year follow-up period. These effects could not be attributed to differences in age, ethnicity, socioeconomic status, repressive coping style, health-relevant behavioral patterns (e.g., drug use, exercise), anxiety, depression, or reporting biases (e.g., negative affectivity, social desirability). Results are interpreted in the context of previous data linking concealed homosexual identity to other physical health outcomes (e.g., HIV progression and psychosomatic symptomatology) and theories linking psychological inhibition to physical illness.

Key words: psychological inhibition, cancer, infectious diseases, homosexuality

Since at least the second century AD, clinicians have noted that inhibited psychosocial characteristics seem to be associated with a heightened risk of physical illness (Kagan, 1994). Empirical research in this area has focused on inhibited expression of emotions as a risk factor for the development of several types of disease, including cancer, hypertension, and rheumatoid arthritis (Gross, 1989; Solomon & Moos, 1964; Sommers-Flanagan & Greenberg, 1989). Whereas epidemiologic studies of disease incidence have produced inconsistent results (Gross, 1989; Sommers-Flanagan & Greenberg, 1989), experimental studies have shown that inhibiting the expression of emotions can alter health-relevant physiologic functions (Pennebaker, 1993). In particular, inhibiting the expression of emotions can heighten activity in the sympathetic division of the autonomic nervous system (Gross & Levenson, 1993). However, basic research on the inhibition of motoric, cognitive, and social behavior has identified similar effects on sympathetic nervous system activity (Fowles, 1980; Pennebaker & Chew, 1985; Wegner, Shortt, Blake, & Page, 1990). Such results raise the possibility that any health risks associated with psychological inhibition may extend beyond the realm of emotional behavior to include the inhibition of nonemotional thoughts and other kinds of mental or social behaviors, experiences, and impulses. Construed broadly, *psychological inhibition* can be defined as a failure to publicly express any subjectively significant private experience, including, but not limited to, emotional, social, and behavioral impulses. Although basic research has identified specific psychophysiologic correlates of psychological inhibition, little research has been done to determine whether inhibition of psychological events other than emotional expressions might relate to physical health.

Exclusive focus on emotional expression as an indicator of psychological inhibition also involves a serious methodological difficulty. Most studies of emotional inhibition infer psychological inhibition from the failure to overtly express an emotion (e.g., Pennebaker & Beall, 1986; Rogentine et al., 1979; Weinberger, Schwartz, & Davidson, 1979). Inferring inhibition from the absence of expression risks confusing the failure to generate a psychological event (e.g., a thought, an emotion, or a behavioral impulse) with the inhibition of that event once generated (e.g., suppressing the expression of a thought, a feeling, or an impulse or repressing such an event before it becomes conscious). As a result, it is difficult to determine whether the behaviors taken as indicators of psychological inhibition in previous studies actually reflect the generation and subsequent inhibition of private events or whether they reflect instead a failure to generate such events in the first place.

To expand the scope of theories linking psychological inhibition to physical illness while avoiding the methodological difficulties outlined above, we sought a behavioral model in which (a) the inhibited psychological event was a social or behavioral impulse not directly linked to emotional expression

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and (b) both the generation and subsequent inhibition of a psychological event could be directly assessed. Gay men's management of their homosexual identity may provide such a model. Many gay men inhibit the public expression of their homosexual identity to avoid stigmatization, ostracism, or physical assault (M. S. Weinberg & Williams, 1974). Although concealing homosexual identity may be an effective strategy for avoiding social rejection (G. Weinberg, 1972), concealment may also require gay men to inhibit the expression of subjectively significant social and behavioral impulses (e.g., public displays of affection, disclosure about one's self or personal life, expression of attraction to others). If psychological inhibition is associated with physical health risks, then "closeted" gay men may experience poorer physical health outcomes than those who are "out." In the context of homosexual identity management, psychological inhibition can be directly assessed by measuring both the presence of a homosexual identity (e.g., by asking individuals to identify their sexual orientation) and the degree to which that identity is publicly expressed (e.g., by asking those who identify themselves as homosexual to indicate the extent to which they conceal that identity from others).

In a recent study of 80 HIV-seropositive gay men, HIV infection was found to progress more rapidly among those who concealed their homosexual identity than among those who were "out" (Cole, Kemeny, Taylor, Visscher, & Fahey, in press). Participants who indicated being "half or more in the closet" reached each of three HIV-relevant end points (a critically low CD4 level, AIDS diagnosis, and HIV-related mortality) between 20% and 40% faster than did those who were "mostly" or "completely out of the closet." These results are consistent with hypothesized negative health effects of psychological inhibition, and sample characteristics and statistical controls ruled out a variety of alternative explanations (e.g., differences in disease progression at study entry, demographic characteristics, affective states, drug use, sexual behavior, and biomedical prophylaxis). In the present investigation, we considered the possibility that the health risks associated with concealed homosexual identity extend beyond the context of HIV infection to the incidence of cancer and infectious disease among HIV-seronegative individuals. These analyses provided an opportunity to conceptually replicate previous findings linking concealment to physical health risk while examining the extent to which those findings generalize beyond the unique circumstances of HIV infection.

Method

Overview

The incidence of cancer, pneumonia, bronchitis, sinusitis, and tuberculosis was assessed over 5 years in 222 HIV-seronegative gay and bisexual men participating in the Natural History of AIDS Psychosocial Study (NHAPS)—a study of psychological and behavioral characteristics among participants in the University of California, Los Angeles (UCLA) site of the Multicenter AIDS Cohort Study (MACS). Concealed homosexuality, demographic characteristics, anxiety, depression, negative affectivity, repressive coping, and social desirability response sets were measured at study entry, and health-relevant behaviors (e.g., tobacco smoking, alcohol consumption, recreational drug use, exercise, and sleep disturbance) and HIV serostatus were assessed at 6-month intervals over the 5-year follow-up. Logistic regression models were used to estimate the association between the degree to which participants concealed their homosexual identity and the probability of contracting a surveyed disease during the 5-year follow-up. These analyses controlled for potential differences in age, other demographic characteristics, health-relevant behavioral patterns, anxiety, depression, negative affectivity, repressive coping, and a tendency to give socially desirable interview responses.

Participants

Data came from 222 HIV-seronegative participants in the NHAPS (Kemeny et al., 1994; Taylor et al., 1992), associated with the UCLA site of the MACS (Kaslow et al., 1987). Between 1984 and 1986, 649 HIV-seronegative gay and bisexual men were recruited into the MACS from the Los Angeles-area gay community (through flyers, newspaper ads, and existing studies of gay men). At study entry, all participants were over 18 years of age, none had been diagnosed with AIDS or cancer, and none knew his HIV serostatus. (Serostatus was documented by enzyme-linked immunosorbent assay for anti-HIV-1 antibodies in 1985–1986, when widespread HIV screening became feasible; Nishanian et al., 1987). Beginning in 1987, 430 HIV-seronegative MACS participants were recruited into the NHAPS by mailed invitation. Between 1987 and 1988 (at MACS Visit 7), 222 of these individuals completed a set of questionnaires measuring concealment and other psychosocial variables examined in this study. Biannual HIV antibody testing indicated that all these individuals remained HIV seronegative throughout the period studied. All MACS–NHAPS procedures were approved by Institutional Review Boards at UCLA, and informed consent was obtained from each participant after the nature and possible consequences of participation were fully explained.

Procedure

Every 6 months, MACS participants received a medical examination, had blood drawn, and were interviewed about various aspects of their physical and psychological health as well as various health-relevant demographic and behavioral characteristics (e.g., age, ethnicity, occupational and educational status, and use of medical and recreational drugs; see Kaslow et al., 1987, for more details). NHAPS participants completed a set of paper-and-pencil psychosocial measures at 6-month intervals coinciding with MACS visits. In these analyses, all psychosocial characteristics were measured during the year following NHAPS entry (corresponding to MACS Visit 7), and the incidence of various disease outcomes was surveyed over the course of the ensuing 10 MACS interviews (Visits 8–17 over the period 1987–1992). (The MACS did not collect information on several of these health outcomes prior to 1987.) Health-relevant behavioral patterns were summarized by averaging measurements over all 11 visits (MACS Visits 7–17).

Psychosocial Measures

Concealed homosexual identity. All but 2 of these 222 NHAPS participants identified themselves as either "totally" or "predominantly homosexual." Since this study focused on variations in the expression of homosexual identity, the 2 participants who identified themselves as "equally homosexual and heterosexual" or "predominantly heterosexual" were excluded from further analysis. As in most previous studies of homosexual identity management (e.g., Martin & Dean, 1990; M. S. Weinberg & Williams, 1974), the degree to which participants concealed their homosexual identity was measured by a

standard five-category index asking respondents to judge themselves as being, "relative to other gay men": *definitely in the closet, in the closet most of the time, half in and half out, out of the closet most of the time,* or *completely out of the closet.*

Social desirability. A tendency to report socially desirable attributes was assessed by scores on the 20-item revision of the Marlowe–Crowne Scale of Social Desirability (Strahan & Gerbasi, 1972).

Negative affectivity. A predisposition toward experiencing negative affective states was measured by the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). People high in negative affectivity often report physical symptomatology in the absence of objectively verifiable physical illness (Watson & Pennebaker, 1989).

Depression and anxiety. Affective and vegetative symptoms of depression were measured by the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), and trait anxiety was measured by the 20-item Bendig (1956) short form of the Taylor Manifest Anxiety Scale (TMAS).

Repressive coping style. Individuals who may not experience or express negative emotional states were identified by scores below the sample median (8) on the TMAS and above the sample 75th percentile (11) on the Marlowe–Crowne Scale of Social Desirability. (For more on the definition and measurement of repressive coping style, see Weinberger et al., 1979.)

Measures of Health Status

MACS interviews surveyed the incidence of cancer (any type), pneumonia, bronchitis, sinusitis, and tuberculosis. Each disease's occurrence was elicited separately by a probe of the form, "Since your last visit in [month of last visit], has a doctor or other medical practitioner told you that you had [e.g., pneumonia]?" If the cancer probe was answered affirmatively, the participant was prompted to provide a site and type of cancer. MACS interviews assessed cancer incidence on all 10 follow-up occasions (MACS Visits 8–17). Tuberculosis was surveyed on Visits 12–17, pneumonia on Visits 14–17, and bronchitis and sinusitis on Visits 15–17.

Measures of Health-Relevant Background Characteristics

Demographic and behavioral characteristics that may relate to physical health include age; socioeconomic status; ethnicity; use of cigarettes, alcohol, and other recreational drugs; exercise; and sleep disturbance (Adler et al., 1994; Breslow & Enstrom, 1980). MACS interviews assessed age (birth date); education (attendance and degree attainment); occupation (U.S. census classification); ethnicity (U.S. census classification); cigarette smoking; alcohol consumption; and use of marijuana–hashish, nitrite inhalants ("poppers"), cocaine, amphetamines, and barbiturates–tranquilizers–sedatives. For each 6-month period, dichotomous scores were created for measures of drug use (none during previous 6 months vs. some), smoking (one or more cigarette per day vs. less), and alcohol consumption (nondrinkers and those reporting two or fewer drinks during any 24-hr period vs. those reporting more). (Analyses treating drug use and alcohol consumption as continuous variables produced results similar to those described here, but continuous measures were less predictive of outcome incidence than were dichotomous scores.) Scores were then averaged over the 5-year surveillance period to create an overall summary of each drug's use. Because few participants fell in any category of ethnicity besides Caucasian (93%), ethnicity was scored dichotomously (i.e., Caucasian vs. non-Caucasian). Education was scored as a three-level categorical variable: high school (28%), some college education (46%), or some graduate education (27%), as was occupational status: professional–managerial (58%), technical–sales (31%), or service–other (11%), by U.S. census classification. Age was measured at study entry (*Mdn* = 36 years, range = 24–58 years).

NHAPS questionnaires assessed sleep disruption ("Over the last month, how many nights in an average week did you get less sleep than you needed?" with responses ranging from 0 to 7) and aerobic and anaerobic exercise ("Over the last month, how many days in an average week did you engage in aerobic exercise: vigorous and continuous activity such as running, swimming, bicycling?" and "Over the last month, how many days in an average week did you engage in anaerobic exercise: short bursts of activity such as tennis, walking, yoga, baseball, stretching?" both with responses ranging from 0 to 7). Dichotomous indicators of sleep disturbance and exercise were created by grouping (a) individuals who reported an average of 2 or more nights of insufficient sleep per week (vs. 0 or 1) and (b) individuals who reported either aerobic or anaerobic exercise an average of 1 day a week or more (vs. those who were sedentary; Blair et al., 1989). Again, dichotomous scores were more predictive of outcomes than were continuous scores, and dichotomous scores were averaged over the entire 5-year surveillance period to create summary scores.

Statistical Analysis

Logistic regression models were used to relate the degree of homosexual identity concealment to the probability of contracting a given disease during the period surveyed (Cox & Snell, 1989; Hosmer & Lemeshow, 1989). As in Cole et al.'s (in press) previous study, concealment was represented both as a five-level scale score (1 = *completely out of the closet,* 5 = *completely in the closet*) and as a dichotomous variable (0 = *mostly or completely out,* 1 = *half or more in the closet*). Preliminary analyses treating concealment scores as a five-class categorical variable indicated strictly monotonic relationships with outcome incidence. Because very few individuals indicated being completely in the closet, graphical presentations collapsed those who were completely in with those who reported being in the closet most of the time. Analyses using this four-level score produced substantively identical results to those reported here for the five-level score.

Initial analyses were collapsed over all disease outcomes (cancer, pneumonia, bronchitis, sinusitis, and tuberculosis) to assess the association between concealment and general physical health risk over the course of the 5-year surveillance period. Separate analyses were

Table 1
Association Between Degree of Concealment of Homosexual Identity and Biobehavioral or Demographic Characteristics (Rank or Intraclass Correlation)

Characteristic	*r*	*p* (two-tailed)
Age (years)	.10	.13
Ethnicity (non-Caucasian or Caucasian)	.20	.01
Education (graduate school, college, or high school)	.15	.09
Occupation	.16	.09
Exercise (aerobic and anaerobic, days per week)	.11	.10
Sleep disturbance (nights per week)	−.01	.85
Cigarette smoking (average ≥ 1 per day)	−.13	.09
Alcohol consumption (≥ 3 drinks within 24 hr)	−.08	.28
Drug use (any in previous 6 months)		
Marijuana–hashish	−.19	.01
Nitrite inhalant	−.06	.38
Cocaine	−.14	.05
Amphetamine	−.07	.29
Barbiturates–tranquilizers–sedatives	−.09	.20

Table 2
Association Between Disease Incidence and Degree of Concealment of Homosexual Identity

Model (covariates adjusted)	All disease outcomes				Cancer			
	n	OR	*p*	Parameter ± *SE*	*n*	OR	*p*	Parameter ± *SE*
Model 1 (simple association)	56/200				20/205			
Ordinal[b]		2.04	.001	0.711 ± 0.205		1.97	.013	0.680 ± 0.272
Dichotomous[c]		3.44	.001	1.237 ± 0.369		3.18	.020	1.159 ± 0.496
Model 2 (demographic and behavioral characteristics)	45/163				18/167			
Ordinal[b]		2.41	.001	0.879 ± 0.272		2.32	.022	0.843 ± 0.357
Dichotomous[c]		4.45	.001	1.492 ± 0.462		4.07	.019	1.404 ± 0.597
Model 3 (Model 2 + affect, repressive coping, and social desirability)	37/134				14/137			
Ordinal[b]		2.97	.002	1.094 ± 0.360		4.36	.032	1.473 ± 0.686
Dichotomous[c]		4.15	.019	1.423 ± 0.608		9.79	.046	2.281 ± 1.142

Note. N = number of incident cases/total number of cases analyzed. OR = odds ratio.
[a]Estimates for Models 2 and 3 are based on backward stepwise deletion ($p > .15$) of variables from the fully adjusted model. [b]Scored on a 5-point

then conducted on the incidence of neoplastic and infectious diseases (i.e., pneumonia, bronchitis, sinusitis, and tuberculosis). Three models were fit to the data on each outcome. The first model assessed the simple association between concealment and disease incidence. The second model controlled for demographic characteristics (age, ethnicity, education, and occupation) and health-relevant behavioral practices (cigarette smoking, drinking, use of each of five recreational drugs, exercise, and sleep disturbance). Control for these variables was critical because each had been linked to physical health outcomes in previous research (Adler et al., 1994; Breslow & Enstrom, 1980), and several of them were also associated with the degree to which participants concealed their homosexual identity (see Table 1). A third model controlled for social desirability response sets (Marlowe–Crowne), negative affectivity (PANAS), anxiety (TMAS), depression (CES-D), and repressive coping, as well as the demographic and behavioral variables controlled in the second model. These additional controls ensured that any concealment-related differences in physical health risk could not be attributed to differences in reporting biases, repressive coping, or comorbid anxiety or depression. (The repressive-coping indicator was defined by scores on the Marlowe–Crowne Scale of Social Desirability and the TMAS, raising the possibility that collinearity among these measures might distort or destabilize parameter estimates. However, variants of Model 3 that excluded either the repressive-coping indicator or scores on the TMAS and the Marlowe–Crowne Scale of Social Desirability produced results substantively identical to all those reported here.)

Following these general analyses, we examined the incidence of each specific infectious disease. Pneumonia and tuberculosis occurred too infrequently to permit accurate parameter estimation in disease-specific analyses, so no results are available for these analyses. (Pneumonia occurred in 3 of the 196 individuals for whom data were available, and tuberculosis did not occur in any of the 200 individuals for whom data were available.) Bronchitis and sinusitis did occur sufficiently frequently to estimate a small number of parameters but not the entire set necessary to model all the potential confounders controlled in the more general models (i.e., age, ethnicity, education, occupation, negative affectivity, social desirability, smoking, drinking, use of each of five recreational drugs, exercise, sleep disturbance, anxiety, and depression). As a result, we used a backward stepwise algorithm to eliminate from the third model any variable that failed to predict the incidence of sinusitis or bronchitis at a relatively liberal level ($p < .15$). This procedure increased the ratio of incident outcomes to model parameters (and thus the statistical stability of the obtained parameter estimates) while producing results that are likely to be substantively identical to those derived from a model controlling for all potential confounders. For sinusitis, this backward algorithm removed all potential confounders except heavy alcohol consumption and sleep disturbance, and for bronchitis, all confounders except sleep disturbance and marijuana use (Model 2) or sleep disturbance and Marlowe–Crowne scores (Model 3).

Missing outcome data reduced sample sizes slightly below the total number of cases available (e.g., absence of outcome data on 22 individuals reduced the number of cases in the analysis of all disease outcomes to 200). Missing data on potential confounders (e.g., demographic characteristics, health-relevant behavior, and affective variables) led to further sample-size reductions (see *n*s in Table 2). However, the adjusted models (Models 2 and 3) produced parameter estimates that were substantively identical to those for unadjusted models (Model 1), so the reduction in sample size associated with covariate inclusion did not alter substantive conclusions.

Variations in censoring (i.e., the incidence of missing data) across differing levels of concealment could conceivably have biased estimates of concealment's association with disease. As a result, we conducted analyses of variance testing for differences in the number of observations available for each individual (e.g., the number of times a given participant responded to the cancer interview item out of the 10 possible follow-up occasions). These analyses indicated no association between the frequency of missing data and concealment (all Fs < 1) regardless of how concealment was scored (dichotomous, five-level score, or four-level score). Similarly, logistic regressions controlling for the number of responses given by each individual produced results virtually identical to those reported here. As a result, differential patterns of missing data could not account for any of the results reported below.

Results

Figures 1 and 2 portray the incidence of infectious and neoplastic diseases, respectively, as a function of degree of concealed homosexual identity. Table 2 reports logistic regression coefficients summarizing these associations. Surveyed infectious diseases included pneumonia, bronchitis, sinusitis, and tuberculosis. Most neoplasms were cancers of the skin or face (16 out of 19 tumors for which site or type was available). Overall, the odds of experiencing at least one of the diseases surveyed increased by a factor of 2.04 with each succeeding degree of concealment (Model 1, 5-point score: linear parameter estimate = 0.711, SE = 0.205, p = .001). Those who clas-

All infectious diseases				Bronchitis[a]				Sinusitis[a]			
n	OR	*p*	Parameter ± *SE*	*n*	OR	*p*	Parameter ± *SE*	*n*	OR	*p*	Parameter ± *SE*
39/200				19/194				28/195			
	1.77	.009	0.569 ± 0.217		1.70	.056	0.531 ± 0.277		1.82	.013	0.598 ± 0.242
	2.91	.007	1.067 ± 0.397		2.67	.055	0.983 ± 0.515		2.60	.031	0.958 ± 0.444
30/163				19/194				28/195			
	2.05	.016	0.717 ± 0.298		1.90	.025	0.641 ± 0.286		1.79	.021	0.581 ± 0.251
	3.82	.010	1.339 ± 0.518		3.25	.030	1.178 ± 0.542		2.90	.022	1.091 ± 0.475
25/134				19/175				28/195			
	2.74	.008	1.009 ± 0.379		1.87	.028	0.625 ± 0.284		1.89	.014	0.634 ± 0.259
	3.78	.049	1.331 ± 0.675		3.11	.035	1.135 ± 0.539		3.17	.016	1.154 ± 0.479

ordinal scale ranging from 1 (*completely out*) to 5 (*completely in the closet*). [a]Half or more "in the closet" versus "mostly" or "completely out."

sified themselves as at least "half in the closet" were 2.17 times as likely as those who were "mostly" or "completely out" to experience at least one of the disease outcomes surveyed (49% incidence among those at least half "in" vs. 23% incidence among those "mostly" or "completely out"; Model 1, dichotomous score: linear parameter estimate = 1.237, SE = 0.369, p = .001). Figures 1 and 2 depict the dose-dependent increase in disease incidence as degree of concealment progressed from "totally out" to "in the closet most of the time" or "completely in." On all outcomes except pneumonia and tuberculosis (which were virtually absent in this sample), rates of disease incidence increased in direct proportion to the degree to which participants concealed their homosexual identity. Concealment continued to significantly predict disease incidence in models controlling for age, ethnicity, occupational and educational status, health practices, depression, anxiety, negative affectivity, repressive coping, and an inclination to report socially desirable characteristics (Models 2 and 3), so the heightened physical health risks associated with concealment could not be attributed to potential differences on any of these

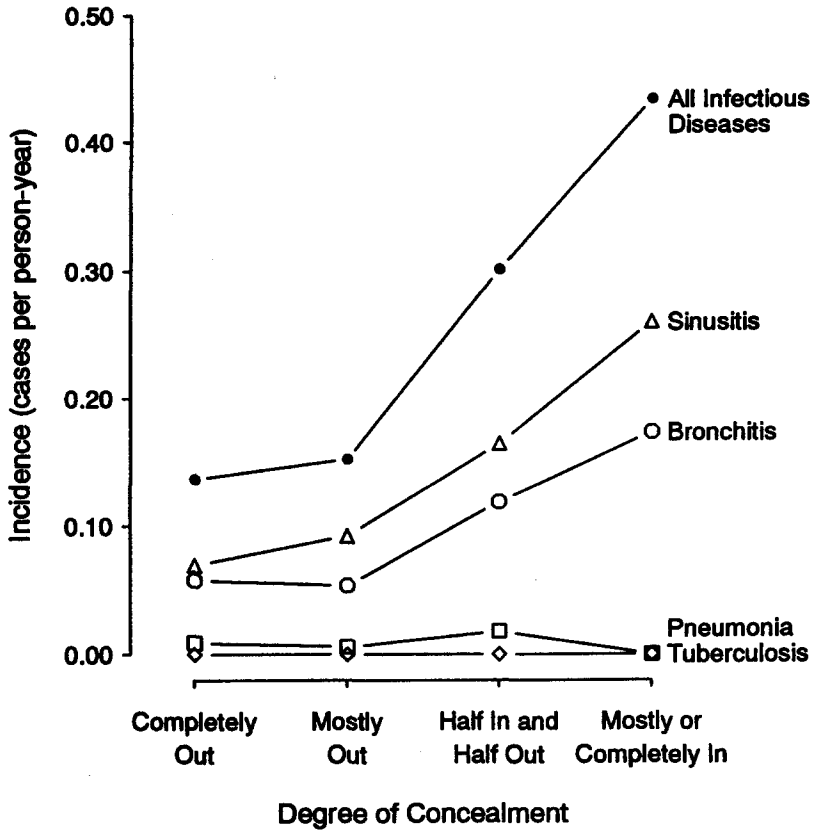

Figure 1. Incidence of infectious disease as a function of degree of concealment of homosexual identity.

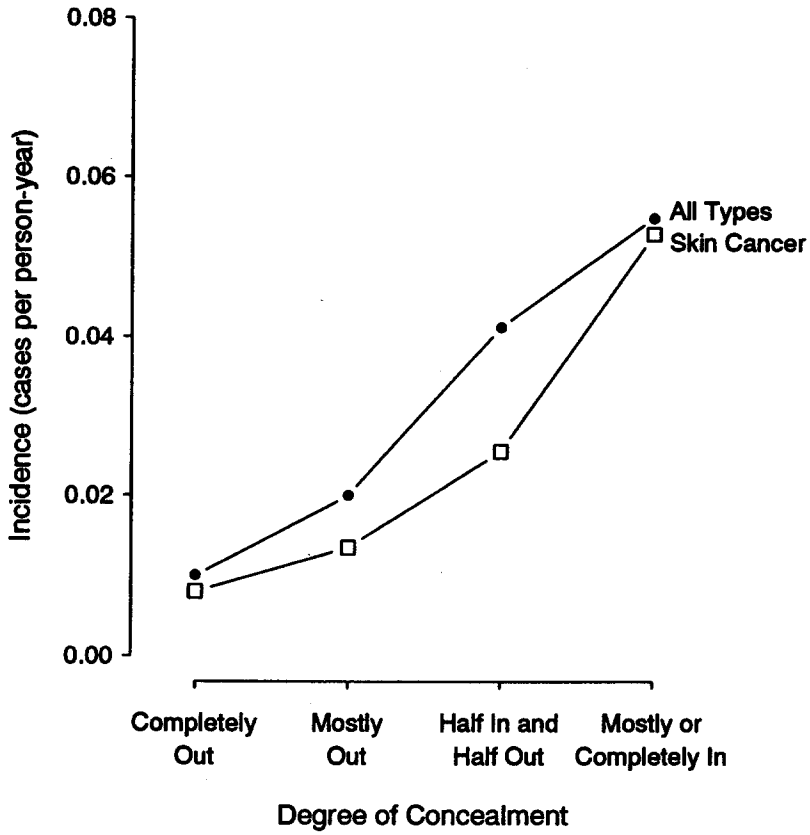

Figure 2. Incidence of cancer as a function of degree of concealment of homosexual identity.

dimensions. A repressive coping style was identified more often among those "half" or more in the closet (22%) than among those "mostly" or "completely out" (12%). However, this difference did not reach conventional levels of statistical significance ($p = .088$), and repressive coping style failed to significantly predict the incidence of any of the disease outcomes (all $ps > .20$). In addition, concealment continued to significantly predict disease incidence (all $ps < .05$) despite control for repressive coping style. As a result, the health risks associated with inhibiting the expression of homosexual identity do not appear to stem from correlated differences in inhibited emotional expression.

Discussion

Among 222 HIV-seronegative gay and bisexual men, the incidence of cancer and moderately serious infectious diseases increased in direct proportion to the degree to which participants concealed their homosexual identity. Surveyed infectious diseases included pneumonia, bronchitis, sinusitis, and tuberculosis, and most cancers were identified as cancers of the face or skin. None of these effects could be attributed to differences in demographic characteristics (e.g., age, ethnicity, occupation, or education), health-relevant behavioral patterns (e.g., drug use, exercise, or sleep disruption), depression, anxiety, negative affectivity, repressive coping, or social desirability response biases. Although a repressive coping style was more prevalent among relatively "closeted" participants (consistent with previous data; see Cole et al., in press), repressive coping did not predict the incidence of any disease outcome, and concealment continued to predict disease incidence when repressive coping was controlled. These data indicate a heightened risk of physical illness among gay men who conceal their homosexual identity and suggest that such risks cannot be attributed to confounded differences in demographic, behavioral, or psychosocial variables that might influence either physical health status or participants' reports of health status.

These findings conceptually replicate the results of a previous study documenting accelerated progression of HIV infection among gay men who concealed their homosexual identity (Cole et al., in press). The present findings are also consistent with data from M. S. Weinberg and Williams (1974), who measured both concealment and the occurrence of 15 psychosomatic symptoms (e.g., tremors, headache, loss of appetite, upset stomach, weight loss, heart palpitation, dizziness, and sleep disturbance) in a sample of 625 gay and bisexual men from New York and San Francisco. Analysis of the data they reported (M. S. Weinberg & Williams, 1974, p. 265, Table 3) indicates that "closeted" gay men were 1.23 times as likely as those who were "out" to report high levels of psychosomatic symptomatology ($p = .011$ by logistic regression). Although these symptoms should not be taken as indicators of serious physical illness, many of them are mediated by neurophysi-

ologic mechanisms (e.g., sympathetic nervous system activation) that may also influence aspects of immune response or the pathogenesis of serious physical illnesses (Kiecolt-Glaser, Cacioppo, Malarkey, & Glaser, 1992; Lyte, 1993; Manuck, Cohen, Rabin, Muldoon, & Bachen, 1991; Ottaway & Husband, 1992; Sapolsky, 1994). As a result, the present data are consistent with previous research in suggesting an elevated physical health risk among gay men who conceal their homosexual identity.

When considering the effects of concealment, it is important to note that "passing" as a heterosexual is not a discrete proposition. Gay men may be "in" versus "out" to varying degrees (e.g., known vs. suspected vs. not suspected) and to various audiences (e.g., friends, family, coworkers, and other gay men; M. S. Weinberg & Williams, 1974).[1] Most participants in the present study reported intermediate levels of concealment, and ancillary analyses (not reported here) indicated that partial concealment was correlated with discomfort in being identified as homosexual to significant others (e.g., friends and family members) and in more generic social environments (e.g., at work, at school, and in social gatherings). Although this sample contained few individuals at the most "closeted" end of the concealment continuum, even partial concealment would require gay men to inhibit the expression of homosexual identity over significant periods of time in highly consequential settings (e.g., 8 hr a day at work, at school, and at family gatherings). Moreover, the dose–response relationship observed over intermediate levels of concealment suggests that physical health risk may be fairly sensitive to variations in gay men's presentation and management of their homosexual identity.

Implications for Psychological Inhibition Theory

The present results are consistent with psychosomatic theories linking psychological inhibition to physical illness (Pennebaker, 1988, 1993). In addition, they extend the scope of previous studies exploring the health correlates of psychological inhibition by (a) directly measuring both the existence and subsequent inhibition of a subjectively significant psychological event (a homosexual social identity) and (b) demonstrating that differences in emotional inhibition alone (i.e., repressive coping) cannot account for the health effects observed. These results are consistent with a broadened definition of psychological inhibition that extends beyond the inhibition of emotions to include the inhibition of social actions and behavioral impulses (cf. Kagan, 1994; Kagan, Reznick, & Snidman, 1988). Results such as these suggest that the health effects of psychological inhibition may stem from inhibitory processes per se, rather than from the specific psychological event inhibited (e.g., emotional expressions vs. public social behavior).

Although concealment requires inhibiting the public expression of thoughts, feelings, and social behaviors relevant to homosexuality, it cannot be determined from the present observational study whether the physiologic effects of psychological inhibition were directly responsible for the health effects observed. Associations between concealment and physical health risk could be induced by other causal mechanisms that do not imply any direct effect of concealment on physical health. For example, "closeted" gay men may differ from those who are "out" on health-relevant variables not measured in this study (e.g., generalized readiness to seek medical treatment; exposure to infectious pathogens or carcinogens or, in the case of skin cancer, overexposure to sunlight; genetic characteristics that may relate to immune function or, in the case of skin cancer, skin pigmentation). Because inhibiting versus expressing a homosexual identity would not necessarily alter such characteristics, the present data should not be taken to imply that "coming out of the closet" will improve gay men's physical health. It is possible that constitutional differences in physical health might causally influence degree of concealment by leading gay men with a history of health problems to conceal their sexual orientation in order to maintain employment and attending health care benefits. It is also possible that concealment may causally influence physical health but not through psychosomatic correlates of psychological inhibition. For example, concealment may create or maintain a chronic fear of discovery that could, in turn, alter physiologic function. Although the present data are consistent with previous studies (e.g., Cole et al., in press; M. S. Weinberg & Williams, 1974) in suggesting a heightened risk of physical illness among gay men who conceal their homosexual identity, the causal mechanisms underlying these results require further investigation.

In addition to the causal uncertainty associated with observational analyses, two other limitations of the present study are important to keep in mind. First, the present data are based on participants' reports; the disease states measured here were not independently verified by biophysical means. However, reporting biases are unlikely to have produced the present results because (a) participants did not select themselves into this study on the basis of any of the outcomes measured here (they volunteered for a study of psychosocial and behavioral correlates of AIDS); (b) outcomes were assessed by inquiring about physicians' diagnoses rather than the participants' own perceptions of health or illness; (c) outcomes were surveyed over a relatively short period of time (6 months) so recall biases are likely to be minimal (Jobe, Tourangeau, & Smith, 1993); and (d) results remained significant despite statistical control for potential reporting biases (e.g., negative affectivity and social desirability). Although the aforementioned considerations cannot totally rule out the possibility of reporting biases, the present results are consistent with those from previous studies using objective biological measures of physical health (e.g., immunologic parameters, diagnosis of AIDS-defining conditions, and HIV-related mortality; see Cole et al., in press).

A second limitation of the present study concerns the

[1] Concealment status can also change over time as individuals "come out of the closet." In the present study, concealment was measured at study entry, and no information was available on change in status over time. However, because it is generally not possible to go back "in the closet" once one is "out," any changes that did occur would tend to contaminate the "closeted" groups with individuals who subsequently transitioned to a less "closeted" status. Such a dilution would tend to work against finding the kind of dose–response relationships between concealment and health status demonstrated in this study.

composition of the studied sample. These gay men were all voluntary participants in a long-term biomedical study of a homosexuality-linked disease conducted in an urban west coast setting. It is not clear how results from such a sample might generalize to other groups of gay men (e.g., those reluctant to volunteer for a study on HIV–AIDS). However, M. S. Weinberg and Williams (1974) found similar results even though their recruitment strategy did not involve any mention of health-related outcomes. Nevertheless, future research would be useful in both replicating the present results and defining their scope and mechanism.

Implications for Homosexual Identity Management

Even if the present results could be directly attributed to psychosomatic correlates of inhibited social behavior (rather than potentially confounded differences in health-relevant behavior, risk exposure, etc.), such results would not imply that "coming out of the closet" should improve gay men's physical health. Whereas most laboratory studies on the health effects of psychological inhibition have treated inhibition as a state variable (e.g., by experimentally manipulating inhibition; see Gross & Levenson, 1993; Pennebaker, 1988), most epidemiologic studies of psychological inhibition as a physical health risk factor have measured psychological inhibition as a trait variable (e.g., classifying people as "inhibited" vs. "uninhibited" or as "repressors" vs. "sensitizers"; see Gross, 1989; Kagan, Snidman, Julia-Sellers, & Johnson, 1991; Weinberger et al., 1979). Kagan and his associates have amassed a substantial body of evidence suggesting that natural variation in inhibited social behavior may stem in part from genetically based differences in neurophysiologic function (Kagan, 1994; Kagan et al., 1988; see also Suomi, 1991). Ancillary analyses (not reported here) indicated that concealment was correlated with two behavioral characteristics of Kagan's "inhibited temperament" syndrome: a heightened sensitivity to social rejection (Cole, Kemeny, Taylor, & Visscher, 1996) and reduced emotional expressiveness (scores on the Emotional Expressiveness Questionnaire of King & Emmons, 1990). Concealment itself may serve as a behavioral marker of another aspect of inhibited temperament—a tendency to withdraw in the face of challenge or uncertainty (Kagan, 1994). If constitutional differences in neurophysiologic function underlie part of the physical health risk associated with inhibited social behavior, then altering inhibited behavior (e.g., through interventions) may not necessarily reduce physical health risks (unless such alterations also affect the neurophysiologic substrate of inhibited social behavior). However, some interventions promoting the expression of inhibited thoughts and feelings about significant personal experiences have resulted in short-term improvements in measures of physical health (e.g., physician visits and days of reduced activity due to illness; see Pennebaker, 1988, 1993) and immune function (e.g., antibody production in response to inoculation, latent virus reactivation, and cellular proliferation in response to mitogens; see Booth, Petrie, Pennebaker, Davison, & Thomas, 1994; Esterling, Antoni, Kumar, & Schneiderman, 1990; Pennebaker, Kiecolt-Glaser, & Glaser, 1988). Thus, both state and trait aspects of psychological inhibition may relate to physical health, and further research might profitably seek to disentangle their respective contributions. Further research might also focus on the physical health correlates of basic behavior inhibitory processes (cf. Gray, 1982; Kagan, 1994), because state and trait inhibition show many physiologic parallels (cf. Fowles, 1980; Kagan et al., 1988), and the present data are consistent with a broader relationship between behavioral inhibition and physical health risk than that attributable to emotional inhibition alone.

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