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Abstract

Previous research identifies that low levels of social relationships are associated with psychological distress. Despite the general understanding in the link between social isolation and health, we still lack knowledge on how social isolation gets under the skin, especially the role of self-concept in the association between isolation and distress. In this research, I examine (a) the effect of confidant isolation on distress and (b) psychosocial processes through which isolation affects distress. Analyses of nationally representative 16 year follow-up data, 'Americans' Changing Lives,' show that (a) effects of confidant isolation on depression are significant even after controlling for social relationships and physical health and (b) the remaining effects are entirely explained by both mediating and moderating role of psychosocial resources (i.e., mastery and self-esteem). Future research that examines effect of social isolation on distress therefore should consider both objective social conditions (i.e., SES, Social ties) and subjective evaluations (i.e., self-concepts).

CONFIDANT ISOLATION, PSYCHOSOCIAL PROCESSES, PSYCHOLOGICAL DISTRESS

Introduction

> *"…. social relationships, or the relative lack thereof, constitute a major risk factor for health--rivaling the effects of well-established health risk factors such as cigarette smoking, blood pressure, blood lipids, obesity, and physical activity. Indeed, the theory and evidence on social relationships and health increasingly approximate that available at the time of the U.S. Surgeon General's 1964 report on smoking and health…." (House, Landis, and Umberson 1988, p. 541)*

As illustrated above the study on social relationships and health has produced a significant knowledge that shows the strong link between them (Berkman and Glass 2000; Cohen 2004; House, Landis, and Umberson 1988; Kawachi and Berkman 2001). One of consistent findings and the implications scholars drawn from those studies are detrimental effect of social isolation (House 2000). Lack of social relationships whether in the form of social integration or social support has served as factors undermining health conditions and contributing to shortened life duration.

Although previous literatures have produced invaluable findings that shed light on the relationships between social isolation and health, they have not paid a full attention to social isolation that is characterized by no confidant. Confidants are composed of inner circle of total network and they are very important people who share many important life experiences. Failing to report any confidant therefore might signal crucial deficiency in one's network. Despite general consensus that confidant isolation is detrimental state, there is much to be learned from confidant isolation. First, we do not know observed association between confidant isolation and health is not the product due to a common third factor such as social relationships. If the effect of confidant isolation on distress is completely explained by social relationships, then confidant isolation might not exert its own effects on distress. Second, we do not know psychosocial processes through which confidant isolation affects distress. It is possible that the

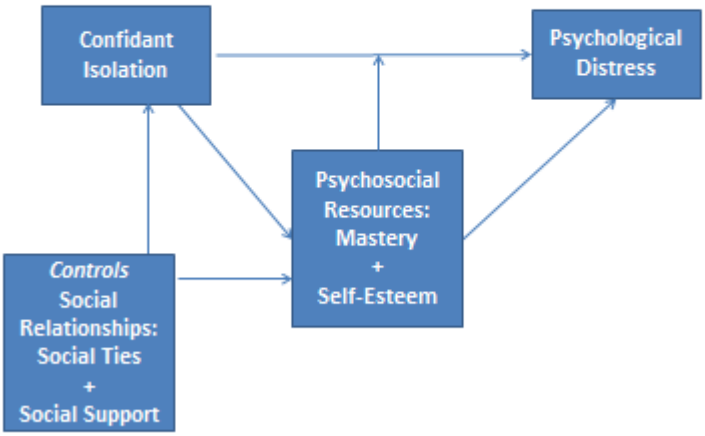
effects of isolation on distress is either mediated or moderated by psychosocial resources. This study addresses these significant gaps in the literature by outlining the theoretical arguments of (a) linkage between social relationships and confidant isolation, (b) role of psychosocial factors between confidant isolation and psychological distress.

Research Questions and Conceptual Model

(a) What might be health consequences of confidant isolation?

(b) What might explain the impact of confidant isolation? In other words, what might be role of psychosocial resources in the link between confidant isolation and psychological distress?

Figure 1. Conceptual Framework:
CONFIDANT ISOLATION, PSYCHOSOCIAL PROCESSES, PSYCHOLOGICAL DISTRESS



Theoretical Background and Literature Review

Linkage between Social Relationships and Confidant Isolation

Why might be important to investigate the detail of social relationships of the people who is isolated (i.e., by means of no confidant)? One of core concerns in this study is to examine the extent to which confidant isolation corresponds to various levels of social relationships. The fact that someone fails to report no significant others does not preclude the chance in which one is engaged in society different ways other than perceiving no confiding relationships. In other words, those who report no significant others can still manage 'normal' social life like one who participates in volunteering/church services, chats with friends/relatives over the phone, or even lives with partner/spouse. Likewise, people who are isolated by means of no confidant still can interact with others and appreciate the level of exchange whether it is positive or negative in nature. Given the theoretical plausibility between the report of confidant and various types and levels of social relationships, it will be then empirical scrutiny whether/how much the different aspects of social relationships corresponds each other. Investigating mechanisms through which structure and content of social relationships produce social isolation would inform one of main sources of social isolation.

Conceptualizing Social Isolation

The concept of social relationships is multidimensional and so is social isolation. Each facet of social relationships represents diverse interaction among individuals and consequently there are various measures developed to suit the purpose better. Three types of social relationships measure stand out—(1) social integration; (2) social support; and (3) social network. My purpose of reviewing these concepts is to link social isolation with social relationships. Social isolation defined in this study as no confidant has elements that partially represent social relationships. This allows me to link social isolation or state of no confidant with social relationships or social integration and social support conceptually. Below I discuss each sub-concept of social relationships in detail.

First, *social integration* refers to the existence or quantity of social relationships. The existence of a spouse or partner (i.e., intimate ties), the frequency of contact with friends or relatives (i.e., intermediate ties), or the frequency of organizational memberships/church attendance or civic engagements are three types of social integration employed in the study. Because social integration represents the relational structure of social relationships, it is also called a structural variable as opposed to functional variables. Further, the term, s*ocial ties* is used alternatively with social integration primarily due the fact that they share quantifiable nature of social relationships (House and Kahn 1985). Using the concept of social integration, past studies operationalize social isolation such as (a) being unmarried; (b) infrequent contact with network members; (c) low participation in social activities such as volunteering and religious attendance.

Second, *social support* indicates the quality of content of relationships. While previous studies have identified a number of functions social support serves (e.g., instrumental, informational, emotional, perceived) (House and Kahn 1985), perceived emotional supports seem to stand out in terms of health consequences (Cohen 2004; Lin, Ye, and Ensel 1999). Therefore, I focus on two types of perceived emotional support—positive and negative. Recognizing both positive and negative aspect of social support is important because relationships are multidimensional and can be supportive and encouraging as well as critical and demanding. Although a significant body of work has documented the role of 'dark side' of social relationships play with respect to health and well-being, the potentially important role of negative side is typically overshadowed or overlooked by many scholars. A more balanced approach that incorporates both costs and benefits of social relationships is needed. The lack of quality of support has been documented in exercising health exacerbating effect, suggesting that lack of social support is another type of social isolation.

Third, studies of social networks are characterized as a third type under social relationships (Smith and Christakis 2008). The distinction between *weak ties* and *strong ties* is relevant here. The distinction is made based on strength of ties determined by the amount of time spent together, the

emotional intensity of the relation, the intimacy of mutual disclosure, and the reciprocity in services provided to one another (Granovetter 1973). People are surrounded, not only by those who spend more time together and with whom to share more close feelings and emotions (i.e. strong ties), but by people who share less mutual time and emotion but still allows interconnection to the web of world (i.e. weak ties). Members in strong ties are generally small in size, informal, intimate, and enduring. However, it is documented that weak ties are often more important than strong ties when it comes to achieving tangible or instrumental goals such as job search procedures. The key mechanism of weak ties is the effective transaction of information as compared to strong ties that are a rather ineffective and even redundant information process. The weak ties operate efficiently in fulfilling some instrumental and informational need among network members (Granovetter 1973).

Three types of social relationships—(a) social integration, (b) social support, and (c) social networks (i.e., strong ties versus weak ties) are identified. Although there could be number of different ways in which these three concepts are related, my research focus is to examine interplay between social integration and social support in producing social network or lack thereof. Among two types of social network—strong and weak ties-- identified above, my discussion centers on strong ties. Confidant ties share great similarity with strong ties (Thoits 2011).

Focusing on strong ties with respect to social relationships might be useful in three ways. First and foremost, measure of confidant or strong ties reflect both social integration and social support in some sense. As for the linkage to social integration, confidant ties are often employed as one of social integration measure based on the quantifiable feature (i.e., existence or quantity of social relationships). Regarding relationships with social support, significant others reflect the quality or content of relationships (i.e., confidant is important person by definition), which main element of social support. Second, the concept of social isolation varies due to the nature of social relationships it originates from. Research has used either low integration or low social support as the case of social isolation. One of the alternative ways would be implementing a third measure that represents both types of social relationships

at the lower end as social isolation and examine the linkage between or among them. Third, the unit of analysis used in strong ties is the number of individual. While other measures of social relationships are imposed of arbitrary choice in selecting the "appropriate threshold" of social isolation (i.e., relative quantity of social integration and relative quality of social support), social isolation in strong ties is relatively straightforward since no confidant is lowest quantity itself.

How might Social Integration and Social Support Predict Confidant Isolation?

Social isolation defined in this study refers to individuals with no confidant. As discussed earlier, this state has unique combination in terms of social integration and social support. First, social integration is predictive of social isolation. Put it in different way, it is based on subjective assessment on personal networks that probably reflects structural as well as functional (or emotional) aspects of social relationships. Because this is based on subjective evaluation it is possible to have some degree of discrepancy with objective social connection. Individuals can feel alone or lonely despite abundant objective social ties. Ordinary adult people live with a spouse or partner, are most likely to have or had children, engage in some interpersonal networks, and participate in social activity one way or other. The levels of connection vary significantly, however, absolute no interaction is very unlikely. Therefore, it is empirical questions in the association between objective social ties and subjective evaluation of ties. Similarly, the association between subjective evaluation on quality of support (i.e., social support) and subject evaluation on personal networks is a matter of empirical scrutiny. It is likely that feeling of no confidant is a product of negative support or lack of positive support, but the specific association remains untested.

This study examines relational determinants of social isolation. In specific, three levels of social integration and two types of social supports will be tested for predicting the change of social isolation. Lin (1999) proposed that people are connected to society through various levels of social ties and social support. Three levels social integration (i.e., community ties, social network ties, and intimate ties) and

several types of social support are evaluated for predicting depressed symptoms. Following his idea, I test the role of social integration and social support in predicting social isolation.

Social Isolation and Health

Social isolation is associated with a variety of health outcomes. First, social isolation is linked to physical health. According to a comprehensive review by House et al. (1988), the impacts of social relationships on mortality tend to be nonspecific and a basic pattern is that strong social relationships are predictive of low mortality. Social isolation in the form of low level of social ties and social support are associated with the specific cause of death, as well with overall mortality (Everson-Rose and Lewis 2005;Kawachi et al. 1996). Socially isolated individuals typically have higher rates of cardiovascular disease mortality, compared with socially integrated individuals. Low levels of emotional support have been associated with an increased risk of cardiovascular mortality. Social support is associated not only with mortality but also subjective life expectancy. People expect to live longer when they report high levels of emotional support (Ross and Mirowsky 2002).

Second, social isolation is also predictive of psychological distress (Ensel and Lin 1996; Lin, Dean, and Ensel 1986; Lin, Ye, and Ensel 1999; Loscocco and Spitze 1990; Pearlin 1989; Thoits 1984; Turner and Marino 1994; Turner and Lloyd 1999). A number of stressors make a significant contribution to the explanation for variations in psychological well-being by social relation. Umberson and colleagues (1996) found that supportive relationships are associated with low levels of psychological distress, while strained relationships are associated with high levels of distress. The salutary effects of social support on mental health are also found in a longitudinal study using a latent growth curve model (Taylor and Lynch 2004). Social ties are associated with a risk of cognitive functioning; the elderly who have no social ties were at increased risk for incident cognitive decline, after adjustment for individual characteristics (Bassuk, Glass, and Berkman 1999).

Low levels of Social support or social integration may increase the negative effects of a variety of life stressors and structural environments on mental health. The buffering effect of social support and social integration on stressors in relation to mental health is supported in previous studies; those psychosocial resources reduce the effect of stressful events on health (Jackson 1992; Krause 2005; Larocco, House, and French, Jr. 1980; Lincoln, Chatters and Taylor 2005; Ross and Jang 2000; Schieman and Meersman 2004). Social support and social integration are more beneficial for health when individuals are under stress. The findings about moderation effects of social support and integration on physical health and mortality are slim, however. These results confirm that social support and integration are related to both physical and mental health.

Psychosocial Pathways that Link Social Isolation to Health

Self-perceptions or psychological resources might take a key mechanism between social isolation and distress. Mastery or sense of control is marked by beliefs that one can control their life outcomes through their own actions. Self-esteem refers to individuals' belief about their self-worth. Social isolation may deteriorate self-perception perhaps via lack of social support or via lack of social ties (Mirowsky and Ross 2003). Psychological resources—mastery and self-esteem, are typically regarded as resources on which people may draw when dealing with stressors (Pearlin 1982; Thoit 1995). Mirowsky and Ross (2003) locate this construct as a core cross-cutting resource that links individuals' objective social conditions to emotional consequences. There are a number of studies that show these resources directly reduce distress and physical illness and buffer the effects of stressors on health and well-being(Mirowsky and Ross 1996; Thoits 1995). In this study, I consider the role psychological resources as potential link between confidant isolation and distress. *[will add more literature review and theory here]*

Data and Sample Description

This study employs data from the nationally representative four-wave panel "Americans' Changing Lives," (ACL) survey. The survey data was collected by the Survey Research Center at the

University of Michigan using a multistage stratified area probability sample. The universe consists of households within the continental United States. Individuals age 25 or older were included with an oversampling of African Americans and those aged 60 and older. The survey was conducted in 1986, 1989, 1994, and 2002 (House 2007). In the first panel 3,617 individuals were interviewed. A series of attempts were made to re-interview the same respondents and 2,867, 2,398, and 1,692 responses were collected in Wave 2, Wave 3, and Wave 4, respectively. [1]

ACL is a rich dataset that contains various measures of social life. In particular, it contains a variety of social relationships and health outcome measures and therefore allows users to examine links between complex aspects of social relationships and ways in which they affects health and well-being. Moreover, ACL is a panel study that covers 16 years of period with four different measurements point. Additional wave of information have been collected recently and it will be available to the public in the future. In order to take a full advantage of rich information collected, all four waves panel data will be examined in the analyses.

Measures

Social Isolation.

Confidant Isolation. Respondents were asked, "Thinking of all your family and friends, including your spouse/ partner, child(ren) and parents, is there anyone in your life with whom you can really share your very private feelings and concerns?" Response categories were as follows: 1=No and 0= Yes. Those who respond 'No' to this question will be used as '*confidant isolation*' and 'Yes' to 'otherwise' (having a least one confidant). Respondents who answered 'Yes' were further asked the number of persons. These variables will be measured in all four waves.

[1] In Wave 3, 164 interviews were done by proxy and the proxy interviewees were not asked some of the key variables including quality of support and number of confidants. Thus, the proxy was not included in the analysis.

Wave of Confidant Isolation. This item will be constructed using *confidant Isolation* and will tap an accumulative aspect of social isolation in each wave. Thus, the maximum value of this item will correspond to each wave. For example, *Wave of Confidant Isolation* in Wave 2 will be valued as 0, 1, or 2. The value of "0" will indicate no experience of isolation. The numeral "1" will indicate that one wave of isolation occurred in either Wave 1 or Wave 2. The numeral "2" will indicate two waves of isolation. In the multivariate analyses, this variable will be converted into a series of dummy variables using each category. Due to the small number of cases that will have a high number of waves of social isolation, the value of "4" and "3" in *Wave of Confidant Isolation* will be collapsed into "2" in the analysis. A dummy variable of "0" will serve as a reference category and it will be compared to "1" and "2 or more isolations."

Social Integration.

Community Ties. This measure will be constructed by tapping the frequency with which respondents attended meetings and the frequency with which respondents attended church services. This measure will reflect a respondent's involvement in community activities. Respondents were asked, "How often do you attend meetings or programs of groups, clubs, or organizations that you belong to?" and "How often do you attend religious services?" Response categories were as follows: 1=more than once a week, 2=once a week, 3=2 or 3 times a month, 4=about once a month, 5=less than once a month, 6=never. An index variable will be created by averaging the two items. Answers will then be recoded so that higher values represent more community involvement. This variable will be measured in all four waves. The reliability test of community ties scale for each Wave yields an alpha coefficient of: Wave 1=.57; Wave 2=.56; Wave 3=.58; and Wave 4=.60.

Social Network Ties. Frequency of weekly contacts and frequency of weekly phone conversations will measure interpersonal networks ties. Respondents were asked, "How often do you get together with friends, neighbors or relatives and do things like go out together or visit in each other's homes?" and "How many times do you talk on the telephone with friends, neighbors or relatives?" Response categories were as follows: 1=more than once a week, 2=once a week, 3=2 or 3 times a month, 4=about

once a month, 5=less than once a month, 6=never. Again, the two items will be averaged and recoded so that the higher values represent more social networks ties. This variable will be measured in all four waves. The reliability test of intermediate ties scale for each Wave yields an alpha coefficient of: Wave 1=.45; Wave 2=.43; Wave 3=.50; and Wave 4=.51.

Intimate Ties. This item will be constructed so that 1=married or living with a partner and 0=otherwise. Two questions will be used to construct intimate ties. First one is a dummy variable indicating a married status. Second question is asked to those who were currently not married, "Are you currently living with another adult as a partner in an intimate relationship?" Those who responded "Yes" to either question are coded 1 and others are coded 0. This variable will be measured in all four waves.

Social Support

Positive Support. Positive support will be measured in terms of perceived levels of support from two types of relationships: (a) spouse/partner and (b) friends/relatives. Respondents were asked the following questions: "How much does your (husband/wife/partner) make you feel loved and cared for?" and "How much is (he/she) willing to listen when you need to talk about your worries or problems?" Responses were categorized as follows: 1=great deal, 2=quite a bit, 3=some, 4=little, 5=not at all. An index variable of positive support for each type of relationship will be created by averaging the two items. Answers will be recoded so that higher values represent more positive support. This variable is time-varying and is measured in all four waves. The reliability test of positive support scale for each Wave yields an alpha coefficient of: Wave 1=.72; Wave 2=.73; Wave 3=.79; and Wave 4=.77.

Negative Support. A measure of negative support will be created in the same manner as the measure for *Positive Support*. Respondents were asked two questions: (a) "To what extent do you feel (he/she) makes too many demands on you?" and (b) "How much is (he/she) critical of you or what you do?" Response categories will be the same as the measure for *Positive support*. Higher values indicate higher negative support from the two types of relationships. This variable is also time-varying and, unlike the positive

support measure, it will only be measured in Wave 1 and Wave 2. For this reason, this item will be used as a time invariant variable in a random coefficient model. The reliability test of indices of negative support scale for each Wave yields an alpha coefficient of: Wave 1=.62; Wave 2=.61.

Loneliness. As a part of the questions associated with the Center for Epidemiological Studies Depression Scale, respondents were asked how often in the last week they felt lonely: Hardly ever, some of the time, or most of time. A dummy variable will be created where 1=loneliness (most of the time) and 0=otherwise. This variable will be measured in all four waves.

Self-Concept/Psychosocial Resources

Self-esteem. Respondents were asked how much they agree with the following three statements: (1) "I take a positive attitude toward myself." (2) "At times I think I am no good at all." (3) "All in all, I am inclined to feel that I am a failure." Response categories for each item included: 1= strongly agree, 2=agree somewhat, 3=disagree somewhat, and 4=strongly disagree. Three items will be recoded to ensure that higher scores reflect greater self-esteem. They will be summed to create the index. This variable will be measured in all four waves. The reliability test of self-esteem scale for each wave yields an alpha coefficient of: Wave 1=.57; Wave 2=.60; Wave 3=.58; and Wave 4=.58.

Mastery. Mastery will also be gauged with a three-item index. The response scale and summation method are same as in the *Self-esteem* section above and the scores will be based on the respondents' agreement or disagreement with the following three statements: (1) "Sometimes I feel that I am being pushed around in life." (2) "There is really no way I can solve the problems I have." (3) "I can do just about anything I really set my mind to do." This variable will be measured in all four waves. The reliability test of mastery scale for each Wave yields an alpha coefficient of: Wave 1=.50; Wave 2=.50; Wave 3=.45; and Wave 4=.46.

Chronic Stressors.

Health Problems. Respondents were asked if they had chronic conditions (e.g., lung disease, stroke, heart attack, cancer, or diabetes) during the last 12 month[2].

Financial Hardships. Respondents were asked the degree of financial difficulty with two items (standardized variable)

"How satisfied are you with your present financial situation? 1. Completely Satisfied to 5. Not At All Satisfied.

"How difficult is it for you/your family to meet the monthly payment on your bills? 1. Extremely Difficult to 5. Not Difficult at All

Health Status.

Depression. The Center for Epidemiological Studies Depression Scale (CES-D) will be the measure for depressive symptoms. The 11-item instrument is available in the ACL; however, only 10 items (excluding "I felt lonely") will be used in this study. Respondents were asked to respond to the following statements: "In the past week, I felt that everything I did was an effort." "My sleep was restless." "I was happy."" People were unfriendly." "I enjoyed life." "I did not feel like eating." "I felt sad." "I felt that people disliked me." "I couldn't get going." "I felt depressed." Response categories were as follows: 1=hardly ever, 2=some of the time, 3=most of the time. Responses to two positive items (happy, enjoy) will be reversely coded so that higher values indicate a more depressed mood. This variable will be measured in all four waves. The reliability test of the total 10-item CES-D scale for each wave yields an alpha coefficient as follows: Wave 1=.81; Wave 2=.80; Wave 3=.80; and Wave 4=.80. (Radloff 1977)

Self-rated Health. Self-rated Health will reflect how respondents rated their health at the time of the interview on a five-point scale. Respondents were asked how they would rate their health at the present

[2] These are top five leading cause of death besides accident in the U.S. 2006, according to CDC. http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_14.pdf

time. The response categories were as follows: 5=excellent; 4=very good; 3=good, 2=fair; and 1=poor. A higher score indicates better health. This variable will be measured in all four waves.

Physical Limitations. An index of physical limitations will be measured with three variables related to the Rosow-Breslau functional scale for gross mobility. The questions respondents were asked included the following: (1) "Do you currently have any difficulty climbing a few flights of stairs because of your health?" (2) "Do you currently have any difficulty walking several blocks because of your health?" (3) "Would you currently have any difficulty doing heavy work around the house such as shoveling snow or washing walls because of your health?" This variable will be measured in all four waves. The variable does not seem to be associated with the dependent variables, depression and self-rated health, but can be entered into the models if theoretically needed.

Controls.

Age. Age will be measured in years.

Female. Female will be a dummy variable with male equal to 0 and female equal to 1.

Black. Black will be a dummy variable where Black=1 and otherwise=0

Education. Education level will be a continuous measure of highest grade completed.

Household Income. An ordinal household income--a measure containing 10 categories--will be used. The range will be coded as follows: 1=Less than $5,000; 2=$5-$9,999; 3=$10,000-$14,999; 4=$15,000-$19,999; 5=$20,000-$24,999; 6=$25,000-$29,999; 7=$30,000-$39,999; 8=$40,000-$59,999; 9=$60,000-$79,999; 10=$80,000 or more. This variable will be measured in all four waves.

Employment Status. Employment status will be a dummy variable where1=currently employed and 0=not currently employed. This variable will be measured in all four waves.

Cooperation. This item will indicate the degree to which the respondents were cooperative during the interview where 1=poor and 4=excellent.

Fatigue. This item will indicate the degree to which respondents appeared to be tired during the interview where 1=not tired and 3=very tired. This variable will be measured in all four waves.

Attrition. Attrition will be a series of dummy variables that will indicate attrition in each wave. In an effort to classify the attrition pattern (Hedeker and Gibbons 1997), five dummy variables will be used as follows: att1=no attrition across all waves; att2=responded up to Wave 3; att3=completed responses up to Wave 2; att4=responded in Wave 1; att5=intermittently responded.

NRH (Nonresponse Hazard). This variable will be created to adjust for attrition and is entered into a multivariate regression model to adjust for attrition in the longitudinal study.

Methodology

To examine the health implications of social isolation the data will be used in a longitudinal format. The data will be constructed as a long form where each respondent contributes at least one case and up to four cases to the data. Random effects regression models will be used to correct the error clustering resulting from the multiple regression model. Random-effect linear will be used. For the former, this is marked by two-level random-coefficient models with measurement occasions (level-1 units) nested within individual (level-2 units) and is used to predict continuous health outcomes, depression. The formal expression of the equation is:

$$Y_{ij} = \beta_1 + \beta_2 x_{1ij} + \beta_3 x_{2ij} + \ldots + \zeta_j + \varepsilon_{ij}$$

Weighting, Missing Values and Possible Data Attrition Bias

All descriptive statistics reported here are weighted in order to represent U.S. population in 1986. Using weight in ACL is important for at least two reasons: (1) sampling frame and (2) data attrition.

While there is no clear consensus of using weight in multivariate analysis (Winship and Radbill 1994), the ACL data manual advises researchers to use relevant sampling weight as much as possible (House 2007). Thus, I have made effort to follow the guideline.[3]

Longitudinal data often encounters methodological issues from missing values and data attrition especially when a survey is conducted over a long period of time (Musick, Campbell, and Ellison 2001). One of the ways that is proposed to handle attrition in a random-effects model is called a pattern-mixture model (Hedeker and Gibbons 1997). Following the advice from Hedeker and Gibbons, a series of dummy variables will be created to adjust for bias due to missing-data patterns.

In order to address issues of sampling attrition in ACL, a method known as the Heckman-type correction will be employed. Following Umberson and her colleagues (2006), a non-selection-hazard model will be estimated in order to predict those failed to be reach at Wave 4 based on the entire ACL sample over the sixteen-year interval as a function of a number of variables shown to be associated with non-selection risk in a previous study (age, sex, black, income, employment status, depressed symptom, and self-rated health were assessed at based line). This non-selection-hazard variable is used as a covariate in a multivariate model along with a series of dummies from a pattern mixture model.

Results

Focusing on Mediating/moderating Role of Psychosocial Resources in the Relationship between Confidant Isolation and Depressed Symptoms

[3] Applying sampling weight in longitudinal study is not straightforward. Typically a longitudinal study employs multilevel modeling where time points are nested under a subject. Using sampling weight in multilevel asks for a weight for each level. However, the provided sampling weight in each wave in ACL may be only suitable for lower level modeling, thus lacking on higher level weight. To address this issue, a long form data was constructed that represents the sampling frame, which no longer asks for using weight in analyses. Essentially, whole process is a way of replicating the data after bringing the sample to the population using given weight and then random-sample from population with the same sample size of Wave 1.

First, effect of confidant isolation on depression is still significant after controlling for a list of variables such as (a) sociodemographic factors, (b) two types of chronic stressors, and (c) a set of social relationship (coefficient .445 at .001 level). Second, two types of self-concept, or psychosocial resources mediates the effects of isolation on depression where the magnitude of mediation is greater in self-esteem than in mastery. Two resources combined explained more than the half of effect of isolation on depression (from Model 1 to Model 4, the coefficient has dropped from .445 to .214 and significant at .05 level). Third, a sense of mastery moderates the relationship between isolation and depression, but self-esteem does not. The interaction term of isolation-mastery completely explain the effect of isolation on depression (coefficient .139, ns). *[more detailed analyses and discussion will be added later]*

[references will be added later]

Table 1: Descriptive Statistics by Wave								
	Wave 1		Wave 2		Wave 3		Wave 4	
Variables	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Isolation Status								
Confidant Isolation (0-1)	0.12	0.32	0.11	0.31	0.12	0.32	0.12	0.33
Cumulative Confidant Isolation (0-4)	0.12	0.32	0.19	0.39	0.23	0.42	0.26	0.44
Social Relationships								
Structure: Social Integration								
Church Attendance (1-6)	3.31	1.79	3.30	1.82	3.31	1.76	3.33	1.82
Attend meetings (1-6)	2.78	1.80	2.87	1.76	3.01	1.75	3.01	1.83
Volunteer hours (0-240)	31.04	62.83	35.36	66.93	31.14	57.76	35.73	63.32
Community Ties (1-6)	3.04	1.50	3.09	1.48	3.16	1.48	3.17	1.55
Social Networks Ties (1-6)	4.49	1.14	4.51	1.09	4.40	1.05	4.46	1.05
Intimate Ties (0-1)	0.73	0.44	0.73	0.44	0.74	0.44	0.71	0.45
Content: Quality of Support + Feelings of Loneliness								
Positive (1-5)	3.89	0.89	3.88	0.87	4.06	0.85	4.14	0.83
Negative (1-5)	1.78	0.81	1.83	0.81	--	--	--	--
Feelings of loneliness (0-1)	0.05	0.21	0.04	0.20	0.04	0.19	0.04	0.19
Psychological Resources								
Mastery (Standardized)	0.00	1.00	0.05	0.98	0.08	0.94	-0.07	1.02
Self Esteem (Standardized)	0.00	1.00	0.08	0.97	0.16	0.94	0.33	0.88
Chronic Stressor								
Difficulty in Paying Bills (Standardized)	0.00	1.00	-0.09	0.94	-0.05	0.96	-0.23	0.91
Number of Chronic Illness (0-7)	1.02	1.26	1.03	1.28	1.16	1.27	1.19	1.21
Demographics and SES								
Age (in years)	47.06	16.45	--	--	--	--	--	--
Female (0-1)	0.53	0.50	--	--	--	--	--	--
Black (0-1)	0.11	0.31	--	--	--	--	--	--
Education (in years)	12.37	3.14	--	--	--	--	--	--
HH Income (1-10)	5.32	2.58	5.90	2.66	6.69	2.70	7.69	2.69
Employed (0-1)	0.66	0.48	0.67	0.47	0.72	0.45	0.78	0.41
Health Status								
Depression (11-31)	15.33	3.84	15.05	3.74	14.32	3.55	14.40	3.55
Functional Health (1-4)	3.73	0.70	3.73	0.70	3.70	0.76	3.68	0.79
Selfrated Health (1-5)	3.70	1.07	3.52	1.02	3.58	1.02	3.56	1.02
	N=3,617		N=2,858		N=2,195		N=1,677	

Table 2. Random Intercept Models Predicting Depressed Symptoms							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Trend (ref.=Wave 1)							
Wave 2	0.002	-0.023	0.020	-0.002	-0.003	-0.002	-0.003
	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Wave 3	-0.596***	-0.638***	-0.526***	-0.569***	-0.564***	-0.569***	-0.564***
	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
Wave 4	-0.190+	-0.518***	-0.052	-0.314**	-0.311**	-0.315**	-0.310**
	(0.11)	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
Attrition (ref.=completed)							
Up to Wave 3	0.083	0.050	0.038	0.023	0.024	0.022	0.024
	(0.12)	(0.11)	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)
Up to Wave 2	0.145	0.121	0.191	0.165	0.164	0.164	0.165
	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Wave 1 only	-0.032	-0.158	0.160	0.033	0.038	0.033	0.037
	(0.15)	(0.14)	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)
Intermittent	0.732***	0.598***	0.545***	0.485***	0.486***	0.487***	0.485***
	(0.13)	(0.12)	(0.12)	(0.11)	(0.11)	(0.11)	(0.11)
Non Selection Hazard	1.776***	1.354***	1.427***	1.193***	1.204***	1.194***	1.204***
	(0.32)	(0.30)	(0.29)	(0.28)	(0.28)	(0.28)	(0.28)
Functional Health	-0.765***	-0.691***	-0.687***	-0.648***	-0.648***	-0.649***	-0.648***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Demographics and SES							
Age(~)	-0.080***	-0.077***	-0.053***	-0.057***	-0.056***	-0.057***	-0.056***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age squared(~)	0.000*	0.000**	0.000	0.000	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Female	0.739***	0.543***	0.540***	0.438***	0.435***	0.437***	0.435***
	(0.09)	(0.09)	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)
Black	0.130	0.235+	0.325*	0.363**	0.368**	0.363**	0.368**
	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Income(~)	-0.028	-0.011	-0.025	-0.013	-0.012	-0.013	-0.012
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Education	0.064***	0.074***	0.083***	0.087***	0.087***	0.086***	0.087***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Employment(~)	-0.333***	-0.328***	-0.239**	-0.253***	-0.246***	-0.250***	-0.247***
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Chronic Stressor							
Illness(~)	0.326***	0.327***	0.279***	0.287***	0.288***	0.287***	0.288***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Financial concerns(~)	0.694***	0.537***	0.546***	0.460***	0.458***	0.459***	0.459***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Social Relationships							
Structure: Social Ties							
Community(~)	-0.149***	-0.143***	-0.127***	-0.128***	-0.128***	-0.128***	-0.128***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Social Networks(~)	-0.070*	-0.067*	-0.047+	-0.048+	-0.047+	-0.047+	-0.047+
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Intimate (~)	-0.472***	-0.551***	-0.481***	-0.540***	-0.538***	-0.539***	-0.539***
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Content: Quality Support							
Positive(~)	-0.385***	-0.286***	-0.292***	-0.237***	-0.237***	-0.238***	-0.236***
	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Negative1	0.446***	0.313***	0.351***	0.275***	0.276***	0.276***	0.276***
	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Confidant Isolation(~)	0.445***	0.346***	0.214*	0.184*	0.136	0.171*	0.139
	(0.09)	(0.09)	(0.09)	(0.08)	(0.09)	(0.09)	(0.09)
Psychological Resources							
Mastery (~)		-0.865***		-0.621***	-0.596***	-0.621***	-0.594***
		(0.03)		(0.03)	(0.03)	(0.03)	(0.03)
Self-esteem(~)			-1.033***	-0.832***	-0.829***	-0.822***	-0.835***
			(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Isolation x Resources							
Isolation x Mastery					-0.206**		-0.222**
					(0.07)		(0.08)
Isolation x Self-esteem						-0.060	0.033
						(0.07)	(0.08)
Constant	18.417***	18.136***	17.468***	17.468***	17.431***	17.465***	17.429***
	(0.51)	(0.48)	(0.47)	(0.46)	(0.46)	(0.46)	(0.46)
Observations	10,485	10,485	10,485	10,485	10,485	10,485	10,485
Number of groups	3,581	3,581	3,581	3,581	3,581	3,581	3,581
Standard errors in parentheses							
*** p<0.001, ** p<0.01, * p<0.05,							