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SOCIOTROPY, AUTONOMY, DEPRESSION AND SUICIDALITY

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Abstract*:*

The present study was designed to study whether the association between sociotropy and autonomy and nonsuicidal self-harm could be extended to suicidal behavior. The participants were 101 undergraduates enrolled in a psychology course who were administered the Personal Style Inventory (PSI-II), the short form of the Beck Depression Inventory (BDI-13), and two questions about a lifetime history of suicidal ideation and attempts. Scores on measures of sociotropy and autonomy were positively associated. Sociotropy and autonomy scores were positively associated with depression scores, but only defensive separation, a component of autonomy, predicted past suicide attempts.

Beck (1983) proposed two cognitive personality style which he labelled sociotropy and autonomy. Sociotropy was defined as "the person's investment in positive interchange with others," while autonomy was defined as "the person's investment in preserving and increasing his independence, mobility, and personal rights" (Beck, 1983, p. 272). Individuals with the sociotropy personality trait have a strong desire for a positive relationship with others, and their behaviors are aimed at gaining the support and approval of others. Individuals with the autonomy personality trait have a strong desire for independence, and they are highly sensitive to failure and frustration in attempting to achieve the goal (Blatt & Zuroff, 1992).

According to Beck's (1983) cognitive theory, these two personality traits are correlated with an elevated cognitive vulnerability to depression, and several research studies have examined the relationship between sociotropy and autonomy and depression. Some studies have reported a positive association between sociotropy scores and depression, but no association between autonomy scores and depression (Alford & Gerrity, 1995; Gilbert & Reynolds, 1990). In a study of French university students, Husky et al. (2007) found that those with higher sociotropy scores (but not higher autonomy scores) experienced increased depression scores after experiencing negative events. In Spanish adolescents, Calvete (2011) found that sociotropy scores were associated with higher depression scores, mediated by stress and negative inferences about their experiences.

However, other studies have reported a positive association between both sociotropy and autonomy scores and depression. For example, on the Personal Style Inventory (Robins Ladd, et al., 1994), Sato and McCann (2000; 2007) reported that both sociotropy and autonomy scores were associated with scores on the Beck Depression Inventory (BDI) ($r = 0.41$ and $r = 0.34$, respectively). These positive associations were found also in study of Spanish psychology students conducted by Permuy, et al. (2009). Furthermore, Gandhi et al (2016) reported that scores of sociotropy and autonomy were positively associated ($r = 0.44$).

Sociotropy and autonomy personality characteristics increase sensitivity to stressful events, but they can also trigger stressful events, specific interpersonal conflicts, and relationship patterns that influence their depression (Lynch, et al., 2001). Hammen and Shin (2015), Gandhi, et al. (2016), Robins and Luten (1991) reported that a high level of sociotropy can result in depression as a result of loss of important relationships or abandonment. A high level of autonomy can also result in depression as a result of loss of self-worth resulting from personal failures and from an inability to live up to one's standards and expectations. In a study on depressed psychiatric patients, Lynch, et al. (2001) concluded that interpersonal relationships differ in the two personality styles of sociotropy and autonomy in these patients. Sociotropic depressed patients reported their own behavior as demanding and their partner's behavior as withdrawing, whereas autonomous depressed patients reported their partner's behavior as demanding and their own behavior as withdrawing.

Gandhi, et al. (2016) investigated whether sociotropy and autonomy were associated with a lifetime history of non-suicidal self-injury (such as scratching and head-banging) and, in a sample of high school students, found positive associations for both sociotropy and autonomy with a lifetime history of non-suicidal self-injury. O'Keefe, et al. (2016) tested a sample of undergraduate students on three occasions. They found that autonomy at time 1 predicted depression at time 2, and depression at time 2 predicted feelings of perceived burdensomeness and thwarted belongingness at time 3. These latter two traits are postulated to be present in all suicides according to Joiner's (2004) Interpersonal Theory of Suicide. However, O'Keefe, et al. did not study actual suicidal behavior in the sample. In contrast, Park, et al. (2019) found that sociotropy and depression predicted perceived burdensomeness and suicidal ideation in a South Korean sample of undergraduate students.

Given that previous research has reported that sociotropy and autonomy are associated with depression (reviewed above), and given the fact that suicidal individuals are typically depressed, the present study was designed to study whether the findings of Ganghi, et al. (2016) on sociotropy and autonomy and nonsuicidal self-harm (reviewed above) could be extended to suicidal self-harm, that is, suicidal behavior. The present study studied the associations between the scores for sociotropy and autonomy and a lifetime history of suicidal ideation and attempts in a non-clinical sample.

Method

Participants

The participants were 101 undergraduates enrolled in a psychology course at XXX. There were 73 women and 28 men, with a mean age of 21.2 yrs., SD = 3.5, median 20 and range 18-40. Verbal consent was obtained from the students.

Measures

The Personal Style Inventory (PSI-II): The PSI-II, developed by Robins, et al. (1994), has 48 items with two 24-utem scales, one for sociotropy and one for autonomy. The sociotropy scale is made up of three components: concern what others think, dependency, and pleasing others. The autonomy scale is made up of three components: perfectionism/self-criticism, need for control, and defensive separation. Typical items are: sociotropy "I often put other people's

needs before my own" and autonomy "I am easily bothered by other people making demands of me." Each item is answered using a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Robins, et al. (1994) reported that the scale had good factor structure, validity, and reliability (Cronbach's *a*s were 0.88 for sociotropy and 0.86 for autonomy subscales, respectively), results replicated by Damiri, et al. (2014) and by Gandhi, et al. (2016).

The short form of the Beck Depression Inventory (BDI-13): The BDI-13, developed by Beck and Beck (1972), has 13 items and has good concurrent validity (r = 0.94) with the 21-item long form (Beck & Beamesderfer, 1974; Beck, Rial & Rickels, 1974). The 13-items each have four levels of response. A typical item is "I do not feel sad, I feel sad, I am sad all of the time and I can't snap out of it, and I am so sad or unhappy that I can't stand it". Each item is scored on a scale of 0 to 3, giving a total score ranging from 0 to 39. Cronbach alphas were from 0.78 to 0.97 (Beck & Beamesderfer, 1974; Beck et al., 1974), 0.89 to 0.94 (Dadsetan & Mansour, 1990; Rajabi, 2005), and 0.85 (Dadfar & Kalibatseva, 2016). The BDI-13 also has good construct validity (see Dadfar & Kalibatseva, 2016).

The participants were also asked to respond to two questions with yes/no: "I have had thoughts of killing myself in the past" and "In the past, I have attempted suicide". The use of single items in assessment has, in most instances, proved to have concurrent validity (e.g., Abdel-Khalek, 1998), and scales devised to assess suicidal behavior typically use single items to assess suicidal ideation and suicide attempts (e.g., Osman, et al., 2001). Although there have been criticisms of the use of single item questions concerning, for example, suicidal ideation (e.g., Millner, et al., 2015) on the basis that respondents who have related thoughts, but not suicidal thoughts (such as that life is not worth living) will check that they have had suicidal ideation.. There is no evidence for this, and some scales to assess suicidal ideation do include thoughts such as the wish to live and ambivalence (e.g., Beck, et al., 1979).

The questionnaire was administered to the students while in class using a paper-and-pencil format.

Data Analysis

The data were analyzed using means, standard deviations (SDs), Pearson correlation coefficients, and multiple regressions using SPSS-26.

Results

The mean scores, standard deviations and Cronbach alphas for the present sample are shown in Table 1. The Cronbach alps reliabilities were good for the total scores for sociotropy and autonomy, but some of the subscales had low Cronbach alpha reliabilities (the Dependency subscale for sociotropy and the Perfectionism/Self-criticism for autonomy).

Sociotropy and autonomy scores were positively associated (r = 0.49, two-tailed p < .001). A principal components analysis with a varimax rotation identified two factors that matched the two higher level traits (sociotropy and autonomy) as shown in Table 2.

Both sociotropy scores and autonomy scores, as well as all of the subscale scores, were positively and significantly associated with depression scores. Sociotropy and autonomy scores were not associated with a history of suicidal ideation and suicide attempts with one exception. Autonomy scores and, in particular, defensive separation scores, were associated with a history of attempted suicide (see Table 3).

Multiple regressions (Table 4) confirmed these results. depression was predicted by pleasing others, perfectionism/self-criticism and defensive separation, as well as age. Lifetime suicidal ideation was predicted only by age and perfectionism/self-criticism. Lifetime attempted suicide was predicted by age, concern with what others think, pleasing others and defensive separation.

Discussion

As has been reported in previous research, sociotropy and autonomy scores were positively associated. Thus, these two traits are not opposite poles of a single dimension. Furthermore, the associations of both sociotropy and autonomy scores with depression scores indicates that higher levels of both traits are pathological. The association of sociotropy and autonomy with depression is consistent with previous research (Robins et al., 1994; Fresco et al., 2001; Iacoviello et al., 2009; Sutton et al., 2011), although some studies report that only sociotropy is associated with depression (Bakhshani, 2007; Beck et al., 2003; Fistikci et al., 2015; Moree & Blackburn, 1994; Sahin et al, 1993; Sato & McCann, 2000; Sato, 2003; Sohlberg et al., 2006).

Lifetime suicidal ideation was predicted perfectionism/self-criticism, a component of autonomy. Lifetime attempted suicide was predicted by concern with what others think and pleasing others (components of sociotropy) and by defensive separation, a component of autonomy.

Lester (1969), in a study of undergraduate students with a history of suicidal ideation and attempts, found that they resented those upon whom they depended whereas non-suicidal students did not resent those upon whom they depended. Lester suggested that, when suicidal students are in a crisis, they are deterred from seeking help from friends and family because of this resentment felt toward those friends and family members. In the present study, keeping distance from others as a defensive style, a style which resembles the state described by Lester, might also prevent suicidal individuals from seeking help from potential resources when they are in crisis.

These present findings are limited by a cross-sectional design rather than a predictive design, and the use of a non-clinical sample of college students with a limited age range and a preponderance of female participants. However, the results suggest the usefulness of exploring the relevance of the constructs of sociotropy and autonomy in understanding depressed and suicidal patients. In addition, it may be that those individuals with suicidal ideation may differ in characteristics from those who attempt suicide, although they may be overlapping populations (May & Klonsky, 2016). However, all those who attempt suicide must have had suicidal ideation prior to their attempt.

Conclusion

In this study of university undergraduates, both sociotropy and autonomy scores contributed to the prediction of depression scores, along with age. Sociotropy and autonomy were less strongly associated with and predictive of a lifetime history of suicidal ideation and attempted suicide. Only pleasing others, a component of sociotropy, predicted past suicide attempts.

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TABLE 1 Mean scores and reliabilities for the measures

	Mean	SD	range	Cronbach alpha
Sociotropy	93.40	19.22	50-135	0.894
Concern what others think	24.33	7.68	9-38	0.850
Dependency	19.89	5.19	`0-33	0.526
Pleasing others	30.41	9.43	11-51	0.836
Autonomy	85.10	16.20	51-129	0.857
Perfectionism/Self-criticism	11.93	4.07	4-21	0.542
Need for control	28.52	6.00	15-43	0.696
Defensive separation	42.53	9.51	17-60	0.797
BDI-13	5.06	4.89	0-20	0.864
	% yes			
Past suicidal ideation	39%			
Past suicide attempts	12%			

TABLE 2: Factor analysis of the six subscales in the PSI

	Factor 1	Factor 2
Sociotropy		
Concern what others think	+0.81	+0.36
Dependency	+9.84	-0.04
Pleasing others	+0.79	+0.33
Autonomy		
Perfectionism/Self-criticism	+0.46	+0.66
Need for control	+0.42	+0.70
Defensive separation	-0.06	+0.91
Eigenvalues	3.26	1.12
% variance	54.28%	18.58%

TABLE 3 Correlations between scores for depression, suicidality, sociotropy and autonomy

	suicidal ideation	attempted suicide	depression
Sociotropy	+0.07	+0.08	+0.40***
Concern what others think	+0.07	-0.04	+0.35***
Dependency	+0.02	+0.04	+0.24*
Pleasing others	+0.09	+0.16	+0.37***
Autonomy	+0.17	+0.23*	+0.52***
Perfectionism/Self-criticism	+0.18	+0.09	+0.46***
Need for control	+0.12	+0.11	+0.41***
Defensive separation	+0.15	+0.28**	+0.43***

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

TABLE 4 Multiple regression

	depression (betas)	suicidal ideation B (se)	attempted suicide B (se)
Age	+0.212*	+0.197 (0.102)#	+0.328 (0.133)*#
Sex	-0.087	-0.684 (0.529)	-0.890 (1.156)
Sociotropy			
Concern what others	-0.015	-0.033 (0.048)	-0.145 (0.081)#
Dependency	+0.104	+0.000 (0.053)	+0.064 (0.092)
Pleasing others	+0.161#	+0.017 (0.036)	+0.162 (0.071)*#
Autonomy			
Perfectionism	+0.227#	+0.114 (0.079)#	-0.003 (0.122)
Need for control	+0.061	+0.016 (0.052)	-0.017 (0.087)
Defensive sep	+0.213#	-0.003 (0.030)	+0.085 (0.054)#

* p < .05
# significant in a backward multiple regression

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THE EFFECT OF CULTURE ON SURVIVING A SUICIDE ATTEMPT: A BRIEF NOTE ON BYSTANDER RESPONSES

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Abstract: Observation of suicide attempts in by drowning in Kashmir show that bystanders (primarily men) are more likely to try to save women who attempt suicide by drowning than they are to save men who attempt suicide in this way.

It is well documented that men die by suicide at higher rates than do women, whereas women attempt suicide (and survive) more than do men. The best study on this was done by Farberow and Shneidman (1961). They recorded all of the suicides in Los Angeles in 1957, and they also made an effort to track down all attempted suicides. The attempted suicides who never required medical attention were uncounted, but all of those who contacted medical and rescue services were counted. Their data are:

	Males	Females
Suicides	540	228
Attempted suicides	828	1824

This sex difference was not solely determined by choice of method (more lethal versus less lethal). For each method of suicide, the men died more often.

This difference is sometimes attributed to suicidal intent. Perhaps women, in general, have less suicidal intent in their suicidal actions than do men? Women are more likely to choose less lethal methods for suicide (such as the use of solid and liquid substances) whereas men are more likely to choose more lethal methods for suicide (such as firearms). Hover, given the choice of method, is there a difference by sex. For example, for those using firearms for suicide, men are more likely o shoot themselves in the head whereas women are more likely to shoot themselves in the body and, therefore, survive (Lester, 1969).

What about other methods for suicide? Mao and Lester (2010) studied 321 suicides in China who jumped to their deaths and found no significant differences in the heights from which they jumped. Similarly, Lester (2003) found no differences in the height from which a small sample of suicides in India jumped. However, what is required for a methodologically sound study is a sample that includes attempted suicides in addition to suicides.

In Kashmir, suicide by drowning in rivers is often used by suicides. When women attempt suicide by this method, many bystanders jump in to rescue them. In contrast few, if any, people try to rescue men who jump into rivers. This difference in bystander reactions to suicidal behavior may apply to other methods for suicide. Why might this be?

Sexual behavior and physical contact between men and women is strictly prohibited in Kashmir prior to marriage, and marriage for men takes place at about the age of 30. Therefore, any legitimate way to have physical contact with a woman is welcome to men in this society (such as sitting next to a woman on a bus). Women, in general in Kashmir, receive more attention and, when help or assistant is required, women are more likely to receive assistance. For example, it is easier for women than for men to get lifts from car drivers.

The responses to suicide attempts in public by bystanders vary. For example, occasionally, they urge someone threatening to jump to do so, and they may applaud, for example in 2018 in China when the crow urged a 19-year-ol female to jump. Mann (1981) noted that reactions vary. Sometimes the crowd urges the individual to jump, but sometimes they applaud when the man is talked down, as they did when Muhammad Ali talked a man down on January 19, 1981, in Los Angeles.

Mann studied this by collecting cases of threatened or actual jumping and noted that baiting was rare. Only 17% of the fifteen cases with crowds involved baiting. Mann also noted that the crowd's anger was genuine and not mock serious. In one case, the crowd jeered when the man was rescued and threw stones and debris at the rescue squad. Baiting was more likely with large crowds (three hundred or more) suggesting that large crowds facilitate feelings of anonymity and diminished self-awareness. Baiting was also more common in evening and night incidents. Baiting was more common if the individual was lower (on or below the twelfth floor), the reverse of Mann's prediction. He felt that the lower the jumper, the less dehumanization would occur. Baiting was also more common in the incidents that lasted longer (more than two hours) suggesting the role of boredom in the reactions of the bystanders. Mann did not study impact of the sex of the suicidal individual.

Future research should examine further the sex differences in bystander behavior for suicide attempts in public, and also whether a sex difference in bystander behavior is found in other situations.

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WARNING SIGNS FOR SUICIDE: AN ANALYSIS BY ETHNICITY, SEX AND AGE

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Abstract: Six of the IS PATH WARM signs for predicting suicidal ideation were tested using a data base of 30,778 Americans. The six signs were significant predictors of suicidal ideation for women and for European Americans. They were least successful for Native American and Asians Americans and for those over the age of 65. It would be useful to devise warning signs tailored for specific groups of the population.

The American Association of Suicidology (www.suicidology.org) has posted ten warning signs for assessing immediate suicidal risk, known by the mnemonic IS PATH WARM (Juhnke, et al., 2007). IS PATH WARM stands for: Suicide **I**deation, **S**ubstance abuse, **P**urposelessness, **A**nger, **T**rapped, **H**opelessness, **W**ithdrawal, **A**nxiety, **R**ecklessness, and **M**ood change.

Seven of these risk factors are represented in the National Survey on Drug Use and Health (NSDUH) of 2009, a survey in the USA of 37,933 respondents aged 18 years or older: suicide ideation, substance abuse, anger, hopelessness, withdrawal, anxiety, and recklessness. (Purposelessness, trapped and mood change were not assessed by the NSDUH survey.) In logistical regressions, Gunn, Lester and McSwain (2011) found that anger, hopelessness, withdrawal, alcohol abuse and recklessness distinguished those who had suicidal ideation in the past year from those with no suicidal ideation, while only anger distinguished suicidal ideators who had attempted suicide in the past year from ideators who had not.

The sample in the NSDUH comprises people of varying sex, age and ethnicity, and the present study was designed to explore the generality of the signs for suicide in these different demographic groups.

Method

Participants and Procedure

The participants for this study were gathered from the 2009 National Survey on Drug Use and Health (NSDUH). The NSDUH dataset is collected with the primary purpose of investigating the prevalence and correlates of drug use in the United States. Qualified participants for the 2009 NSDUH had to be noninstitutionalized civilians, aged 12 years of age or older. The sample consisted of 30,778 participants.

In order to test the effectiveness of the IS PATH WARM warning signs of suicidal behavior, subjects who had reported having suicide ideation in the past year were compared to subjects who had reported not having suicide ideation in the past year. Of the IS PATH WARM warning signs for suicidal behavior, substance abuse, anger, hopelessness, withdrawal, recklessness, and anxiety were present in the NSDUH dataset, leaving purposelessness, trapped and mood change left out of this study.

Variables

Suicidal Ideation and Behavior: Participants were asked: (1) During the past 12 months, did you try to kill yourself?" and (2) "At any time in the past 12 months, did you seriously think about trying to kill yourself? The answers to these variables were coded as yes versus no. There were too many missing data points for attempted suicide, and so this report is restricted to predicting suicidal ideation.

Substance Abuse: Alcohol and drug abuse were diagnosed as present versus absent according to DSM-IV-R by the staff conducting the survey.

Aggression: Participants were asked, "During the past 12 months, how many times have you attacked someone with the intent to seriously hurt them?" Participants who reported not having attacked someone in the past year were coded as having no aggression present and those who reported have attacked someone in the past year, regardless of how many times, were coded as having aggression present.

Hopelessness: Participants were asked, "During the past 30 days, how often did you feel hopeless?"– Participants who responded that they had felt hopelessness "none of the time" were coded as having no hopelessness present, while subjects who responded they felt hopelessness "a little of the time", "some of the time", "most of the time", or "all of the time" were coded as having hopelessness present.

Withdrawal: Participants were asked, "During that one month when your emotions, nerves or mental health interfered most with your daily activities, how much difficulty did you have in participating in social activities, like visiting friends or going to partiers?" This was recoded from a 10-category variable to a dichotomous variable. Subjects who responded "no difficulty", "mild difficulty", "moderate difficulty", or "severe difficulty" were coded as having no withdrawal present, as these subjects participated, even with difficulty. Subjects reporting that they had not participated in social events at all were coded as having withdrawal present.

Anxiety and Depression: Participants were asked whether a doctor or other medical professional had told them in the past 12 months that they had an anxiety disorder or depression.

Recklessness: Recklessness was assessed by the question, "How often do you like to test yourself by doing something a little risky?" Subjects who responded "never" were coded as not having recklessness present, whereas subjects who responded "seldom", "sometimes", or "always" were coded as having recklessness present.

Demographic variables: The sex and race of the participants were noted.

Data Analysis

The data were examined using SPSS. A binary logistical regression model was used to determine the power of aggression, anxiety, hopelessness, depression, social withdrawal, recklessness, substance abuse (both alcohol and illicit) to predict suicidal ideation

Results

Predictors by Sex

The results of the logistic regressions are shown in in Table 1. It can be seen that all of the predictive signs contributed significantly to the prediction of suicidal ideation. However, looking at the results by sex, alcohol abuse no longer contributed significantly to the prediction of suicidal ideation for men while still being statistically significant for women.

Predictors by Ethnicity

Similar results were found by ethnicity. Alcohol and drug abuse, while significant predictors for European Americans, did not contribute to the prediction of suicidal ideation for African Americans, and alcohol abuse did not contribute significantly for Hispanic Americans. The sample sizes for Asian Americans and Native Americans were relatively small, but again the number of significant predictors was reduced for these two ethnic groups. For Asian Americans, only aggression, hopelessness and alcohol abuse predicted suicidal ideation, and only withdrawal and hopelessness for Native Americans.

Predictors by Age

By age, for the youngest respondents (aged 12-19 and 20-34), alcohol abuse did not play a role in predicting suicidal ideation. In fact, alcohol abuse played a role only for those 35-49 years of age. On the other hand, drug abuse was a significant predictor for those aged 12-19 and 20-34 years of age. For the elderly respondents (65 years of age and older), data were missing for several variables (drug abuse and aggression), reducing the available predictive signs. For these elderly respondents, only hopelessness proved to be a significant predictor of suicidal ideation.

Discussion

It can be seen that the predictors of suicidal ideation were most successful for predicting suicidal ideation for the total sample, for women and for European Americans. Both alcohol abuse and drug abuse were often non-significant in the regression equations. The warning signs were less successful for predicting suicidal ideation in Native Americans and Asian Americans, and also for those 65 years of age and older, but the sample sizes for these group were small.

The results of the present study suggest that it would be useful to identify warning signs for suicide specifically tailored for different ethnic groups and those of different ages.

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Table 1: Predicting suicidal ideation with the IS PATH WARM signs

	All Ss (n=30,778)	
	B	SE
Aggression	0.86***	0.085
Withdrawal	1.22***	0.081
Reckless	0.52***	0.056
Hopelessness	2.07***	0.067
Alcohol abuse	0.22**	0.079
Drug abuse	0.68***	0.132

	Males (n=13,768)		Females (n=17,010)	
	B	SE	B	SE
Aggression	0.54***	0.129	1.21***	0.117
Withdrawal	1.30***	0.139	1.16***	0.101
Reckless	0.42***	0.094	0.61***	0.070
Hopelessness	1.96***	0.095	2.15***	0.094
Alcohol abuse	0.11	0.113	0.41***	0.113
Drug abuse	0.76***	0.168	0.60**	0.217

	European Americans (n=20,001)		African Americans (n=3,651)	
	B	SE	B	SE
Aggression	0.86***	0.118	0.94***	0.194
Withdrawal	1.33***	0.103	1.17***	0.227
Reckless	0.53***	0.075	0.33*	0.145
Hopelessness	2.19***	0.085	1.75***	0.179
Alcohol abuse	0.22*	0.097	0.37	0.248
Drug abuse	0.67***	0.163	0.60	0.440

	Native Americans (n=423)		Asian Americans (n=1,208)	
	B	SE	B	SE
Aggression	-0.52	0.776	1.46**	0.540
Withdrawal	1.15*	0.587	0.82	0.515
Reckless	0.73	0.382	0.48	0.282
Hopelessness	1.37***	0.416	2.33***	0.435
Alcohol abuse	-1.33	0.774	0.94*	0.412
Drug abuse	1.28	0.748	-0.16	1.110

* $p < .05$
** $p < .01$
*** $p < .001$

	Hispanic Americans (n=4,414)	
	B	SE
Aggression	0.85***	0.212
Withdrawal	1.08***	0.208
Reckless	0.55***	0.139
Hopelessness	1.91***	0.181
Alcohol abuse	0.18	0.227
Drug abuse	0.90**	0.345

	Age 65+ (n=1,428)		Age 50-64 (n=2,562)	
	B	SE	B	SE
Aggression	-		1.78**	0.663
Withdrawal	-0.05	0.75	0.85**	0.320
Reckless	0.23	0.39	0.57**	0.203
Hopelessness	1.52***	0.39	1.61***	0.220
Alcohol abuse	0.88	1.07	0.52	0.462
Drug abuse	-		0.82	0.835

	Age 35-49 (n=6,026)		Age 20-34 (n=16,160)	
	B	SE	B	SE
Aggression	0.81*	0.344	1.07***	0.11
Withdrawal	1.73***	0.162	1.15***	0.11
Reckless	0.62***	0.119	0.45***	0.08
Hopelessness	2.31***	0.155	2.12***	0.10
Alcohol abuse	0.46*	0.212	0.13	0.10
Drug abuse	0.25	0.511	0.64***	0.18

	Age 12-19 (n=4,602)	
	B	SE
Aggression	0.36*	0.17
Withdrawal	1.20***	0.24
Reckless	0.50***	0.14
Hopelessness	1.93***	0.15
Alcohol abuse	0.31	0.17
Drug abuse	0.79***	0.22

* $p < .05$
** $p < .01$
*** $p < .001$

Suicide Studies, 2022, 3(4), 18-22.

EXERCISE AND SUICIDAL BEHAVIOR IN LGBTQ+ YOUTH

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Abstract: In a study of one American state in one year, using data from the biannual Youth Risk Behavior Survey (YRBS) of youths aged 12-18, exercise was found to be a risk factor for homosexual youths but a protective factor for bisexual youths.

Over 47,000 people died from suicide in the United States in 2019, at a rate of 14.5 per 100,000 per year (Draper & McIntosh, 2020). Some groups are the focus of special concern (such as the elderly and middle-aged men), and one group considered to be at risk for suicide is the Lesbian-Gay-Bisexual (LGBTQ+) community. It has been well documented that suicidal behavior, both lethal and non-lethal, is more common in those who are LGBTQ+ (e.g., Ream, 2020).

Ed Gallagher, a former tackle with the University of Pittsburgh football team, made a near-fatal suicide attempt when he jumped from a dam (Anon, 1998). His suicide attempt occurred 12 days after his first sexual encounter with another man. Although Gallagher survived the attempt, he was left a paraplegic. After his suicide attempt, he spoke of how, prior to jumping from the dam, he was unable to accept that he was an athlete with homosexual urges, but that afterwards he was able to accept his sexuality.

There are many possible risk factors for suicidal behavior in LGB adolescents, including attitudes against help-seeking, peer victimization, depressive symptoms and drug use (Hatchel, et al., 2019). As members of a minority group, LGB adolescents may experience stress. For example, Meyer (1995) examined the role of minority stress on the mental health of gay men. Minority stress is defined by the author as “psychosocial stress derived from minority status” (p. 38). Meyer examined three processes involved in minority stress. The first, internalized homophobia, refers to the internalization of societal anti-homosexual attitudes, and this occurs prior to self-awareness of one’s sexuality. Second is the perception of stigma associated with being a homosexual. Finally, there is discrimination and violence. Meyer hypothesized that each of these processes would cause distress, and that the level of stigma and prejudice would be related to the level of internalized homophobia.

The process of coming out may also be stressful for adolescents, especially coming out to an athletic group (McDaniel, et al., 2001). Roper and Halloran (2007) noted a significant amount of homophobia at the university level, consisting of physical and verbal assaults, verbal harassment, and threats, and they investigated the attitudes of male and female heterosexual athletes towards gay men and lesbians. They found that heterosexual male athletes held more negative views regarding gay men and lesbians (with their views towards gay men being more negative than their views towards lesbians).

Contrasted with the stress that LGBTQ adolescents may experience in general, and even more in an athletic environment, participation in physical activities and in sports has been shown to be a protective factor for suicidal behavior. Lester and Pompili (2013) reviewed the research on whether participation in sports activities is associated with better psychiatric health in school children and, on the whole, the evidence indicated that it is. For example, Oler, et al. (2011) gave a depression inventory to 823 high students in a high school in Kentucky and found that those participating in school athletic teams were less depressed (and had less lifetime suicidal ideation and had made fewer suicide attempts). At the college level, Armstrong and Oomen-Early (2009) compared athletes in NCAA teams at one university with non-athletes and found that the athletes had higher scores on measures of self-esteem and social connectedness and lower scores on a measure of depression.

The present study sought to explore whether participation in physical activities by LGB youths was a risk factor for suicide behavior or a protective factor.

Method

The government conducts a biannual survey of youths in the USA called the Youth Risk Behavior Survey (YRBS) (www.cdc.gov/healthyyouth/yrbs). Questions on sexual orientation have not been included in the YRBS but, in one year in the 1990s, one state included a question on sexual orientation. That state provided us with their data for the present study. Of the total sample of 4,159 adolescents aged 12 to 18, 3,458 identified themselves as heterosexual, 78 as bisexual, 23 as gay or lesbian, and 600 had missing data (see Table 1).

Questions in the YBRS asked how many days in the past week the student had exercised hard each week, did toning/stretching exercises, walked/bicycled for 30 minutes, and attended physical education classes. Regarding suicidal behavior, the students were asked whether, in the past year, they had considered suicide, planned to attempt suicide, and attempted suicide. Regarding the suicide attempts, the students were also asked how many times and whether they needed treatment for the suicide attempt.

Results

Table 2 shows the prevalence of suicidal behavior in the sample. Suicidal ideation, planning a suicide attempt, and suicide attempts were significantly more often reported by the homosexual and bisexual youths. As for exercise, Table 3 shows that heterosexual youths exercised significantly more often than homosexual and bisexual youths, but did not differ in stretching, walking/cycling and attending physical education classes.

In order to examine the association between physical activity and suicidal behaviors, the number of days for exercise, stretching, walking and attending physical education classes were summed to provide a single score. This scored was correlated (using point-biserial correlations) with suicidal ideation, planning an attempt, and one or more attempts in the last 12 months. The correlations with suicidal ideation and planning an attempt were non-significant. For making a suicide attempt, the correlations +0.033 (not significant) for the heterosexual youths, -0.346 ($p < .01$) for the bisexual youths and +0.594 ($p < .05$) for the gay and lesbian youths. The scores for each group are shown in Table 4.

Discussion

The present study is based on the biannual Youth Risk Behavior Survey (YRBS) survey in the United States in which one state in one year included a question about sexual orientation. The homosexual and bisexual youths reported more recent suicidal behavior (both ideation and attempts) than did the heterosexual youths. The amount of exercise engaged in each week was not associated with suicide attempts in the heterosexual youths, acted as a protective factor for the bisexual youths and a risk factor for the homosexual youths. Of course, using these data from the YRBS survey, it is not possible to determine whether the homosexual youths had revealed their sexual orientation to their peers or hiding their sexual orientation, a decision which might have an impact on these results. Clearly further research is warranted on these associations, as well as extending the research to participation in NCAA sports.

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Table1: The sample by sex and sexual orientation

	Heterosexual	Bisexual	Gay/Lesbian	not sure	none of the above
Females (n=1887)	1726	33	8	41	84
Males (n=1883)	1727	44	20	22	70

$X^2 = 21.14$, df=4, p<.001

Table 2: Suicidal behavior and sexual orientation

Suicide	Heterosexual	Bisexual	Gay/Lesbian	X^2 (df=2)	p
Total Sample					
Ideation	24.7%	48.1%	33.3%	30.35	< .001
Plan attempt	17.7%	42.1%	20.0%	29.62	< .001
Attempt	8.7%	33.3%	31.6%	56.09	< .001
Males					
Ideation	18.0%	52.3%	27.8%	33.61	<.001
Plan attempt	12.8%	44.2%	17.6%	35.25	<.001
Attempt	5.0%	40.0%	31.2%	91.77	<.001
Females					
Ideation	31.3%	51.5%	66.7%	7.78	.02
Plan attempt	22.7%	30.4%	33.3%	5.30	.07
Attempt	12.3%	22.2%	33.3%	3.62	n.s.

Table 3: Exercise and sexual orientation

Exercise:	Heterosexual	Bisexual	Gay/Lesbian	F	df	p
Total Sample						
Exercise	4.65 (2.48)	3.66 (2.56)	3.23 (2.45)	9.16	2/3459	< .001
Stretching	3.62 (2.44)	3.07 (2.30)	2.81 (2.91)	2.93	2/3451	n.s.
Walk/cycle	3.47 (23.49)	3.07 (2.17)	3.00 (2.35)	1.26	2/3374	n.s.
PE	3.07 (1.50)	3.13 (1.74)	2.95 (2.07)	0.11	2.3410	n.s.
Males						
Exercise	5.21 (2.45)	3.78 (2.59)	3.16 (2.50)	12.14	2/1731	<.001
Stretching	3.95 (2.45)	2.20 (2.40)	2.72 (1.87)	4.05	2/1729	=.02
Walk/cycle	3.45 (2.57)	2.95 (2.14)	2.89 (2.18)	1.18	2/1687	n.s.
PE	3.09 (1.57)	3,34 (1.87)	2.81 (2.04)	0.75	2/1704	n.s.
Females				t-test		
Exercise	4.09 (2.39)	3.58 (2.54)		1.18	df=1178	n.s.
Stretching	3.29 (2.38)	2.94 (2.22)		0.83	df=1712	n.s.
Walk/cycle	3.48 (2.42)	3.22 (2.27)		0.56	df-1678	n.s.
PE	3.05 (1.43)	2.80 (1.56)		0.94	df=1695	n.s.

Table 4: Total exercise score and suicide attempts

		n	Mean (SD)	t	df	p
Heterosexual youths						
	Attempt	253	15.45 (6.37)	1.82	2971	.07
	No attempt	2720	15.74 (5.92)			
Bisexual youths						
	Attempt	18	10.22 (5.41)	2.81	58	<.01
	No attempt	42	15.02 (6.31)			
Gay/Lesbian youths						
	Attempt	6	6.55 (2.67)	2.76	14	.015
	No attempt	10	4.54 (1.44)			

Social Studies, 2022, 3(4), 23-24

Erratum Re.

BODY MASS INDEX, ECTOMORPHY, AND SUICIDALITY: RESULTS FROM THE 2009 YOUTH RISK BEHAVIOR SURVEY

David Lester &John F. Gunn III
Published in: Suicide Studies, 20201, 2(3)

Table 2 was mislabeled, and Table 3 was omitted. The correct tables are:

Table 2: BMI scores and suicidality by age and sex

	Attempted suicide			Suicidal ideation		
	No	Yes	t	No	Yes	t
Females						
Age:						
14	.2160 (.0171)	.2123 (.0187)	1.80	.2158 (.0172)	.2135 (.0178)	1.54
15	.2129 (.0174)	.2118 (.0179)	0.56	.2132 (.0172)	.2106 (.0185)	2.39*
16	.2114 (.0175)	.2061 (.0214)	3.60***	.2111 (.0176)	.2083 (.0196)	2.67**
17	.2098 (.0176)	.2042 (.0206)	3.60***	.2100 (.0176)	.2046 (.0203)	5.06***
18+	.2073 (.0189)	.1998 (.0216)	3.10**	.2071 (.0190)	.2024 (.0212)	2.27**
Males						
Age:						
14	.2140 (.0188)	.2144 (.0204)	0.10	.2141 (.0192)	.2150 (.0210)	0.34
15	.2115 (.0186)	.2108 (.0186)	0.28	.2113 (.0184)	.2102 (.0193)	0.76
16	.2082 (.0187)	.2100 (.0178)	0.84	.2081 (.0186)	.2086 (.0181)	0.33
17	.2053 (.0183)	.2079 (.0169)	1.24	.2053 (.0181)	.2062 (.0190)	0.69
18+	.2029 (.0189)	.1996 (.0217)	1.16	.2023 (.0192)	.2046 (.0192)	1.24

* two-tailed $p < .05$
** two-tailed $p < .01$
*** two-tailed $p < .001$

Table 3: Ectomorphy scores and suicidality by age and sex

	Attempted suicide			Suicidal ideation		
	No	Yes	t	No	Yes	t
Females						
Age:						
14	0.4224 (.0237)	0.4165 (.0262)	2.07*	0.4220 (.0239)	0.4186 (.0247)	1.64
15	0.4188 (.0245)	0.4174 (.0252)	0.52	0.4191 (.0243)	0.4153 (.0253)	2.63**
16	0.4170 (.0249)	0.4089 (.0230)	3.90***	0.4165 (.0253)	0.4128 (.0272)	2.45*
17	0.4153 (.0248)	0.4074 (.0283)	3.59***	0.4155 (.0249)	)0.4080 (.0279)	4.99***
18+	0.4118 (.0268)	0.4014 (.0291)	3.08**	0.4116 (.0271)	0.4045 (,0292)	3.08**
Males						
Age:						
14	0.4280 (.0262)	0.4298 (.0269)	0.38	0.4281 (.0269)	0.4296 (.0277)	0.39
15	0.4265 (.0260)	0.4261 (.0283)	0.13	0.4254 (.0282)	0.4262 (.0257)	0.39
16	0.4237 (.0265)	0.4250 (.0251)	0.41	0.4235 (.0265)	0.4238 (.0258)	0.14
17	0.4209 (.0262)	0.4246 (.0247)	1.26	0.4208 (.0259)	0.4225 (0.276)	0.94
18+	0.4178 (.0271)	0.4117 (.0349)	1.49	0.4171 (.0275)	0.4191 (.0289)	0.74

* two-tailed $p < .05$
** two-tailed $p < .01$
*** two-tailed $p < .001$

Suicide Studies, 2022, 3(4), 25-30

PREDICITNG SUICIDALITY IN EGYPTIAN UNIVERSITY STUDENTS

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Abstract: In a sample of Egyptian university students, measures of love of life, self esteem and positive and negative affect predicted suicidality. The scales performed better for Egyptian women than for Egyptian men, and better for past suicidal ideation than for past suicide attempts. It was proposed that counselors should monitor their clients' mental state each session using scales with a positive outlook on life (such as love of life) than scales with a negative outlook on life (such as depression).

A great deal of research has been conducted to explore whether standardized psychological scale can predict suicidal ideation and behavior. Most of the research is conducted in Western countries. The present study explored whether psychological scales can predict suicidal ideation and behavior in an Arab sample and whether there were sex differences in the prediction. The following constructs were used.

Love of life (LOL) is a positive evaluation of one's own life, and involves holding on strongly to life, grasping at life, having a pleasurable attachment to life, and having an appreciation for life (Abdel-Khalek, 2007). Significant positive associations have been reported between LOL scores and happiness, life satisfaction, mental health physical health, self-esteem, optimism, hope, emotional intelligence, general self-efficacy, social support and religiosity, in addition to negative associations between LOL and neuroticism, anxiety, depression, suicide ideation, pessimism, somatic symptoms, and hopelessness (e.g., Abdel-Khalek, 2007; Abdel-Khalek & Lester, 2012).

Self-esteem stands out as an important topic in psychology since its introduction by William James (1890/1983). Many studies have identified self-esteem as an important determinant of, and highly correlated with emotional well-being, mental health, happiness, and optimism (Abdel-Khalek, 2007; Baumeister et al., 2003).

Positive affect and negative affect are two broad, general factors that have emerged reliably as the dominant dimensions of emotional experience, and the Positive Affect and Negative Affect Schedule (PANAS) is one of the measures in this domain (Watson & Clark, 1994).

The present study was designed to explore whether scores on these scales could predict suicidal ideation and behavior in male and female university students.

Method

Participants

A convenience volunteer sample (141 men; 168 women) took part in the present study, with M_{age} = 20.41 (*SD* = 2.55) for men, and M_{age} = 20.97 (*SD* = 2.63) for women. All were Egyptian undergraduates enrolled in different departments and colleges at the University of Alexandria, Egypt. Inclusion criterion was willingness of the student to participate.

Questionnaires

Four assessment instruments were used.

The Love of Life Scale (LOL scale)

The LOL scale (Abdel-Khalek, 2007) was written originally in Arabic and has equivalent English, Persian and Turkish versions. A typical item is: "There are many things that make me love life".

The Self-esteem Scale (SES)

Rosenberg (1989) has defined self-esteem as a favorable or unfavorable attitude toward oneself. The SES was originally designed to assess adolescent global feelings of self-worth or self-acceptance. Because of problems in the translated versions of the SES (Cheng & Hamid, 1995), as well as problems in understanding the double negatives (Carver & Scheier, 2000, p. 47; Schiriesheim & Hill, 1981), the five negatively-worded items of the SES were changed to affirmatively-worded ones in the present Arabic version.

The Positive and Negative Affect Schedule (PANAS)

The short version of the PANAS (Watson et al., 1988) was used. It consists of two separate scales: Positive Affect and Negative Affect. The PANAS was translated into Arabic by the first author.

Suicidal Behavior Scale (SBS)

The SBS assesses the thoughts, cognitions and intentions to commit suicide. The items are answered 1 no, 2 sometimes and 3 yes.

1- I've thought to end my life.
2- I've threatened someone that I will kill myself.
3- I tried to commit suicide.
4- I thought about killing myself.
5- I wished I were dead.

This scale was developed by the first author (unpublished). A principal components factor analysis with a varimax rotation for the present sample identified a single factor with factor loadings all greater than 0.68.

Procedure

The four questionnaires were administered anonymously to undergraduates in their classrooms during university hours. All students were volunteers. The testers were MA and Ph.D. candidates. The issues of informed consent, confidentiality and privacy were stipulated. Testing was conducted in the second semester of the academic year 2020-2021 during the Covid-19 pandemic.

Statistical analysis

The data were analyzed using SPSS-27.

Results

Table 1 presents the main psychometric characteristics of the study's scales. The scales had good Cronbach alpha validity. Table 2 indicates that men obtained higher mean scores for self-esteem and positive affect whereas the women had higher scores for negative affect and suicidality.

The ability of the scale scores to predict past suicidality (the total SBS score) is shown in Table 3. The scale scores were more successful in predicting past suicidality in the women than in the men as shown by the R^2 values and the number of significant predictors.

In terms of predicting past suicidal ideation versus past suicide attempts, the women were less likely to respond *never* to four of the five SBS items (see Table 4). For predicting past suicidal ideation (Table 5) and past suicide attempts (Table 6), the scale scores were less successful in predicting suicidality for men than for women, and, for women, the R^2 values were higher for predicting past suicidal ideation than for past suicide attempts/

Discussion

The results of the present study show that psychological self-report scales are more successful in predicting suicidal ideation and behavior in Egyptian women as compared to Egyptian men. It may well be that, in Egyptian culture, men are less willing to admit negative thoughts and emotions on questionnaires (or even to themselves).

More interestingly, Lester (2021) noted that labelling some variables as risk factors for suicide while others are labelled as protective factors may be less useful than it appears. For a hopelessness scale, for example, a high score is a risk factor and a low score a protective factor. For an optimism scale, a high score is protective factor whereas a low score is a risk factor. The present study showed that love of life and self-esteem (protective factors for suicide) contributed to the prediction of suicidality, along with negative affect. This suggests that, in psychotherapy, rather than a counselor administering, say, a depression scale before each session, the counselor could administer a love of life scale in order to monitor the client's mental state, and this would set a more positive tone to the counseling.

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Table 1. Psychometric properties of the scales.

Scales	No. of items	Response format	Range of scores	Cronbach alpha
1. Love of life	16	1-5	16-80	.71
2. Self-esteem	10	1-5	10-50	.72
3. Positive affect	10	1-5	10-50	.62
4. Negative affect	10	1-5	10-50	.57
5. Suicidality	5	1-3	5-15	.72

Table 2. Sex differences in scale scores (means and standard deviations)

Scales	Men $N = 141$		Women $N = 168$		t	p	d
	M	*SD*	*M*	*SD*			
Love of life	54.33	12.10	54.57	11.77	0.17	n.s.	n.s.
Self-esteem	39.08	6.53	36.67	7.72	2.97	.004	0.34
Positive affect	33.69	6.84	31.35	7.05	2.95	.004	0.34
Negative affect	26.19	7.06	28.06	7.90	2.19	.03	0.25
Suicidality	6.18	1.61	6.99	2.62	3.20	.002	0.37

Table 3. Predicting SBS total score (beta coefficients shown)

Scales	Men	Women
1. Love of life	-0.123	-0.271**
2. Self-esteem	-0.083	-0.240*
3. Positive affect	-0.093	+0.264
4. Negative affect	+0.216*	+0.333***
5. R^2	0.104	0.287

* two-tailed $p < .05$
** two-tailed $p < .01$
*** two-tailed $p < .001$

Table 4: Sex differences in SBS items: % answering never is shown plus X^2 (df=2)

Scales	Men	Women	X^2
Item 1	73.0%	73.2%	0.69
Item 2	90.1%	79.8%	6.47*
Item 3	95.0%	86.3%	7.53*
Item 4	89.4%	76.8%	13.74***
Item 5	58.2%	44.0%	7.70*

* two-tailed $p < .05$
** two-tailed $p < .01$
*** two-tailed $p < .001$

Table 5: Predicting suicidal ideation – SBS item 4 (beta coefficients shown)

Scales	Men	Women
1. Love of life	-0.118	-0.067
2. Self-esteem	-0.011	-0.237*
3. Positive affect	-0.140	+0.143
4. Negative affect	+0.101	+0.294***
5. R^2	0.059	0.162

* two-tailed $p < .05$
** two-tailed $p < .01$
*** two-tailed $p < .001$

Table 6: Predicting suicide attempt – SBS item 3 (beta coefficients shown)

Scales	Men	Women
1. Love of life	+0.069	-0.059
2. Self-esteem	-0.138	+0.114
3. Positive affect	-0.101	+0.049
4. Negative affect	+0.168	+0.372
5. R^2	0.059	0.121

* two-tailed $p < .05$
** two-tailed $p < .01$
*** two-tailed $p < .001$

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SUICIDES AFTER NATURAL DISASTERS: A REVIEW

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Abstract" Natural disasters have been documented as affecting the mental health of survivors and may result in them dying by suicide. The current review identified all studies on this topic to see to what extent natural disasters result in suicides. A literature search was conducted in the Web of Knowledge, PubMed, and Scopus databases, as well as the reference list of relevant studies, using keywords including "natural disasters", and "suicide". The search led to the retrieval of 3079 studies published up to November 2020, of which 47 studies were selected for data extraction. The natural disasters included earthquakes (n=21), geomagnetic disturbances (n=5), droughts (n=3), hurricanes (n=3), dust storms (n=1), floods (n=1), and natural disasters in general (n=3). The results showed that, for most natural disasters, there are only a few studies, often only one study. However, the evidence supports a rise in suicide rates after a disaster for droughts, dust storms, hurricanes, and geomagnetic disturbances, but not for floods. For earthquakes, the majority of the studies reported a rise in suicides, at least for some groups of the population.

Natural disasters can be a source of health concerns as they affect a large number of people around the world every year. Although the rate of natural disasters varies in different regions, they are increasing in the world, causing physical, social, and mental effects for the survivors (Matsubayashi, et al., 2013; Safarpour, et al., 2020). The immediate effects of disasters on physical health are well described. For example, respiratory, gastrointestinal, and cardiovascular symptoms have been reported among the survivors for up to five years after the natural disaster (Krug, et al., 1998). The Center for Research on the Epidemiology of Disasters (CRED) and United Nations International Strategy for Disaster Reduction (UNISDR) have estimated that 1.3 million people have lost their lives in the last two decades because of natural disasters, and more than 4.4 billion people were rendered homeless, injured, or in need of urgent assistance (Jafari, et al. 2020). An earthquake and tsunami that occurred in the northern region of Japan in March 2011, caused a large number of people to go missing and more than 15,000 people to die (Matsubayashi, et al., 2013). About 1.5 million households in the United States suffer from injuries or lost property each year from floods, tornadoes, or earthquakes (Krug, et al., 1998).

The health effects of natural disasters are not limited to death and injuries, but they include psychological effects such as mental disorders, anxiety, fear, depression, post-traumatic stress disorder (PTSD), aggression, insomnia, and suicide (Safarpour, et al., 2020; Jafari, et al.,

2020). Death by suicide is considered one of the major public health problems, so the World Health Organization (WHO) has designated September 10 as World Suicide Prevention Day (Safarpour, et all, 2020).

Studying the environmental effects affecting suicide is important. Evidence has shown that environmental factors have a greater impact on negative psychological outcomes (Stein, et al., 2010). Identifying the factors affecting the population suicide rate is essential for understanding the underlying elements of suicide risk (Mezuk, et al., 2009). Mental disorders, depression, and post-traumatic stress are associated with suicide (Mezuk, et al., 2009), and reviews have shown that suicidal behaviors (ideation and attempts) can be an aftermath of natural disasters (Hyodo, et al., 2010), and suicide rate may increase after natural disasters (Jafari, et al., 2020). For instance, after the Nepal earthquake in 2015 (Kane, et al., 2018), the death rate by suicide increased by 41% compared to the previous year. In American. counties, regional suicide rates increased significantly after natural disasters (Voracek & Sonneck, 2002).

Studies have shown that disasters affect some groups of society more than others (Matsubayashi, et al., 2013). Psychological consequences may be greater for women and younger adults, and after disasters with high casualties (Krug, et al., 1998). In addition, the elderly, people with depression and PTSD, those suffering from low social support, and those without parents were found to be among the ones being highly vulnerable to suicide after natural disasters. This, therefore, creates a need for providing psychosocial support for survivors after disasters (Jafari, et al., 2020).

On the other hand, sometimes, natural disasters strengthen social communication among affected people, leading to decreased suicide rates. For example, a study by Nishio, et al. (2009) showed a decrease in suicide rate up to two years after the earthquake in Kobe, Japan. Also, some studies, such as the Krug, et al. (1998) study, have shown no significant ecological association between suicide rates and natural disasters. Therefore, how natural disasters affect suicidal behavior is still under debate and requires further study (Krug, et al., 1998; Jafari, et al., 2020). In this paper, we present a review examining suicide rates after natural disasters to see whether a clear conclusion is possible.

There have been previous incomplete reviews. Rezaeian (2008) reviewed eight studies on suicide rates after natural disasters. He found an increase in 7 (although the results of one of these studies were later retracted) and a decline in one. However, one of the seven studies cited by Rezaeian was not on suicide, and one other reported only one suicide after a hurricane. Therefore, 4 studies reported an increase in suicide rates after a disaster versus one a decline. (All of those five studies are reviewed here.)

However, Rezaeian did note that the research ought to take into account the extent of the disaster, the type of disaster, and the number of disasters occurring in a given period. The changes in the suicide rate should take into account the time periods chosen, the areas chosen for controls, and the age, sex, and other characteristics of the suicides.

Kõlves, et al. (2013) reviewed 19 studies on suicide mortality after natural disasters, 11 on earthquakes, 2 on hurricanes (but with only one of these two studies reporting suicide rates),

one on tsunamis, one on floods, one on droughts, and one on a series of disasters of various types over years. They were unable to come to a definite conclusion, except that some studies reported a delayed increase in suicide rates.

Can a prediction be made as to whether natural disasters should increase or decrease the suicide rate? Clearly, natural disasters create stress, and stress would be predicted to create mental health problems, especially anxiety and depression. Therefore, suicide rates might increase after a natural disaster. On the other hand, Henry and Short (1954) argued that, if people have a clear external cause to blame for their misery, then they are less likely to blame themselves for their misery and so less likely to be depressed and suicidal. Clearly, natural disasters present a clear external cause for people's misery, and so suicide should be less common.

The present review was carried out: (i) to identify all relevant research studies on disasters and subsequent suicide rates, and (ii) to identify reliable conclusions.

Method

Literature Search

A literature search was carried out for studies assessing the relationship between suicide and natural disasters in the general population. Natural disasters were defined as major adverse events due to natural processes of the earth leading to "a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its resources" (UNISDR, 2004). According to the Emergency Events Database (EM-DAT), natural disasters can be classified as biological, climatic, hydrological, geophysical, meteorological, and extraterrestrial disasters (Keerthiratne & Tol, 2017).

The search was conducted in the Web of Knowledge (ISI), PubMed, and Scopus by the MeSH and non-MeSH terms in the title/abstract/keywords of journal articles published until 18 November 2020. The search strategy included the following keywords: suicide, earthquake, drought, flood, hurricane, storm, cyclone, typhoon, volcano, landslide, landslip, blizzard, snowstorm, tsunami, and natural disaster.

Eligibility Criteria

The inclusion criteria included articles assessing the relationship between deaths from suicide and exposure to a natural disaster in the general population. We excluded non-English articles, articles on unnatural, man-made disasters, articles on suicide attempts/suicidal ideation/suicidality, studies using unreliable data sources, and those with inadequate data to extract. We excluded heat waves which are long-term weather variables.

Study Selection

The steps of study selection included the removal of duplicates, examination of titles/abstracts for possibly relevant studies, examination of full texts for eligibility criteria,

cross-checking between researchers to reach a consensus on study selection, quality assessment of select studies, and data extraction. Among the articles retrieved from the electronic search, the eligible ones were selected by two of the authors (MD and FBA) independently. A third author (DL) was consulted to resolve disagreements, if any, to read the articles and summarize the results. A manual search was conducted on the reference lists of the selected studies to find papers missing in the electronic search.

Data Extraction

The extracted data included authors' names, publication year, country of origin, type of natural disaster, data periods, and outcomes. The outcome in some of the studies was the percentage of change in the suicide rate before and after the disaster or between the affected or unaffected areas.

Results

The electronic search led to the retrieval of 3,079 studies (Scopus 1,323, Web of Knowledge 1,210, Pubmed 546). After removing duplicates (n=959), 1,285 studies remained for title/abstract assessment. In addition, 14 new studies were detected during a manual search. Thirty-seven studies were used for data extraction. The natural disasters included earthquakes (n=21), geomagnetic disturbances (n=5), droughts (n=3), hurricanes (n=3), dust storms (n=1), floods (n=1), and natural disasters as a whole (n=3).

Results

Droughts

Guiney (2012) looked at suicides by farmers as a result of the drought in Victoria, Australia, 2001-2007 and identified 110 suicides, constituting 3.1% of the suicides in Victoria during that period. The number of suicides by farmers showed no clear trend over the 8-year period, and Guiney was not able to calculate suicide rates prior to, during and after this period.

Nicholls, et al. (2006) looked at the suicide rate in New South Wales (Australia) for the period 1964-2001. They found that years with low rainfall had higher suicide rates, and they concluded that droughts increased the suicide rate. However, they did not compare years that had droughts with those years that did not.

Hanigan, et al. (2012) studied New South Wales, Australia, for the period 1970-2007. Using the Hutchinson drought index which counts consecutive months of lower than median rainfall, they found that suicides among men aged 10-49 rose as this index increased from zero to three. This trend was not found for females and, indeed, for females aged 30-49, suicides declined as the index increased.

The conclusion here is that droughts do result in a higher suicide rate, at least for men. Interestingly, research on this has appeared only for Australia.

Dust Storms

Lee, et al. (2019) examined the number of suicides on the days of dust storms in South Korea during the period 2002 -2015, during which there were 133 dust storms of which 55 lasted two days or longer and 67 resulted in high levels of particulate matter (< 10μm in diameter). The risk of suicide was 13.1% higher on days with dust storms, while those of long duration and high intensity resulted in a 19.8% and 17.0% increased risk of suicide, respectively. The increased risk of suicide remained after controls for local air pollution and meteorological factors.

Floods

De Leo, et al. (2013) compared suicide after the January 2011 flood in Queensland, Australia, with the prior 11 years (for the period January to June) for the two regions affected by the flood (Ipswich and Toowoomba). They found no significant increase in suicides in the first six months of 2011 and, although the number was small, a decrease in suicides in Toowoomba. However, De Leo, et al. did not calculate accurate suicide rates

Hurricanes

There have been a few non-statistical reports on hurricanes and suicides. For example, after Hurricane Andrew (a category 4 hurricane) that made landfall in South Florida on August 24, 1992, Lew and Wetli (1996) noted five suicides in the following six months and that the number of murder-suicides doubled. Jani, et al. (2006) noted one suicide in the days after Hurricane Isabel on September 18, 2003, out of 32 hurricane-related deaths.

Castellanos, et al. (2003) compared suicides in youths aged 13-24 for the 16 months before hurricane Andrew (36 suicides) and the 16 months after hurricane Andrew (49 suicides), an apparent increase (see Table 2). The sex of the suicides and the destruction in the area had no significant impact on the results, but there appeared to be an increase in the use of firearms for suicide after the hurricane.

Earthquakes

Italy (*L'Aquila: April 6, 2009; magnitude 6.3)*

Stratta and Rossi (2013a) studied suicide in the residents before and after the earthquake in the province of L'Aquila. The earthquake was on April 6, 2009, and Stratta and Rossi looked at the suicide rate in L'Aquila and surrounding provinces from 2004 to 2009. In 2009, the suicide rate in L'Aquila was lower than the rate in any of the previous 5 years (see Table 2). The suicide rates in surrounding provinces did not show any change, although there was a tendency for an increase in the suicide rates, as well as Italy as a whole.

Interestingly, Stratta and Rossi (2013b) noted that the media in Italy misreported the suicide rate after the earthquake, claiming that it had risen. (See also Vasterman, et al., 2005.)

Japan
Great Hanshin-Awaji 1/17/1995 (magnitude (6.9)

Nishio, et al. (2009) compared the suicide rate in Kobe after the earthquake and reported that the suicide rate was low for the next two years. Although they did not report accurate rates in tabular form, they state: “The regression analysis disclosed that the two years of 1995 and 1996 showed significantly lower suicide rates in Kobe than those in Japan as a whole.” This decrease was strongest in middle-aged men.

Shioiri, et al. (1999) found that the suicide rate in Kobe declined in 1995 compared to the suicide rate in the preceding 10-year period of 1985-1994 (see Table 2). The suicide rate in 1995 was 12.6 compared to 15.1 in 1994. In 1996 and 1997, the suicide rate returned to the average for the period. The decline in 1995 was found only for males, particularly for those in their 30s and 50s. There was also a decline in suicides by falling from high places.

Niigata-Chuetsu 10/23/2004 (magnitude 7.0)

Hyodo, et al. (2010) compared suicide rates for the five years before the Niigata-Chuetsu Earthquake in the disaster area and a control area. The suicide rates declined for men and women in both the affected areas and the control areas (see Table 2). Hyodo, et al. claimed that female suicide rates increased after the earthquake in the disaster area compared to the control area, but their data do not support their claim (see Table 2). In fact, the female suicide rate declined in both regions, but less so in the disaster area.

East Japan: March 11, 2011 (magnitude 9.0)
Note: This earthquake also resulted in a tsunami and a nuclear disaster.

Orui, et al. (2014) looked at monthly suicide rates from March 2009 to February 2013, a period surrounding the earthquake in east Japan on March 11, 2011, which occurred offshore of Sanriku, creating a tsunami (see Table 2). Comparing the two-year periods before and after the earthquake, Orui, et al. found a sex difference. This period appears to have been one in which the suicide rate in Japan was declining. For men, the decline in areas affected by the earthquake and neighboring areas which were not affected was similar. But for women, the decline in the suicide rates was almost (1.7%) zero in the affected areas compared to the suicide rate in the unaffected areas (-10.7%).

In follow-up studies, Orui (2020; Orui, et al., 2015) found that in the years after the earthquake, through to 2018, the male suicide rate in the affected areas was higher than the national average for 2013-2014, then dropped, but rose again in 2017. Thus, long-term trends might differ from the short-term impact on an earthquake.

The earthquake noted above led to a nuclear disaster: the Fukushima Daiichi nuclear disaster. Some residents were in total evacuation areas, while others were in only partial or temporary evacuation areas. Orui, et al. (2018) looked at the suicide rates in these two types of areas before and after the disaster. It is not clear in their article how people remained in areas that had total evacuation but, as far as one can tell, many people remained in those areas. They found an immediate increase in suicide rates in the first year after the Fukushima nuclear disaster in areas with a temporary evacuation order, but not in areas that were permanently evacuated. In the long-term, increases in the suicide rates were observed, differing by gender,

Ohto, et al. (2015) looked at suicide rates in Fukushima and neighboring provinces up until 2014 (see Table 2). Although the suicide rate declined in 2012 in Fukushima province, by 2014 it was higher than before, while at the same, the overall suicide rate in Japan was declining during this period.

Takebayashi, et al. (2020) studied the Fukushima prefecture where the suicide rate was higher than in two neighboring prefectures and Japan as a whole. Takebayashi, et al. distinguished disaster-related suicides in Fukushima from non-disaster-related suicides. The disaster-related suicides seemed to be higher for women in their 50s and 80s, but lower for men above the age of 70. The disaster-related suicides used the same methods for suicide as the other suicides.

Traphagan (2013) examined suicide rates in three prefectures affected by the earthquake: Fukushima, Iwate, and Miyagi. Traphagan looked at the changes in the suicide rates from 2010 to 2011 by month and by age, which makes the results complex. In Fukushima, the suicide rate rose in March, April, May, and August, but decreased in June and July. The suicide rate in Iwate was higher than the previous year only in May and August. In Miyagi, the rate was higher only in April. By age, the suicide rate increases in May 2011 (compared to May 2010) were greater for the young and the middle-aged for Fukushima and Iwate, but not for Miyagi. The elderly showed very little change in the suicide rate from the previous year. However, the numbers were small for these months in the two years when classified by age.

Uchimura, et al. (2014) looked at the same three prefectures in 2011 and found a significant rise in the suicide rate in May (but not other months) for those aged 70+ but not for those in the 60s.

Sri Lanka

Rodrigo, et al. (2009) looked at changes in the number of suicides before and after a tsunami on December 26, 2004, and found no significant differences, although the trend was a decline in the affected areas compared to the control areas (see Table 2).

Taiwan
Nantou, Taiwan: September 21, 1999 (magnitude 7.3)

Yip (2009) reported the suicide rates in Nantou County before and after the earthquake (see Table 2). From 1998 to 2001, the total suicide rate rose 81.1% in Nantou versus 25.0% for Taiwan as a whole, the male suicide rate rose 81.0% in Nantou versus 29.8% for Taiwan as a whole, and the female suicide rate rose 82.3% in Nantou versus 16.2% for Taiwan as a whole.

Liaw, et al. (2008) looked at age-standardized suicide rates in 1997-1998 compared to 2000-2001 in Nantou County (see Table 2). The male suicide rate increased by 45% and the female suicide rate increased by 43%. By age, those aged 45-64 showed the greatest increase (90%).

Chou, et al. (2003) studied 68 municipalities in the Taichung City (a special municipality in Taiwan), comparing the suicide rate from January 1, 1998, to September 20, 1999, with the suicide rate on November 1, 1999 –to December 31, 2000 (see Table 2). The total suicide rate increased by 17% in the second period compared to the first period. The suicide rate increased by 23.5% in those regions affected by the earthquake and 13.6% in those areas unaffected by the earthquake. For the whole region of Taichung City, the suicide rate increased by 88.9% for victims versus 10.3% for non-victims, where victims were defined by being injured, loss of co-resident family members, or property loss. The suicide rate in Taichung City was higher in the affected areas, victims, men, those aged 25+, and aborigines.

Chen, et al. (2016) examined suicide rates from September 1971 to September 2008 by month (see Table 2). Overall, the suicide rate rose by 5.3% for those affected by the earthquake and 33.9% for those not exposed. However, age affected these results. For those under the age of 45, the suicide rate *declined* by 23.3% for those affected by the earthquake but rose by 25.9% for those unaffected by the earthquake. For those over the age of 45, the suicide rate rose by 11.8% for those affected by the earthquake and rose by 6.6% for those unaffected by the earthquake. The results were similar for men and women. The deleterious effect of the earthquake on suicide rates was found, therefore, only for older adults.

Yang, et al. (2005) compared the municipalities that were affected by the earthquake and those which were not affected, using monthly suicide rates for the 45 months before the earthquake and 27 months following the earthquake (see Table 2). The difference in the changes in monthly suicide rates was large (42.5% versus 0.2%). However, the monthly suicide rate in the affected areas declined to the normal level gradually over the next 10 months.

Lu (2004) located data for 13 counties affected by the 1999 earthquake and reported the death rate from the earthquake, the percentage of houses collapsed, and the SMRs for suicide in the two years prior (1997-1998) and the two years after (2000-2001) the earthquake. The SMRs for suicide appear to have increased in 12 of the 13 counties. For one county, there was no change. However, the percentage change in the SMRs for suicide was not correlated with the death rates (r=-0.32, n.s.) or the percentage of household collapsed (r=-0.02, n.s.).

Chuang and Huang (2007) examined the 23 judicial districts in Taiwan over the period 1983-2001, giving 437 data points. Along with ten other socio-economic variables, the 9/21 earthquake had a significant and positive impact on the suicide rate.

United States
Los Angeles 1/17/1994 (magnitude 6.7)

Shoaf, et al. (2004) compared the suicide rates in Los Angeles County for the three years before the earthquake with the suicide rate for the three years after the earthquake (see Table 2). The suicide rate declined by 9.7%. The decline was found in all groups except for Hispanic males (+1.1%) and was largest for Hispanic females (-32.3%). The decrease was statistically significant for the total population, all males, all females, white males, and Hispanic females. Shoaf, et al. did not study a control region.

Geomagnetic *Influences*

Berk, et al (2006) studied Australia from 1968 to 2002 and found that suicides in women increased in the Autumn at times of geomagnetic storms, but not in men. However, for the period 1980 to 1992 in Australia, Gordon, and Berk (2003) reported an increase in suicides at the time of geomagnetic storms for both men and women.

Nishimura, et al. (2014) examined monthly data for the prefectures of Japan for the period 1999-2008. For men only, they found a significant increase in suicides for months with geomagnetic field magnetic flux density. Tada, et al. (2014) studied the monthly suicide rate in Japan as a whole for the period 1999-2010 and found an increased risk of suicide, but only for men, during months with higher geomagnetic activity

Kmetty, et al. (2018) looked at the daily suicide rate in Hungary for the period 1976-2010 and found no significance for men or for women from magnetic storms or solar protonic events (after controlling for season and day of the week).

Natural *Disasters in General*

Japan

Matsubayashi, et al. (2013) studied the prefectures in Japan for the period 1982-2010, a total of 1,363 prefecture-years. During this period there were three earthquakes, six storms/floods, and one explosion. The results depended on the number of victims. The number of disaster victims was positively associated with the suicide rate in the year of the disaster. When the number of victims was large, suicide rates declined in the short term (the next two years) but rose in subsequent years (as after the Great Hanshin-Awaji earthquake in 1995). For disasters with a smaller number of victims, the suicide rates declined afterward. The results did differ by age and sex, with men under the age of 65 and women over the age of 65 showing the largest effects.

Matsubayashi, et al. noted that the Great Hanshin-Awaji earthquake in 1995 affected the results (The number of victims in this disaster was much larger than in the other nine disasters.) Excluding this earthquake, the suicide rate decreased for the first two years after the disaster, and the association between the number of victims and the suicide rate was no longer found.

United States

Krug, et al. (1998, 1999) studied natural disasters in 377 counties of the United States between 1982 and 1989, comparing the suicide rate in the 36 months before the disaster with the suicide rate in the 48 months after the disaster. After correcting their results, they found non-significant changes after floods (+2.0%), hurricanes (+1.4%), tornados (-0.7%) and earthquakes (-1.3%), but a trend for a decrease after severe storms (-8.7%, $p = 0.07$).

Horney, et al. (2020) studied 281 disasters at the county level in the United States, from 2003-to 2015, comparing suicide rates in the 3-year periods before and after the disaster (storms,

floods, and hurricanes). The average percentage increase in suicide rates was 23% and similar in magnitude for storms and floods but did not reach statistical significance.

Discussion

The results of the studies reporting accurate suicide rates are summarized in Tables 1 and 2. The number of studies showing a change in suicide rate after natural disasters is shown in Table 3. It can be seen that for most natural disasters, there are only a few studies, often only one study. However, the evidence supports a rise in suicide rates after a disaster for droughts, dust storms, hurricanes, and geomagnetic disturbances, but not for floods.

The most extensive set of studies is for earthquakes. For earthquakes, 11 studies were reporting a rise in suicide rates afterward (at least in some groups of the population), while 5 studies report a decline in the suicide rates. It is noteworthy that many of the studies reporting an increase were for the Fukushima earthquake that resulted also in a nuclear disaster. The nuclear disaster is perhaps not *natural* since the placement of a nuclear reactor in that region of Japan was perhaps a poor decision made by the company and the government. Earthquakes in South Korea appeared to result in a decline in suicide rates, while studies of the Nantou earthquake in Taiwan appeared to increase the suicide rates. There was a decline in Los Angeles after an earthquake there, which suggests that a region in which earthquakes are common and in which there is widespread community awareness of the possibility, the impact of an earthquake may not be as negative. Thus, because of the rarity of earthquakes and earthquake-suicide studies, the impact of culture (for example, South Korea versus Taiwan) cannot be ascertained.

Conclusion

Overall, suicide rates in general people can increase following natural disasters. However, some studies reported a delayed increase in suicide rates. The latency may make it difficult to attribute suicides to a natural disaster. Studies with cohort and case-control designs may be fruitful to elucidate more solid results. Besides, case-crossover designs may be valuable in such studies. It is also noticeable that natural disasters usually affect a limited geographical region. This locality makes a lot of variation in possible confounders when one intends to calculate a pooled effect or generalize the results to the whole population. This is a difficulty in epidemiological studies of natural disasters and suicide. Based on the results, we call for ongoing psychological assessments to pave the way for interventions to protect the mental health and lives of people in the aftermath of emergencies like natural disasters.

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Table 1. Changes in suicide rates before and after the disaster for studies with accurate rates (or counts)

	Before	After	% change	Comparison
Italy: Earthquake				
L'Aquila 4/6/2009				
Stratta & Rossi (2013a)	2008	2009		
L'Aquila			-27.9%	
Teramo			+11.5%	
Pescara			+20.6%	
Chieti			+14.3%	
Abruzzo			-2.1%	
Italy			+6.4%	
Japan: Earthquakes + Nuclear Disaster				
Hanshin-Awaji 1/17/1995				
Nishio, et al. (2009)	prior 12 yrs	next 2 yrs		
no accurate rates reported				
Kobe			decrease	
Shiori, et al. (1999)				
	1994	1995		
	15.1	12.6	-16.6%	
	1985-1994	1995		
	16.3	12.6	-22.7%	
Niigata-Chuetsu 10/23/2004				
Hyodo, et al. (2010)	5 years	3 years		
Affected areas				
Men			-5.0%	
Women			-9.4%	
Control areas				
Men			-2.2%	
Women			-16.0%	
East Japan 3/11/2011				
Orui, et al. (2014)	prior 2 yrs	next 2 yrs		
Affected areas				
Males			-17.1%	
Females			-1.7%	
Control areas				
Males			-16.4%	
Females			-10.7%	
Japan				
Males			-10.0%	
Females			-1.8%	

Orui, et al. (2015)				
Total evacuation	prior year	following year		
Males			-21.6%	
Females			-69.4%	
Temporary evac				
Males			+31.4%	
Females			+28.3%	
Neighboring areas				
Males			-12.8%	
Females			+54.0%	
Ohto, et al. (2015)				
Fukushima province				
2010-2012			-13.0%	
2010-2014			+16.7%	
Sri Lanka: Tsunami 12/26/2004				
Rodriguez, et al. (2009)	2002-2003	2005		
Affected areas			-0.08%	
Control areas			+1.10%	
Taiwan: Earthquakes				
Nantou 9/21/1999				
Yip (2009)	1998	2001		Taiwan
Total			+81.1%	+25.0%
Male			+81.0%	+29.8%
Female			+82.3%	+16.2%
Liaw, et al. (2008)	1997-98	2000-01		
Male			+45%	
Female			+43%	
Chou, et al. (2003)	1998-9/99	11/99-2000		
Total			+17.1%	
Affected areas			+23.5%	
Not affected			+13.6%	
Chen, et al. (2016)	prior 28 yrs	next 9 yrs		
Affected areas			+5.3%	
Not affected			+33.9%	
Yang, et al. (2005)	1995-9/99	11/99-2001		
Affected areas			+42.5%	
Not affected			+0.2%	
United States: Earthquake				
Los Angeles 1/17/1994				
Shoaf, et al. (2004	prior 3 yrs to next 3 yrs			
LA County			-9.7%	
Bourque, et al. (2001)				
LA County			-14.5%	

United State: Hurricane
Hurricane Andrew 8/24/1992

Castellanos, et al. (2003)	prior 16 months to next 16 months	
Dade County	+31.6%	
Males		+64.0%
Females		-27.3%
High impact		+114.3%
Low impact		+23.1%

Table 2. The number of studies showing a change in the suicide rate[1]

	increase	decrease	no change	no decision
Droughts	2	1		1
Dust storms	1			
Floods				1
Hurricanes	1			
Geomagnetic events	4			
Earthquakes	11	5	3	1

[1] Note that some studies showed an increase for some groups and a decrease for other groups. Also some studies focused on particular groups, such as adolescents – see the text in the Results section.

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A PRELIMINARY STUDY COMPARING DIARIES WRITTEN BY SUICIDES AND THOSE WRITTEN BY ATTEMPTED SUICIDES[2]

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Abstract: A comparison of a small number of diaries from suicides and attempted suicides generated two hypotheses. The diaries of suicides contained more references to metaphysical and religious issues, while the diaries of attempted suicides contained more references to friends and to work.

Diaries written by those who die by suicide are difficult to obtain. Lester (2014) has managed to obtain 7 diaries written by suicides, four published and three that he has obtained from survivors.

It is even more difficult to obtain diaries written by those who attempt suicide. The same is true for suicide notes. Brevard, et al. (1990) have a study of the only American samples of suicide notes written by completed suicides and attempted suicides, I know of only one other similar set of suicide notes worldwide.

I have obtained two diaries written by people who have attempted suicide. Both are from women, one aged 22 and one in her 40s. Both allowed me to have the diaries because they knew of my interest in suicidal behavior. [3] Three of the diaries from completed suicides in my collection are from women, on the whole younger than the attempted suicides. The suicides were aged 20, 22 and 33 when they died by suicide. However, this does permit a comparison.

With such small sample sizes, it was decided to use a LIWC analysis of the word content (Pennebaker, et al., 2001) and point-serial correlations. In order to generate hypotheses (and interest among researchers), the Table 1 reports point-biserial correlations over 0.700. The LIWC generates percentage scores for the presence of 73 word-oriented variables and content categories. Using two-tailed probabilities, one difference was statistically significant, and three tended toward statistical significance.

The significant content category concerned metaphysical words, including religious words. These were found more often in the diaries of the completed suicides.

The remaining content categories showed a weak tendency for the diaries from attempted suicides to have more references to: up, time, friends, seeing, jobs and more inclusive words and inhibition words. The diaries of the attempted suicides had fewer negation words. Examples of these categories of words are shown in the Table 1.

[2] I would like to thank John Gunn for his help in this study.
[3] One of the women had read Katie's Diary (Lester, 2004).

Table 1: Results of the LIWC analysis

LIWC label	r	two-tailed p	examples
Religion	+0.880	.049	God, church, rabbi
Metaphysical	+0.872	.054	God, heaven, coffin
Up	-0.818	.091	up, above, over
Negation	+0.807	.098	no, never, not
Time	-0.786	.115	hour, day, o'clock
Friends	-0.760	.136	pal, buddy, coworker
See	-0.752	.143	view, saw, look
Inclusive	-0.749	.145	with, and, include
Job	-0.708	.182	employ, boss, career
Inhibition	-0.700	.189	block, constrain
AS coded as 1	n=2		
CS coded as 2	n=3		

Some of the categories do not immediately suggest hypotheses about fatal and non-fatal suicidal behavior. However, the suicides do seem to be more concerned with God and heaven while the attempted suicides seem to be concerned with their social relationships and work. Hopefully, this note will stimulate further research on the diaries of suicidal individuals

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THE IMPACT OF SOCIOECONOMIC FACTORS ON THE VARIATION OF REGIONAL SUICIDE AND HOMICIDE RATES IN POLAND: 2007-2016.

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Abstract: Previous research has revealed inconsistencies in the findings on the influence of socioeconomic factors on suicide and homicide rates. This ecological, cross-sectional study examines how socioeconomic factors influence regional suicide and homicide rates for the 16 counties of Poland between 2007 and 2016. Data for 13 independent socioeconomic variables were obtained for the 16 counties of Poland for 2007-2016 from the Statistics Poland database: sex ratio (females per 100 males), urbanization, population, population density, total emigration, total in-migration, income per capita, unemployment, mortality, infant mortality, marriage, divorce, and birth rates. These variables were subjected to a factor analysis and correlated with homicide and suicide rates. Treating the data set as panel data (i.e., 16 counties and 10 years, providing 160 data points) identified five factors for the socioeconomic variables. There were different patterns of correlations for suicide and homicide rates across the five factor scores. Moreover, the association between socioeconomic variables and suicide and homicide rates in the 16 counties varied across the years. Only some of the variables showed consistent associations over the years. For example, suicide rates were negatively and consistently associated with population density, while homicide rates were positively and consistently associated with divorce rates. Other associations were not always consistent. The results indicate that the associations of socioeconomic variables with suicide and homicide rates depend on the year chosen. A cross-sectional study using one-year data is insufficient to draw reliable conclusions about the influence of socioeconomic variables on rates of lethal violence. Consequently, monitoring the relationship between socioeconomic factors and suicide and homicide rates on a regular (yearly) basis is recommended in order to help policy makers to devise effective prevention strategies.

According to the theory of lethal violence proposed in the 1800s (Ferri 1883; Morselli, 1882), suicide and homicide are alternative ways of expressing aggression, inwardly onto the self or outwardly onto others. However, Durkheim (1897) suggested that homicide and suicide are distinct social acts with different causes. The research outcomes regarding the influence of various socioeconomic factors on suicide and homicide rates are inconsistent, sometimes similar for suicide and homicide, sometimes opposite, and sometimes independent (Millner, et al., 2013; Stack, 2010; Ousey & Kubrin, 2009).

Kunce and Anderson (2002) concluded that socio-economic factors did not affect the

variation in suicide rates in the United States during 1985-1995, thereby failing to support Durkheim's hypothesis that socioeconomic factors explain suicide rates. They also focused on the ecological fallacy in suicide research and called for research at the individual-level. Neumayer (2003) argued, however, that many socioeconomic factors have a statistically significant impact, and that sociological and economic theories seeking to explain the variation in suicide rates at the aggregate level cannot be dismissed because of an alleged ecological fallacy. Other researchers have pointed out that ecological studies can better inform policy makers than studies at the individual level (e.g., Lubinski & Humphreys, 1996).

There are different explanations for inconsistencies in the results of research at the aggregate level, and one explanation focuses on the time period chosen for the study. For example, Sainsbury, Jenkins and Levey (1980) analyzed the relationship between suicide rates and 15 social variables in 18 European countries for the period 1961-1972. Mäkinen (1997) repeated the study for the period 1977-1979 but failed to replicate their results. Mäkinen found that the correlations reported by Sainsbury et al. (1980) were related to a significant increase in suicides during the 1960s in many modern European countries, and in subsequent years. As suicide rates began to decline, the correlations between social variables and suicide rates were reversed or dropped to zero.

Using 12 socioeconomic indicators and multiple regression analysis, Motohashi (1991) showed that the effects of socioeconomic factors on suicide rates in Japan were different in two time periods (1953-1972 and 1973-1986). Over 1953-1972, the suicide rates in both sexes were associated with the unemployment rate and the labor force participation, but between 1973 and 1986, the suicide rate was associated with the divorce rate and the proportion of workers in tertiary industries. Motohashi (1991) suggested that these changes reflect the socioeconomic changes in Japan during the transition from an industrial to a service economy.

The results may also differ between longitudinal (time-series) studies and cross-sectional studies (e.g., across regions). For instance, the relationship between divorce and suicide rates has been reported in cross-sectional studies (Kowalski, et al., 1987), but not in time series studies (Stack, 2000). Similarly, while Luo et al. (2011) reported a strong relationship between unemployment and suicide rates in a time-series study, no relationship was found in a cross-sectional study (Girard, 1988). A cross-sectional study over 3,108 counties of the USA found significant correlations between sociological variables and suicide rates only for the urban counties and not for suburban and rural counties (Kowalski, et al., 1987). However, an increase in urban population was associated with an increase in suicide rates in Finland between 1800-1900 and 1900-1985 (Stack, 1993). Such differences in cross-sectional and time-series studies of social correlates are found for both suicide and homicide rates (Phillips, 2006; Ousey & Kubrin, 2009).

The results also differ by country. Lester, Motohashi and Yang (1992) found that, for the years 1953-1982, divorce rates were associated positively with suicide and homicide rates in the USA, but negatively in Japan, while unemployment rates showed positive associations in both countries. The authors suggest that the divorce rates may have a different social meaning as a social indicator in Japan and in the USA, partly as a result of their level (0.73-1.51 in Japan and 2.1-5.3 in the USA).

Lester and Krysinska (2004) analyzed the relationship of social correlates of suicide and homicide rates in Poland in a cross-sectional study using factor analysis. They observed that both suicide and homicide rates in the year 1998 were higher in regions with higher rates of unemployment/outmigration (Factor I) and divorce/urbanization (Factor II), while homicide rates were higher in regions with lower rates of marriages and births (Factor IV). It may be that unemployment could force people to migrate within the country in order to find employment, resulting in higher levels of social disintegration, thereby leading to higher suicide and homicide rates. On the other hand, Neumayer (2003) examined suicide rates in 72 countries in 1980-1998 and found that higher suicide rates were associated with higher marriage and birth rates.

Summarizing the above findings, the existing studies do not allow for a clear determination whether socioeconomic variables such as urbanization, rates of divorce, marriages and birth, and unemployment will have a positive or negative impact on suicide and homicide rates. The effects depend on the social variables chosen for study, the time periods, study design, and the regions chosen. Researchers may also look for linear trends or quadratic trends. For example, Stack (1982) argued that early stages of urbanization result in disruption of social bonds and an increase in suicide rates whereas, in later stages, urbanization can result in a decrease in suicide rates as people adjust to living in the urban environments. However, many researchers have noticed the positive effects of urbanization in longitudinal studies, for example, in Turkey in 1974-2007 (Altinanahtar & Halicioglu, 2009), in Japan in 1980-1990 (Otsu, et al., 2004) and in China 1990-2010 (Sha, et al., 2017).

The aims of the present study were to examine how social variables influenced suicide and homicide rates in Poland in each year from 2007 to 2016 and to compare the results with those of Lester and Krysinska (2004) for the year 1998.

Method

The present study is an ecological, cross-sectional study conducted in 16 Nomenclature of Territorial Units for Statistics (NUTS-2) regions (voivodships or counties) of Poland for the years 2007-2016. Deaths were considered to be suicides using the International Classification of Diseases and Deaths (ICD-10) codes corresponding to "intentional self-harm" (X60 to X84).

Data for 13 independent variables were obtained for the 16 counties of Poland for 2007-2016 from the Statistics Poland database (2018): sex ratio [number of women per 100 men] (FI), urbanization (U), population (P), population density (DS), total emigration (TEMI), total in-migration (TIMI), income per capita (INC), unemployment rate (UNE), mortality rate (D), infant mortality rate (INFD), marriage rate (MARR), divorce rate (DIV), and birth rate (BIR).

The socioeconomic variables and the factor scores from the factor analysis were then correlated with the county homicide and suicide rates, rates using Pearson correlations. The correlation coefficients are arranged in a matrix and coded so that strong positive correlations that enhance suicide and homicide rates are indicated in **bold** and negative correlations are indicated in *italics*. Differences in the associations from year to year were then examined.

Finally, the data from the 16 counties and 10 years were treated as 160 data points and subjected to a factor analysis using a Principal Components extraction and a varimax rotation.

Results

There were 58,492 suicides and 3,889 homicides in Poland in the years 2007-2016, with a mean suicide rate of 15.30 per 100,000, and a mean homicide rate of 1.02 per 100,000. During these years, the suicide rate peaked in 2009 (16.97 per 100,000) and was lowest in 2016 (12.16 per 100,000) (Figure 1). The homicide rate was highest in 2007 (1.37 per 100,000), and lowest 2016 (0.74 per 100,000) (Figure 2). Lubuskie (LU), Dolnoslaskie (DL) and Lodzkie (LO) counties had the highest suicide rates, while Slaskie (SL), Opolskie (OP) and Warminsko-Pomorskie (WA) counties had the lowest suicide rates (Table 1). The highest homicide rates were in Mazowieckie (MZ), Podlaskie (PDL) and Opolskie county (OP), while Lubelskie (LE), Kujawsko-Pomorskie (KU) and Wielkopolskie county (WI) had the lowest homicide rates (Table 2).

Analysis of the correlation coefficients for suicide rates for the years 2007-2016 (see Table 3) shows that while, at the beginning of this period (2007-2009), suicide rates were associated with family and migration factors (divorce rates and urbanization), after 2009, and especially in 2011, the more prominent correlates were associated with work (per capita income and unemployment). Data for homicide rates (see Table 3) indicate that the correlations between homicide rates and divorce rate, urbanization and total in-migration, as well as income (in 2007 and 2009) were positive relatively consistently throughout the whole study period. Interestingly, the strongest positive correlation between the suicide rate and homicide rates was in 2008, the year when suicide rates started to rise abruptly.

The results of the factor-analysis and the correlational analysis for 16 counties and 10 years (160 data points) are shown in Table 4. Five orthogonal (independent) factors were extracted (each with eigenvalues greater than one). Based on the loadings of socioeconomic factors most highly (> 0.50) on each factor, the factors appeared to tap: (1) dense and large population and low unemployment; (2) high marriage and birth rates (perhaps tapping social integration) and high infant mortality; (3) high divorce rate and urbanization (perhaps tapping social disintegration) and low in-migration; (4) high death rate and high birth rate and low in-migration rate; and (5) low outmigration rate and high per capita income.

Suicide rates were associated with the factor scores for Factors I and V, and they were higher in counties with a higher unemployment rate, lower population, population density and sex ratio (Factor I) and higher income and lower total emigration rate (Factor V). Homicide rates were associated with the factor scores for Factors II, III and IV, and they were higher in counties with higher marriage, birth and infant death rates (Factor II), divorce rate, urbanization index and total in-migration rate (Factor III), higher birth rate, total in-migration rate and lower death rate (Factor IV). Homicide and suicide rates were positively associated over the counties ($r = 0.20$, two-tailed $p < 0.05$).

The results of a multiple regression on the 160 data points depended on whether year was included as a variable. (Both suicide and homicide rates had negative beta coefficients for year.)

Reporting only the beta coefficients significant in both multiple regressions, suicide rates were predicted by the mortality rate (beta 0.18, $p < .05$), divorce rate (beta = 0.20, $p < .05$), birth rate (beta 0.37, $p < .05$) and out-migration (beta = -0.13, $p < .05$). Homicide rates were predicted by population density (beta = -0.37, $p < .05$), urbanization (beta = 0.66, $p < .05$), the mortality rate (beta = 0.25, $p < .05$), infant mortality rate (beta = -0.29, $p < .05$), and in-migration (beta = 0.30, $p < .05$).

Discussion

In the present study, the overall factor analysis indicated that Factors II and III, on which marriage, divorce and birth rates are loaded, were positively associated with homicide rates but not with suicide rates. However, looking at the results by year (Table 2), it can be seen that the size and sign of the associations varied over the years of the study. For example, at the beginning of the period studied, the birth rate was positively associated with the suicide rate, but the association was negative at the end of the period. For homicide rates, birth rates started the period with a negative association but ended the period with a positive association (an opposite trend to that for birth rates). Divorce rates were more consistently associated with homicide rate throughout the period. The higher the divorce rate, the higher the homicide rate.

Social integration has been defined as the extent to which members of society are bound together in social relationships (Durkheim, 1897; Lester, 1989). Higher marriage and birth rates, reflecting greater unity of the family, often serve as proxy measures of social integration. According to Durkheim's theory (1897), increased birth rates should be associated with lower rates of suicide because the presence of children strengthens social ties and increases integration. Studies have confirmed the existence of a protective effect of fertility on suicides in 15 European countries (Andrés, 2005), Denmark (Andres & Halicioglu, 2010), Canada (Leenaars & Lester, 1999), and in the United States (Classen & Dunn, 2011). However, Lester (1999) found that suicide rates in Austria (1990) were not associated with birth rates. Bhandarkar and Shah (2008) examined suicide rates and fertility rates across 75 countries and report that the relation of suicide rates with fertility rates was curvilinear (a U-shaped curve). On the other hand, the research is consistent in reporting that divorce rates are positively associated with suicide rates (Lester, 1989).

Surprisingly, in the current study homicide rates had a positive association with birth rates, especially toward the end of the period 2007-2016. In Factor II, a higher birth rate is accompanied by a higher marriage rate and infant death rate and, in Factor IV, by a higher total in-migration rate and a lower death rate. These associations may suggest that homicide rates are associated with an increase in the population (Lee, 2011). However, both in 1998 and 2007-2016, no association of marriage and birth rates with the suicide rate was found.

Homicide rates, both in the current study and in the study by Krysinska and Lester (2004), were associated with social disintegration (e.g., divorce rates) and with residential instability (urbanization and total in-migration). These processes can cause disruption of social networks, but, interestingly, these factors were not associated with suicide rates. Other research has shown that urbanization was associated with decreases in the suicide rate, for example, in Turkey (Altinanahtar & Halicioglu, 2009), Japan (Otsu, et al., 2004), and China (Sha, et al.,

2017). Further, a higher divorce rate is often is associated with higher suicide rates, for example, in the USA (Minoiu & Andres, 2008), Iran (Haghparast-Bidgoli, et al., 2018), and Denmark (Andrés & Halicioglu, 2010). Nevertheless, some studies have reported the opposite results. Urbanization and divorce rates were not associated as predicted with suicide rates in the USA (Lester, 1992) or in Austria (Lester, 1999). Some researchers report that in-migration increases homicide rates, while other researchers report that in-migration decreases homicide rates (e.g., Ousey & Kubrin, 2009). Back in 1886 Tarde (1898) noted that an inverse relationship between in-migration and suicide could be seen in cross-national comparisons and time series in individual countries (Unnithan, et al., 1994), but Stack (1982) found out that in-migration can increase suicide rates, perhaps by breaking ties between the individual and the social system.

Suicide rates in Poland in the period 2007-2016 increased in the counties with increased income and lower total out-migration. As older people do not have the same propensity to migrate, the above result could be related to the age of the population, but the impact of age was not examined in our study. According to Durkheim (1897), a higher income increases independence and decreases social integration, leading to higher suicide rates. Henry and Short (1954) predicted that (1) suicide rates will rise during times of economic depression and fall during economic prosperity and the homicide rates will behave in the opposite way, and (2) the correlation between suicide rates and the business cycle will be higher for high status groups, while the correlation between homicide rates and the business cycle will be higher for low status groups. The negative influence of high income on suicide rates could be even explained by the Strain Theory of Suicide which proposed that, when poor people are reminded about the wealth and success of the others, their risk of suicide increases (Zhang, et al., 2013). Interestingly, income was not associated with homicide rates, neither in our study nor in the study of by Krysinska and Lester (2004).

Durkheim (1897) suggested that the degree of social interaction varies with the number of people in an area and this influences the degree of social integration. However, he did not use population density in his analysis of suicide rates (Barkan, Rocque & Houle, 2013). Low population density can produce higher suicide rates (Recker, 2016; Chang, 2011; Hong & Knapp, 2013), as it is typically associated with diminished social interaction (Fischer, 1982; Kowalski, Faupel & Starr 1987; Putnam, 2000; Wilkinson, 1984) and weaker social ties (Granovetter, 1973; Wilkinson, 1984), which result in lower social integration, similar to regions with less residential stability (Barkan, Rocque & Houle, 2013). Both in the study of Lester and Krysinska (2004) and in the present study, the regions with smaller populations and higher unemployment were the regions with higher suicide rates. In the present study, it is not only a smaller population size, but also a lower population density and sex ratio (females per 100 males) that add to lower social integration. In 1998, counties with higher suicide rates were the counties with lower residential stability caused by higher total in-migration, total-outmigration, urbanization and higher divorce rates. Also in Poland, Jarosz (1985) reported that, at the beginning of industrialization, there was a weakening of social ties and a gradual loss of traditional values (decreases in social integration and social regulation) in rural regions, and this contributed to higher suicide rates in these regions.

The results of previous research on the relationship between socioeconomic variables and suicide and homicide rates have been inconsistent and contradictory. The present study has

illustrated that even within one country, these associations are not consistent over time. Land, et al. (1990) suggested that much of the apparent inconsistency in the literature can be accounted for by the problem of multicollinearity. Commonly used indicators of structural conditions are often intercorrelated which makes statistical estimation less reliable. To avoid these problems, they suggested that combining correlated structural variables into composite measures could minimize this problem. In our study, three such combination measures seemed to have an influence on suicide and homicide rates in Poland in both in 1998 and in 2006-2017: residential stability (total out-migration, total in-migration, urbanization), social integration (marriage, birth and divorce rates, population, population density, sex ratio, death and infant death rate) and economic deprivation (income, unemployment).

There are limitations in this study. We studied only the total suicide rate of the counties and did not examine the suicide rates be sex or by age (or by any other demographic variables). The study was limited to the 16 counties, and we did not break the counties into smaller regions (which would have provided more data points but less reliable suicide rates). However, our study did demonstrate that the influence of socioeconomic variables on suicide and homicide rates depends critically on the time period analyzed and associations cannot be generalized to all time periods.

This type of study allows us to better document and understand the dynamic changes in society that change over time and space, changes which need to be better acknowledged by researchers and policy makers. Taking into account and monitoring the socioeconomic changes in the population that increase or decrease the potential for homicide and suicidal behaviors on a regular basis may help policy makers to plan for more adequate suicide preventive strategies and to evaluate these strategies. We agree with the suggestions of Anyikwa, Haman and Phiri (2018) that a comprehensive system of adequate data collection providing data on suicides across the different sexes, races, age groups, religious backgrounds and other relevant socio-demographic factors is necessary. This would not only facilitate and enrich future research on lethal violence, but it would also allow us to monitor the direction of changes in lethal violence and take adequate countermeasures. The regular analysis of social correlates by time period and region should become a standard component in the evaluation of the impact of national and regional preventive efforts on suicide and homicide rates.

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Table 1. Suicide rates in Poland (2007-2016). Descriptive statistics.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	MEAN	RANK	DIAGRAM	MAX	MIN	RANGE	STDEV
PL	**13,86**	**14,90**	**16,97**	**16,47**	**15,86**	**16,52**	**16,14**	**15,42**	**14,09**	**12,16**	**15,24**	**7**		**16,97**	**12,16**	**4,81**	**1,50**
DL	16,02	17,81	23,10	18,14	17,83	18,63	22,53	19,36	16,42	13,95	**18,38**	**16**		23,10	13,95	9,16	2,80
KU	13,84	13,45	11,89	14,44	19,11	20,31	20,72	20,42	17,00	7,39	**15,86**	**12**		20,72	7,39	13,34	4,42
LE	12,04	16,32	19,31	21,50	22,39	21,63	18,98	17,52	15,12	16,53	**18,13**	**14**		22,39	12,04	10,35	3,27
LU	17,73	16,84	20,86	22,09	22,58	17,69	22,60	23,12	22,46	14,64	**20,06**	**17**		23,12	14,64	8,48	3,04
LO	17,04	18,12	21,97	18,57	19,03	19,62	18,79	17,78	16,33	14,19	**18,14**	**15**		21,97	14,19	7,78	2,07
MA	13,56	14,90	15,83	15,49	15,09	16,12	14,90	13,38	12,04	12,05	**14,34**	**4**		16,12	12,04	4,07	1,49
MZ	12,28	14,75	15,54	14,88	15,64	15,13	14,15	14,76	13,71	12,69	**14,35**	**5**		15,64	12,28	3,36	1,14
OP	12,43	12,49	16,01	14,24	12,31	14,72	13,11	12,17	13,62	11,56	**13,26**	**2**		16,01	11,56	4,45	1,38
PDK	11,68	14,01	14,79	19,93	16,07	19,26	17,95	17,05	16,22	10,34	**15,73**	**10**		19,93	10,34	9,59	3,10
PDL	15,53	18,07	18,76	16,11	14,14	16,17	14,96	15,34	14,70	13,64	**15,74**	**11**		18,76	13,64	5,12	1,62
PO	13,53	14,06	17,01	15,72	15,66	15,09	17,45	15,75	15,71	14,23	**15,42**	**8**		17,45	13,53	3,92	1,24
SL	11,60	11,29	11,88	11,58	9,96	11,25	10,25	9,45	8,21	6,68	**10,22**	**1**		11,88	6,68	5,20	1,70
SW	10,04	9,84	9,94	17,36	16,95	15,92	18,89	20,86	18,18	17,06	**15,50**	**9**		20,86	9,84	11,03	4,06
WA	15,46	16,16	19,79	19,12	13,35	12,47	6,97	7,61	12,97	14,68	**13,86**	**3**		19,79	6,97	12,82	4,23
WI	15,25	15,38	18,50	16,42	13,51	17,52	15,48	14,79	11,95	11,16	**14,99**	**6**		18,50	11,16	7,35	2,30
ZA	18,63	17,63	22,29	18,62	19,09	17,48	18,49	17,29	15,23	13,22	**17,80**	**13**		22,29	13,22	9,06	2,39

SR – suicide rate. Red – higher suicide rates. Green – lower suicide rates. PL – Poland, DL – dolnoslaskie, KU – kujawsko-pomorskie, LE – lubelskie, LU – lubuskie, MA – malopolskie, MZ – mazowieckie, OP – opolskie, PDK – podkarpackie, PDL – podlaskie, PO – pomorskie, SL – slaskie, SW – swietokrzyskie, WA – warminsko-mazurskie, WI – wielkopolskie, ZA – zachodniopomorskie

Table 2. Homicide rates in Poland (2007-2016). Descriptive statistics.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	MEAN	RANK	DIAGRAM	MAX	MIN	RANGE	STDEV
PL	**1,37**	**1,27**	**1,09**	**0,93**	**1,07**	**0,96**	**1,10**	**0,87**	**0,76**	**0,74**	**1,02**	**10**		**1,37**	**0,74**	**0,63**	**0,20**
DL	1,07	0,69	0,00	0,17	0,28	0,38	1,23	1,54	1,41	1,14	**0,79**	**7**		**1,54**	**0,00**	1,54	**0,56**
KU	1,35	1,16	0,53	0,53	0,92	0,43	0,57	0,62	0,77	0,10	**0,70**	**3**		**1,35**	**0,10**	1,25	**0,37**
LE	0,41	0,69	0,74	1,11	0,97	0,60	0,74	0,65	0,56	0,28	**0,67**	**2**		**1,11**	**0,28**	0,83	**0,24**
LU	1,39	0,89	1,29	0,79	1,58	0,78	1,66	1,08	0,59	1,28	**1,13**	**11**		**1,66**	**0,59**	1,07	**0,36**
LO	1,62	2,49	1,40	1,68	1,29	1,69	1,30	0,59	0,48	0,76	**1,33**	**13**		**2,49**	**0,48**	2,01	**0,60**
MA	1,26	1,14	0,80	0,83	1,28	0,96	0,87	0,90	0,59	0,56	**0,92**	**9**		**1,28**	**0,56**	0,72	**0,25**
MZ	2,37	1,77	1,59	1,16	1,59	1,35	1,46	0,98	1,01	1,09	**1,44**	**14**		**2,37**	**0,98**	1,39	**0,43**
OP	0,95	1,44	1,35	0,68	0,97	0,79	0,69	0,00	0,20	0,00	**0,71**	**4**		**1,44**	**0,00**	1,44	**0,51**
PDK	1,00	0,66	0,57	0,19	0,28	0,61	0,61	0,23	0,42	0,28	**0,49**	**1**		**1,00**	**0,19**	0,81	**0,25**
PDL	1,91	1,33	1,92	1,25	2,01	1,25	1,83	1,08	0,93	2,35	**1,59**	**16**		**2,35**	**0,93**	1,42	**0,47**
PO	1,87	1,46	1,91	1,94	1,44	1,50	1,23	1,14	1,21	1,13	**1,48**	**15**		**1,94**	**1,13**	0,81	**0,32**
SL	1,11	1,03	0,54	0,60	0,43	0,78	0,99	1,00	0,66	0,61	**0,77**	**6**		**1,11**	**0,43**	0,68	**0,24**
SW	0,77	1,32	0,78	0,62	1,64	1,32	0,55	0,86	0,16	0,16	**0,82**	**8**		**1,64**	**0,16**	1,48	**0,49**
WA	1,74	1,54	1,82	1,19	1,05	0,83	1,03	0,69	1,32	1,53	**1,27**	**12**		**1,82**	**0,69**	1,13	**0,38**
WI	0,80	1,04	1,15	1,03	0,74	0,58	0,99	0,78	0,40	0,20	**0,77**	**5**		**1,15**	**0,20**	0,95	**0,30**
ZA	1,54	1,60	2,31	1,06	1,89	1,68	1,80	1,05	0,99	0,88	**1,62**	**17**		**2,31**	**0,88**	1,43	**0,47**

HR – homicide rate. Red – higher homicide rates. Green – lower homicide rates. PL – Poland, DL – dolnoslaskie, KU – kujawsko-pomorskie, LE – lubelskie, LU – lubuskie, MA – malopolskie, MZ – mazowieckie, OP – opolskie, PDK – podkarpackie, PDL – podlaskie, PO – pomorskie, SL – slaskie, SW – swietokrzyskie, WA – warminsko-mazurskie, WI – wielkopolskie, ZA – zachodniopomorskie

Table 3. Pearson correlation for suicide rates and homicide rates and socioeconomic variables in Poland (1998, 2007-2016)

Homicide rate (PL)											
Year	1998	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
P	-14	19	5	-21	-1	-30	-3	1	27	16	-10
DS		-11	-9	-45	-22	-43	-11	-21	14	-9	-24
FI	14	23	46	-5	10	-13	15	15	12	4	-7
D	1	-4	41	-8	10	10	32	8	7	-25	4
INFD	-27	-24	-51	-18	-76	-8	-41	24	-23	-17	-9
INC		54	7	56	-29	30	-1	11	-1	22	-1
UNE	33	-5	-7	13	-14	20	1	-4	-26	11	10
MARR	-43	-18	-27	-32	-14	-52	-63	-44	-23	-16	5
BR	-46	30	-10	13	37	-5	-4	9	31	28	18
DIV	64	52	19	51	9	8	-1	43	31	63	34
U	48	48	27	37	21	5	21	61	60	58	47
TEMI	39	-24	-6	14	-14	10	-17	-15	-27		6
TIMI	48	54	17	46	15	28	19	37	36		30
SUI & HOM	34	16	69	2	24	-20	8	22	-7	30	

Suicide Rate (PL)											
Year	1998	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
P	-27	-26	-14	-22	-49	-33	-22	-24	-31	-60	-41
DS		-38	-45	-45	-64	-49	-42	-29	-38	-62	-60
FI	-18	18	23	7	-27	7	13	12	4	-14	-11
D	-38	4	13	10	1	26	12	13	20	8	25
INFD	-24	29	6	-3	-9	25	13	-4	-27	-8	-11
INC		7	-10	46	19	32	4	7	-12	19	19
UNE	44	18	4	11	45	30	9	-2	3	32	17
MARR	-6	-8	5	-23	-11	-24	7	-19	-19	-20	-28
BR	13	21	16	13	-7	-2	-4	-11	-19	-26	-14
DIV	60	67	32	41	-9	5	-14	6	17	10	-11
U	36	47	24	17	-34	-14	-36	-8	-15	-16	-27
TIMI	54	19	4	13	-15	-5	-37	-1	-4		23
TEMI	43	-2	-19	9	25	2	-20	-22	-8		30

Table 4: Factor Analysis for 16 counties and 10 years (160 data points)
(decimal points omitted for loadings)

Factor	1	2	3	4	5
DS	+76#	+04	+07	+16	-05
FI	+59#	+09	+43	+43	-01
UNE	-81#	+16	+07	+08	+11
P	+89#	+02	+15	-10	+12
INFO	-15	+78#	+25	+13	-10
Year	+03	-90#	-03	+10	+27
MARR	+10	+91#	-14	-22	-12
BIR	+34	+53#	+01	-65#	+21
DIV	-09	+02	+92#	-02	-02
U	+29	+06	+86#	+07	+03
D	+21	-05	+15	+87#	+02
TIMI	+07	+05	+52#	-65#	-13
TEMI	-15	+28	+11	-05	-86#
INC	-46	-16	+13	-06	+64#
Eigenvalues	3.35	3.01	1.94	1.71	1.01
% variance	23.95	21.50	13.86	12.20	7.19
# loading > 0.50					
Correlations with					
Sui rate	-0.33**	+0.08	+0.10	+0.07	+0.20*
Hom rate	-0.06	+0.21**	+0.37**	-0.16*	-0.05

suicide rate and homicide rate r = +0.20*

* two tailed $p < .05$
** two-tailed $p < .01$

Factor 1: DS (population density), FI (feminization [number of women per 100 men]), P (population) positive; UNE (unemployment rate) negative:
Factor 2: INFO (infant mortality rate) MARR (marriage rate) BIR (birth rate) positive; year negative:
Factor 3: U (urbanization) DIV (divorce rate) TIMI (total imigration) positive:
Factor 4: D (mortality rate) positive; BIR (birth rate) TIMI (total in-migration) negative
Factor 5: INC (income per capita) positive; TEMI (total emigration) negative

Figure 1. Suicide rates in Poland 2007-2016.

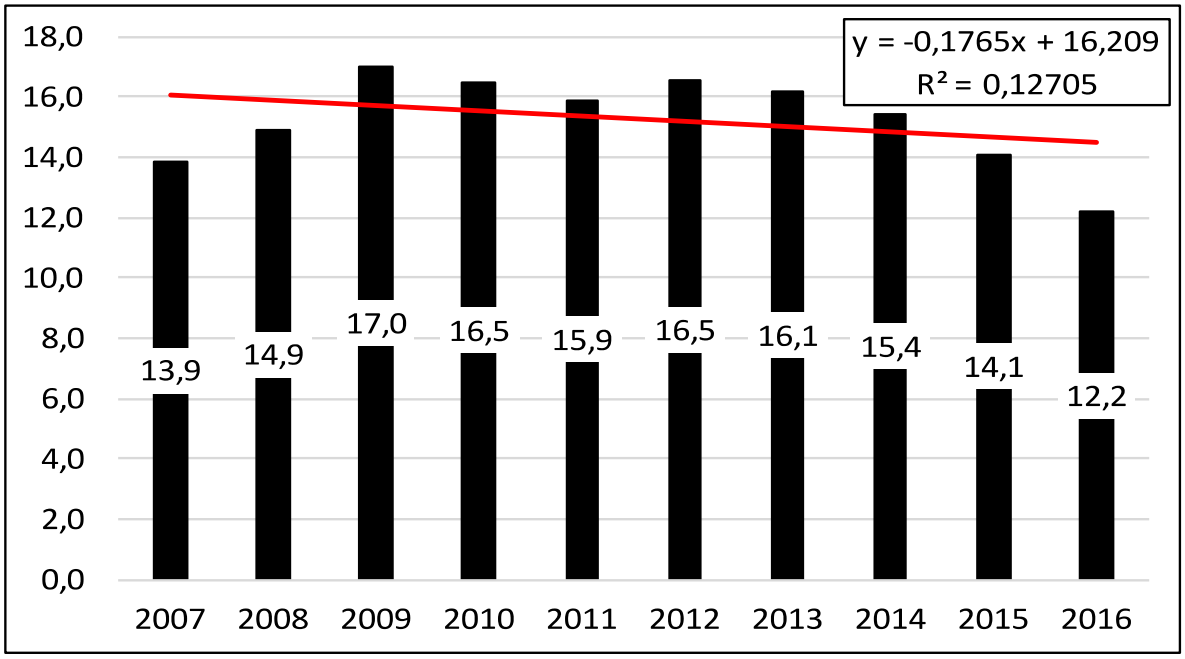
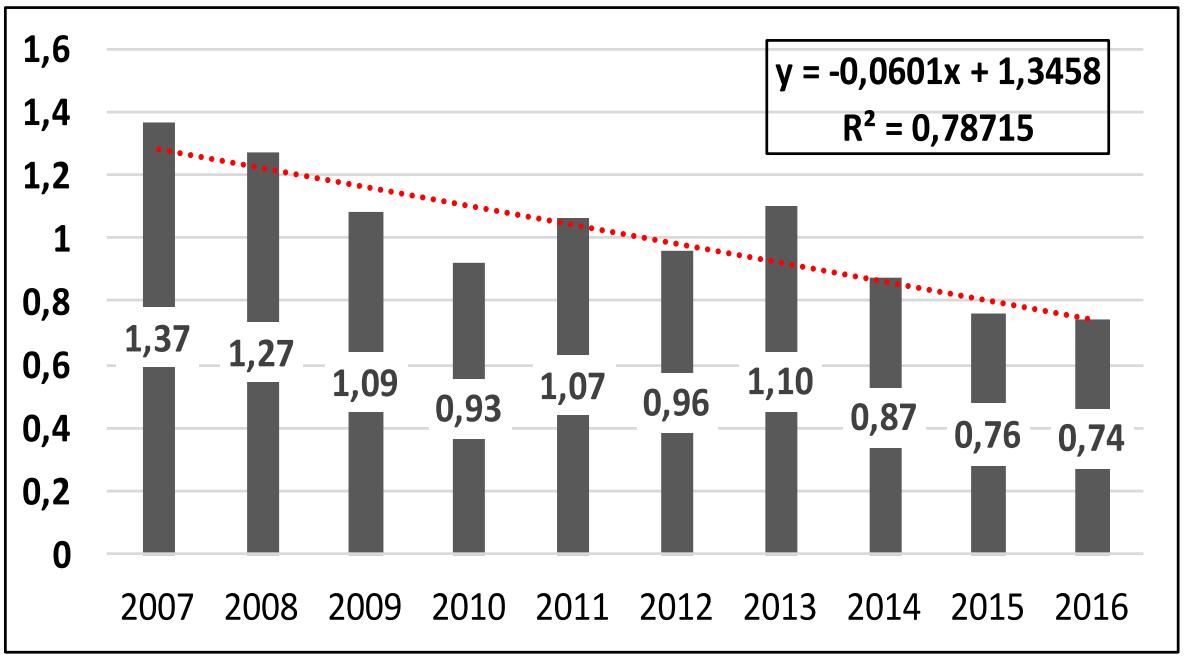


Figure 2. Homicide rates in Poland 2007-2016.



Suicide Studies, 2022, 3(4), 63-71.

SUICIDAL TENDENCIES IN CREATIVE WRITING: AN ANALYSIS OF GENDER-THEMED POETRY BY CESARE PAVESE, ANNE SEXTON AND SYLVIA PLATH

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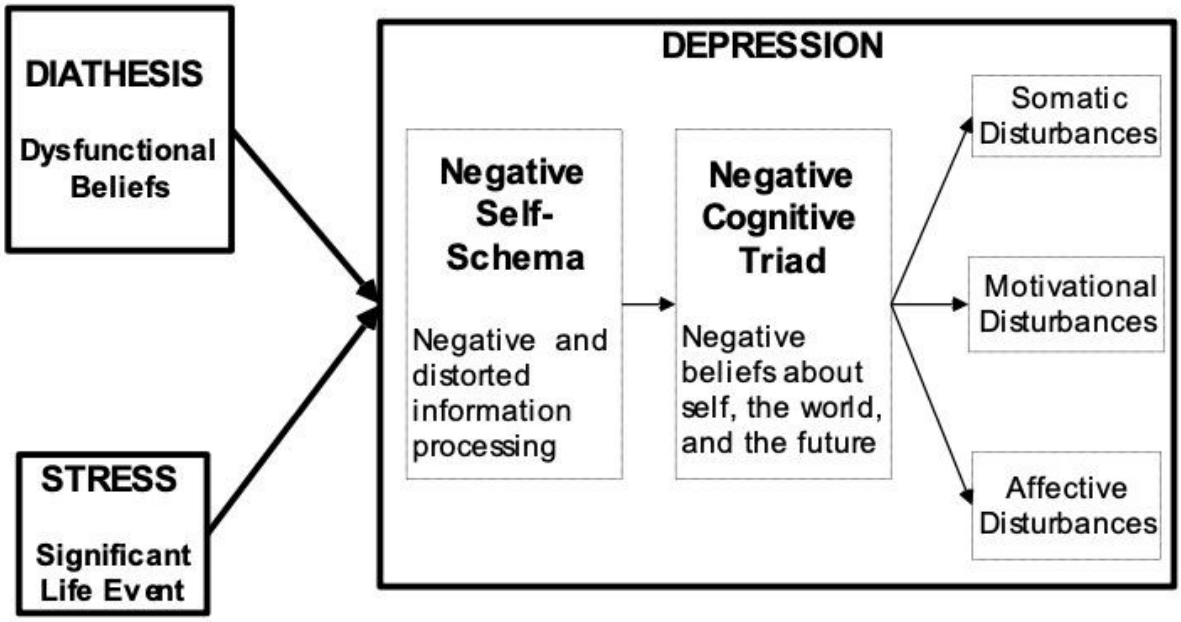
Abstract: The recent and earlier poems of three poets who died by suicide (Cesare Pavese, Sylvia Plath and Anne Sexton) were analysed using the LIWC. The recent poems had more religious words and, surprisingly, more question marks. The gender-themed poems were oriented more toward others and to the present and future.

The relationship between artistic creativity and mental illness has long been a subject of debate, initially derived from a mistranslation of the Greek philosopher, Plato. As a result, "artistic inspiration" came to be seen as a "symptom of psychopathology", a view that led to the trope of the 'mad artist' (Schlesinger, 2012).

This trope has been applied to artists of all kinds, but poets have been found to have higher rates of this so-called 'madness' than others in the creative fields, most notably, higher rates of depression (Thomas & Duke, 2007; Kaufman & Baer, 2002). Many hypotheses regarding this connection have been suggested. For example, perhaps poetry's emotional and more personal nature draws to this particular art form those more susceptible to mental instability (Kaufman & Baer, 2002). However, a definitive reason for this relationship remains to be proven.

Depression, according to Beck's Cognitive Model of Depression (Beck, et al, 1979), is a cognitive disorder that develops as a result of the intersection of dysfunctional beliefs present before the formal diagnosis of depression and a significant life event. From this intersection comes a negative self-schema, which leads to distorted and negatively biased information processing, a state known as the *Negative Self-Schema*. The Negative Self-Schema is characterized by its intrusive nature. As depression worsens, these distortions eventually dominate thinking, leading to the three negative beliefs that characterize the *Negative Cognitive Triad*: a negative view of the self, the world, and the future. Those with depression will develop feelings of worthlessness and see themselves as defective or deficient, beliefs that the world places unreasonable demands upon them, and pessimism regarding their ability to attain desired outcomes (Brown, 2013). These thought processes are the center of all types of depression, which ultimately results in a specific set of symptoms: somatic, motivational, and affective symptoms (Brown, 2013). This progression of depression is known as Beck's Cognitive Model of Depression, as depicted in Figure 1.

Figure 1: Aaron Beck's Cognitive Model of Depression (Brown, 2013)



The culmination of the depressive symptoms illustrated in the above model can be seen through severe depressive episodes, the result of combinations of hopelessness and cognitive distortions. Suicide has been seen to stem from these depressive episodes (Beck, 2001).

Anne Sexton, an American poet renowned for her morose, confessional work, died by suicide in 1974 at the age of 45 (Torres, 2018). Starting with her postpartum depression following the birth of her second daughter in 1955, Sexton developed anxiety attacks, fits of rage, and mental breakdowns (Torres, 2018). She led a promiscuous lifestyle and idealized the female body in her poetry, often praising femininity, emphasizing the female body, and depicting relationships between lovers (Khalifeh, 2010). This promiscuous lifestyle, alcoholism, and strained family relationships following her divorce contributed to her eventual suicide.

Sylvia Plath, another American poet, known for her dark themes and confessional verse, was also the victim of a downward spiral in her early life, a combination of complex feelings regarding her father, career disappointments, and outside pressures to conform to the female gender roles of the time, that resulted in her eventual diagnosis of clinical depression (Torres, 2018). Despite a brief recovery, a strained relationship with her husband Ted Hughes worsened her condition. There was constant discord regarding her role as a wife and mother in the home (Runco, 1998). Her own personal desire to have a child conflicted with her desire to pursue writing as a career, consequently challenging the gender role that she felt she had to fulfill (Runco, 1998), eventually leading to her suicide in 1963.

The Italian poet Cesare Pavese died by suicide 24 years earlier, in August 1950. Pavese lived and died in the same time and literary period as Plath. Pavese's development of

depression was largely due to his views of women. His poor relationship with his mother lead to a life of difficulties with the opposite sex, in which he struggled with communication and rejection (Lester, 2014). Instead of pursuing those who might come to love him, his disdain for maternal or submissive women resulted in the pursuit of women who were perverse and unfaithful. His poetry reflected his distrust of women and portrayed his resulting loneliness and disappointment with himself (Bogousslavsky, 2018).

There have been many studies on suicide, depression, and their relationships with a poet's writing, especially in the case of widely renowned poets such as Sylvia Plath (Pająk & Trzebiński, 2014; Thomas & Duke, 2007; Runco, 1998). However, Anne Sexton and Cesare Pavese have been studied less, and they have never before been studied along with Sylvia Plath in one comparative study. The present study will focus on the writing of these poets, in particular their gender-themed work, themes centered on the ideas of gender norms in society, women, men, romantic and sexual relationships,and motherhood. The relationship between their suicidal tendencies and their gender-themed writing will address the question: How does gender-themed writing versus general themed writing by Cesare Pavese, Anne Sexton and Sylvia Plath potentially illustrate the differing ways suicidal tendencies are reflected in poetry?

The hypothesis is that there will be more extreme values representing the reflection of depression in the gender-themed poetry written one year or less before the suicide than in earlier poems. The severity of the poets' depressive states will indicate suicidal tendencies because suicides are typically characterized by severe depressive episodes. Gender-themed writing will reveal more extreme reflections of depressive symptoms than their general poetry because, for all three poets, their depression stemmed from issues related to these themes in their lives.

Method

Computational Analysis Software:

The Linguistic Inquiry and Word Count (LIWC) software was used for the quantitative analysis. The LIWC is comprised of two main features: the processing component and the dictionaries. The processing feature opens a series of text files (for this study, poems) and searches the files word by word. Each word is compared with the dictionary file, and this comparison is then used to determine the percentage of words in psychologically significant categories (Pająk & Trzebiński, 2014). There are 70 word categories in the LIWC.

The percentage of words belonging to each dimension will be compared in gender-themed poems and those unrelated to gender themes. This software is still relatively crude as words can still have a multitude of implications. A computer program cannot guess perfectly the emotions of a person through their writing (Pennebaker & Tausczik, 2010). It is also difficult to accurately infer a person's state of mind and mental health based on writing alone. Longer texts (50 words or more) are needed to give the software more information to provide a valid analysis.

Poet Selection

Three poets were chosen to compare the different ways suicidal tendencies are reflected in writing closely related with the initial cause of their depressive symptoms. For this study, the sample was limited to three poets. All poets were diagnosed with depressive disorders during their lifetimes and all died by suicide within twenty years of each other. Their births and deaths were in the same time period, and so factors such as literary movements and economic situations were similar. The poets have similar recurring poetry themes, most notably gender norms in society, women, sexual and romantic relationships between men and women, and motherhood. Their depressions and eventual suicides all stemmed from issues related to at least one of these (Lester, 2014; Torres, 2018). The poets chosen were Anne Sexton, Sylvia Plath, and Cesare Pavese.

Poem Selection

A total of 36 poems were chosen, with 12 poems of different lengths from each poet. Six gender-themed poems and six poems with no gender themes at all were chosen. Three gender-themed poems and three general-themed poems were written no more than a year before the poet's suicide, and three of each theme group were written more than a year before the suicide (no more than 20 years), as shown in Figures 2-5. The length of each poem allows for a range of different lengths and word counts to be analyzed. This small number of texts does, however, limit the results. To be eligible for this study, the poems must contain 50 words or more in order to produce as accurate results as possible. The six gender-themed poems contained main themes surrounding gender, including gender norms in society, women, romantic and sexual relationships, and/or motherhood. The general-themed poems could contain any theme as long as there were no gender themes.

Figure 2: Selected Gender-Themed Poems Written 1 Year or Less Before Suicide

By Cesare Pavese[1]	**By Anne Sexton**	**By Sylvia Plath**
"Street Song" (272 words)	"Is It True?" (1586 words)	"Gigolo" (170 words)
"Two" (186 words)	"The Witch's Life" (198 words)	"An Appearance" (113 words)
"The Cats Will Know" (147 words)	"When Man Enters Woman" (97 words)	"Edge" (113 words)

Figure 3: Selected Gender-Themed Poems Written More than 1 Year Before Suicide

By Cesare Pavese	By Anne Sexton	By Sylvia Plath
"Deola Thinking" (385 words)	"Snow White and the SevenDwarfs" (962 words)	"The Snowman on the Moor"(306 words)
"Lost Women" (317 words)	"For My Lover, Returning to HisWife" (342 words)	"Face Lift" (266 words)
"The Country Whore" (264 words)	"Woman with Girdle" (146 words)	"The Spinster" (155 words)

[1] Note that Cesare Pavese's poetry are translations; however, most of these translations are by Geoffrey Brock, and are widely recognized as the English equivalent. Brock was awarded the Raiziss de Palchi Translation Fellowship from the Academy of American Poets, the MLA's Lois Roth Translation award, and the PEN Center USA award for his translation ofPavese's poetry (specifically *Disaffections: Complete Poems 1930–1950*).

Figure 4: Selected General-Themed Poems Written 1 Year or Less Before Suicide

By Cesare Pavese	By Anne Sexton	By Sylvia Plath
"You Have a Face of Carved Stone" (121 words)	"The Fire Thief" (437 words)	"Lady Lazarus" (414 words)
"Death Will Come with YourEyes" (106 words)	"The Rowing Endeth" (244 words)	"Stars over the Dordogne" (360 words)
"In the Morning You AlwaysCome Back" (68 words)	"Big Heart" (199 words)	"Ariel" (112 words)

Figure 5: Selected General-Themed Poems Written More than 1 Year Before Suicide

By Cesare Pavese	By Anne Sexton	By Sylvia Plath
"Smokers of Paper" (511 words)	"The Expatriates" (256 words)	"Tulips" (622 words)
"The Boy that was in Me" (430 words)	"The Ambition Bird" (238 words)	"The Colossus" (223 words)
"Atlantic Oil" (422 words)	"Wallflower" (178 words)	"You're" (115 words)

Results

The results are shown in Table 1 where 2-way ANOVAs were conducted examining the impact of older versus recent poems and general versus gender themes. Fifteen LIWC variables gave significant differences at the .10 level, of which eight were significant at the .05 level or better.

Emotions did not significantly differentiate the old versus recent poems, nor those with gender themes and those with general themes, contrary to the predictions. However, gender them poems did have a higher percentage and long words (more than 6 letters) and a higher percentage of references to others. social process and humans in general and words related to sex.

The recent poems had a higher percentage of references to the present and future (but did not differ in references to the past). The recent poems had higher percentages of metaphysical and religious words and also to the body and physical processes.

In the only significant two-way interaction, the recent gender themed poems had more question marks.

Discussion

The initial hypothesis proposed that gender-themed poetry written one year or less before each poet's suicide would provide the most extreme results. Although the recent poems did not differ from the older poems in emotions and references to death, they did have more religious references and references to the present and future. As their suicide approached, the poets seemed to be less interested in the past. The gender themed poems seemed to be more oriented toward other people than the general themed poems.

The finding regarding question marks may seem odd, but Pennebaker and Stone (2004) found that the use of question marks increased over the last six months of the diary of a young woman who died by suicide. They proposed no explanation for this, but the finding that the recent poems with gender themes had the highest percentage of question marks is consistent with that earlier finding.

This study is limited, of course, by the selection both of the poets and which of their poems to use. Despite these limitations, the present study provides some insights into the minds of these poets close in time to their suicides and provides hypotheses for future research.

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Table 1: Results of the ANOVAs
(F values shown [df=1,32], along with which group had the higher or lower percentages)

	Recent	Gender	Recent-by-Gender	
WC	0.47	0.31	0.15	
WPS	1.19	2.91*	0.29	
Qmarks	5.30**	2.58	3.45*	recent/gender highest
Unique	0.01	0.01	0.20	
Dic	2.82	0.08	0.43	
Sixltr	1.23	3.59*	0.24	gender higher
Pronoun	0.02	0.59	0.41	
I	0.04	1.61	0.59	
We	0.12	0.07	0.48	
Self	0.01	1.76	0.98	
You	0.01	0.36	1.32	
Other	1.31	4.70**	1.59	gender higher
Negate	1.81	0.90	0.47	
Assent	0.87	0.31	0.11	
Article	0.52	0.32	1.89	
Preps	7.94***	0.01	0.01	recent fewer
Number	0.32	0.06	0.24	
Affect	1.08	0.35	1.08	
Posemo	0.32	0.04	0.12	
Posfeel	0.58	0.01	0.20	
Optim	0.07	0.10	1.80	
Negemo	0.86	1.19	1.32	
Anx	1.81	0.96	0.02	
Anger	1.57	0.25	0.17	
Sad	1.56	0.97	075	
Cogmech	0.16	0.69	1.90	
Cause	0.03	0.80	0.37	
Insight	0.10	0.06	0.01	
Discrep	1.95	0.04	0.55	
Inhib	1.35	0.07	1.41	
Tentat	0.01	0.21	0.01	
Certain	0.01	2.68	0.07	
Senses	1.52	0.73	0.31	
See	1.22	0.05	0.38	
Hear	0.15	0.06	0.26	
Feel	0.03	0.41	0.01	
Social	0.10	5.92**	0.41	gender higher
Comm .	0.40	0.27	0.01	
Othref	1.15	1.68	1.90	
Friends	2.09	0.06	1.27	
Family	1.07	0.01	0.36	

Humans	1.43	5.35**	0.98	gender more
Time	0.63	0.55	0.49	
Past	1.63	0.16	1.41	
Present	3.99*	0.36	0.74	recent higher
Future	3.05*	0.27	0.97	recent higher
Space	0.65	0.89	0.13	
Up	1.78	0.23	0.20	
Down	3.01*	0.56	0.99	recent lower
Incl	0.01	1.32	0.01	
Excl	0.01	0.19	0.28	
Motion	0.02	1.75	0.05	
Occup	1.06	0.20	0.87	
School	0.72	0.02	1.09	
Job	9.18***	0.77	1.00	recent lower
Achieve	0.05	0.21	0.37	
Leisure	0.98	1.27	0.04	
Home	1.97	0.80	0.06	
Sports	0.84	0.07	0.28	
TV	0.08	0.05	0.32	
Music	0.14	0.79	0.42	
Money	0.14	0.01	0.50	
Metaph	5.02**	1.29	0.50	recent higher
Relig	5.17**	0.01	0.08	recent higher
Death	1.07	1.94	1.07	
Physcal	3.20*	0.29	0.37	recent higher
Body	3.65*	0.01	0.37	recent higher
Sexual	0.06	4.00*	0.02	gender higher
Eating	0.13	0.57	2.02	
Sleep	1.28	0.50	0.73	
Groom	0.85	1.23	1.28	
Swear	1.87	0.08	0.89	

* $p < .10$
** $p < .05$
*** $p < .01$

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THE VARIATION OF SUICIDE RATES IN MUSLIM NATIONS: THE IMPACT OF SHARIAH RULE AND SHIA/SUNNI PROPORTION

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Abstract: In a sample of 46 Muslim majority nations, the presence of Shariah rule was associated with lower estimated suicide rates, as was the percentage of Muslims in the population. The percentage of Shia Muslims did not appear to be associated with the suicide rate.

It is well documented that Muslim nations have a lower suicide rate than other nations (e.g., Lester, 2006). Although many research studies have focused on the differences in the suicide rate of Catholic versus Protestant nations in the Western world, very little research has looked at the impact of the Sunni/Shia representation in the Muslim nations or the impact of Shariah rule. The present note is an attempt to explore these impacts.

Method

Lew, et al. (2022) presented data on suicided in 46 Muslim majority nations. In 2020, the WHO estimated age-standardized suicide rates from 2000 to 2019 for its member states under the Global Health Estimates.[4] The WHO Global Health Estimates of suicide rates utilized information from the Global Burden of Disease study, the WHO Mortality Database, and other data sources to provide the best possible estimates. The data for 2019 were used for the present analysis.

Data for the Sunni/Shia populations were obtained from www.pewresearch.org/wp-content/uploads/sites/7/2009/10/Shiarange.pdf. Data on the presence of Shariah rule were obtained from https://worldpopulationreview.com/country-rankings/sharia-law-countries.

Data for the populations of the nations and the Hunan Development Index were obtained from Lew, et al. (2022).

[4] WHO. Age-Standardised Suicide Rates for 2000-2019;2021. https://www.who.int/data/gho/data/indicators/indicator-details/GHO/age-standardized-suicide-rates-(per-100-000-population). Accessed October 19, 2021.

Results

First the impact of Shariah rule was examined (Table 1). It can be seen that any form of Shariah rule was associated with lower suicide rates. Accordingly, for the correlational and regression analyses, Shariah rule was coded as absent (0) versus present in some form (1).

Table 1: Suicide rate and Shariah law

	none	classic	mixed	some regions
Mean	8.74	5.97	5.39	4.52
SD	(4.50)	(3.13)	(3.28)	(1.73)

F=2.72, df=3,42, p=.056

The correlational analysis (see Table 2) showed that the presence of Shariah rule in some form was associated with lower suicide rates. This result was also found in the linear regression analysis, where the R^2 value was high. In addition, the higher the Human Development Index (HDI), the lower the suicide rate. However, the percentage of Shia Muslims in the nation did not contribute to the prediction of the suicide rate.

Only the percentage of Muslims in the nations was associated with the male/female suicide rate ratio, with this ratio lower in nations with a higher percentage of Muslims. (Note that all nations in the study had Muslim majorities.)

Discussion

The results of this study suggested that the presence of Shariah rule is associated with and predicts lower suicide rates in Muslim majority nations. The percentage of Shias in the nations was not associated with the suicide rate.

This study suggests avenues for future research, but it must be remembered that the suicide rates here are estimated rates from the WHO and not actual suicide rates. However, if ever suicide rates are reported by these nations, they may be affected by the variables studied here: the presence of Shariah rule, the percentage of Muslims in the nation, and the percentage of Shias in the nations. In the Western world, coroners and medical examiners in Catholic nations are more likely to cover up suicides (and classify them as accidental or natural deaths) than coroners and medical examiners in Protestant nations (Cantor, et al., 1997).

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Table 2: Predicting Muslim nation suicide rates

	Suicide rate	Male/Female suicide rate ratio
Pearson correlations		
suicide rate		-0.103
population	-0.152	-0.050
% Muslim	-0.178	-0.324*
HDI	-0.506***	+0.503***
% Shia	-0.203	+0.132
Shariah rule	-0.297*	-0.041
Regressions (β)		
population	-0.043	+0.009
% Muslim	-0.263*	-0.233#
HDI	-0.516***	+0.451**
% Shia	-0.022	+0.040
Shariah rule	-0.297*	-0.041
R^2	0.464	0.302

significant in a backward multiple regression
* $p < .05$
** $p < .01$
*** $p<.001$

Suicide Studies, 2022, 3(4), 75-80.

DEATH ANXIETY AND SUICIDAL BEHAVIOR

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Abstract: In a sample of 1,145 university students in China found that those who had planned for suicide in the past had less death anxiety than nonsuicidal students, those who had suicidal ideation in the past or those who had made attempts at suicide in the past.

There has been interest in whether those who are suicidal have a reduced fear of death or lower death anxiety than non-suicidal people. For example, Goldney (1982) compared 103 young adult women who had attempted suicide with nonsuicidal women and found no differences in death anxiety. For the attempted suicides, higher current suicidal intent was associated with less death anxiety. Tarter, et al. (1974) found no differences in death anxiety and the lethality of suicide attempts in 50 attempted suicides, nor between first-time attempters and multiple attempters. In contrast, D'Attilio and Campbell (1990) studied 62 adolescents aged 16-20 found that higher death anxiety was associated with *higher* scores on a suicide probability scale. There may be sex differences in these associations. In a sample of Iranian university students, Naderi and Esmaili (2009) found that the men had higher scores on a measure of suicidal ideation along with lower scores on a measure of death anxiety. However, the researchers did not correlate scores on these two measures.

Death anxiety is theoretically associated with past and current suicidal behavior in Joiner's Interpersonal Theory of Suicide (Joiner, 2005). This theory proposes that the occurrence of suicide depends on two psychological dimensions: thwarted belongingness and perceived burdensomeness. Those who think that they are a burden to their significant others and also have their interpersonal relationships disrupted are more likely to contemplate, plan and attempt suicide, even successfully. However, a third factor must be present, the acquired capability to engage in self-harm. This capability is dependent on previous experiences of pain and risk-taking and also a reduced fear of death, and Joiner and his colleagues devised a scale to measure this reduced fear of death (ACSS-FAD).

This scale has produced mixed results for its reliability and validity. In a sample of undergraduate students, Rimkeviciene, et al. (2017) found that the 7 items of the ACSS-FAD scale did not fit a one-factor model, nor did the scores differentiate between students who had a history of attempted suicide and those who did not, although it did differentiate those with and without a history of non-suicidal self-harm. In samples of undergraduates, Ribeiro, et al. (2014)

found that the seven items "largely" fitted a one factor model, and the reliability was "adequate to good." However, scores were not associated with current suicidal ideation.

In a sample of military veterans, Gutierrez, et al. (2016) used a 5-item version of the ACSS-FAD and found that only 4 items loaded on one factor. The internal consistency of the scale was good (omega = 0.74), but scores did not differentiate between veterans who had attempted suicide and those who had not. Wachtel, et al. (2014) also used a 5-item version of the ACSS-FAD and found that 4 of the items loaded on one factor, but the Cronbach alpha was excellent (0.90).

Almost all of the research on death anxiety and suicidal behavior has been conducted on Western samples, and one purpose of the present study was to examine this association in respondents who are resident in mainland China. The 7-item version of the ACSS-FAD was used, as well as a validated measure of suicidality (the SBQ-R).

METHOD

Participants

The participants were 1,145 students at Shandong University in Shandong, Jinan Province, China. The mean age of the students was 20.2 (SD = 1.1; range 18-24), and 51.3% were female.

Measures

ACSS-FAD: The ACSS-FAD (Ribeiro, et al., 2014) has seven items assessing anxiety about dying and death, answered on a scale ranging from not at all like me (0) to very much like me (4). A typical item is "I am very much afraid to die." For the present sample, Cronbach alpha was 0.51, and item-total correlations ranged from 0.54 to 0.75. Examination of the items using a Principal Components factor analysis and a Varimax rotation identified two factors, one with 4 items reflecting no death anxiety and one with 3 items reflecting death anxiety (see Table 1). The Cronbach alphas for these two sets of items were 0.75 and 0.77, respectively. Accordingly, the data analysis examined correlations for the total ACSS score and for the two separate scores based on these two sets of items.

SBQ-R: The Suicide Behaviors Questionnaire-Revised (Osman, et al., 2001) consists of four items assessing prior suicidal behavior (ideation, threat, planning and attempt), recent suicidal ideation (in past year), prior communication of suicidal intent to others, and estimate of the likelihood of a future suicide attempt. Each item has 5-7 response options. Osman, et al. reported excellent reliability and validity for the total score on the SBQ-R. Cronbach alpha for the present sample was 0.76, and item-total correlations ranged from 0.63 to 0.89.

DASS-21: The Depression Anxiety Stress Scales, short version (DASS-21) consists of 21 items measuring depression, anxiety and stress, scored ranging from did not apply to at all (0) to applied to me very much or most of the time (3). Szabó (2010) reported excellent reliability and validity for the three scales. For the present sample, the Cronbach alphas were depression (0.87), anxiety (0.84) and stress (0.86).

The mean scores for the scales are shown in Table 2.

Procedure

The data were collected from enrolled students from November 2017 to April 2018. Stratified cluster sampling was used to obtain students from a variety of departments and year of study/ Classes from each cluster (department-by-year) were then randomly selected. All students in the classes chosen were briefed about the purpose of the study which took about 30 minutes to complete (12 scales with 210 items). Participants were informed that they could stop their participation at any time if they desired, and information on crisis hotlines was provided in the questionnaire. No reward was offered for participation, which was voluntary and with anonymity. Students were given the paper-and-pencil questionnaire to complete in class.

Approval for the study was given by the university's institutional Research Board.

RESULTS

Question 2 on the SBQ asks about suicidal ideation in the past year. Recent suicidal ideation was positively correlated with the total ACSS score (Pearson $r = 0.084$, two-tailed $p < 0.01$) and with scores on the four items measuring low death anxiety ($r= 0.122$, $p < .001$), but not with scores on the three items measuring high death anxiety ($r = -0.002$, ns). A history of recent suicidal ideation was, therefore, weakly associated with less death anxiety. The significant associations remained statistically significant after controlling for DASS anxiety using partial correlation coefficients (partial r's = 0.120 and 0.152, $p < .001$). In a backward linear regression to predict recent suicidal ideation, both death anxiety and depression (along with sex) were significant predictors ($p < .001$): low death anxiety (beta = 0.131), depression (beta = 0.275), and sex (beta = 0.084), with a multiple = 0.305.

Question 1 on the SBQ asks whether the person has thought about suicide, planned suicide, attempted suicide or never been suicidal in the past. The results are shown in Table 3. It can be seen that those who have attempted suicide and those who have never been suicidal have the highest scores for death anxiety. Those who have planned suicide but not carried out their plan had the least death anxiety.

DISCUSSION

The results of the present study indicate that the ACSS-FAD requires modification. As in other fear of death scales, the inclusion of items worded positively and negatively reduces the internal consistency of the scale. The reliabilities of the two subscales (for the positively worded and negatively worded items separately) were higher than that for the 7-items scale as a whole, despite the smaller number of items in each subscale.

However, the results also indicate that the ACSS-FAD scale can be used in a Chinese population, and the associations of the fear of death scores with suicidal behavior were provocative and have never been examined before. The results indicated that nonsuicidal

students and those with a history of suicidal ideation and attempts had higher death anxiety scores than those who had planned suicide (but not yet attempted suicide). It appears that, in the planning stage for suicidal behavior, individuals suppress their normal death anxiety. However, after attempting suicide (but surviving), the death anxiety returns to the level found in nonsuicidal students. Since the association of death anxiety and planning suicide has not been examined in previous research, this association needs to be examined in new samples, both clinical and non-clinical.

The present study had several limitations. There were very few students who had a history of attempted suicide (only 23 out of 1,145: 2.0%) and, of course, the sample was a non-clinical sample, limited in age and educational status. More research is needed using individuals whose suicidal behavior is more recent and who have made suicide attempts. The study was also limited by the lack of homogeneity in the death anxiety scale, and the results should be replicated using a death anxiety scale with better psychometric properties and more previous research on its validity, such as Templer's Death Anxiety Scale (Templer, 1970) or the Collett-Lester Fear of Death Scale (Lester, 1990). Incidentally, Lester found that negatively worded items in the Collett-Lester Fear of Death Scale impaired the internal consistency of the scale, and the final version had items all keyed (scored) in the same direction (indicating a great fear of death and dying).

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Table 1: Principal components analysis of the ACSS

Rotated Component Matrix[a]

	Component 1	2
ACSS_01	-0.15	+0.64#
ACSS_02	+0.89#	+0.01
ACSS_03	+0.88#	-.016
ACSS_04	+0.02	+0.78#
ACSS_05	+0.60#	-0.22
ACSS_06	-0.14	+0.78#
ACSS_07	-0.46	+0.64#
Eigenvalue	2.88	1.34
% variance	41.2	19.8

loading > 0.50

Table 2: Descriptive statistics for the scale scores

	Mean	SD
SBQ1	1.46	0.69
SBQ2	1.27	0.67
SBQ3	1.15	0.47
SBQ4	0.60	1.19
SBQ total	4.44	2.32
ACSS total*	15.83	5.84
ACSS lo-anx items[5]	8.10	3.93
ACSS hi-anx items[6]	4.28	3.11
DASS: Depression	8.49	7.62
DASS: Anxiety	10.42	7.93
DASS: Stress	12.24	7.93

* The ACSS total score is keyed to measure low death anxiety

Table 3: Degree of suicidal behavior and death anxiety

[5] The fact that I am going to die does not affect me; It does not make me nervous when people talk about death; I am not disturbed by death being the end of life as I know it; I am not at all afraid to die.
[6] The pain involved in dying frightens me; I am very much afraid to die; the prospect of my own death arouses anxiety in me.

	n	ACSS total*	ACSS low anxiety items	ACSS high anxiety items
Nonsuicidal	733	15.61 (5.63)	7.88 (3.80)	4.26 (3.11)
Ideation	328	15.93 (6.07)	8.33 (4.07)	4.39 (3.06)
Plan	65	17.83 (6.34)	9.41 (4.16)	3.58 (3.04)
Attempt	23	15.48 (7.06)	8.43 (4.56)	4.96 (3.62)
F		2.95	3.67	1.60
df		3,1145	3,1145	3,1145
p		0.03	0.01	0.19

* The ACSS total score is keyed to measure low death anxiety

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SUICIDE IN SMART PEOPLE[7]

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Abstract

Research indicates that suicide rates are lower in those with higher IQ scores. In this essay, we show that this is consistent with Hamermesh and Soss's utility maximization theory of suicide and Yang and Lester's cost-benefit and demand-and-supply theories of suicide. Research has also shown that individuals with greater intelligence are also *less* likely to engage in delay discounting and that suicidal individuals are *more* likely to engage in delay discounting, research that is consistent with lower suicide rates in those with higher IQ scores. One caveat is that highly creative individuals (such as poets, novelists and artists) have been found to have higher rates of psychiatric disorder (especially bipolar affective disorders) and higher rates of suicide despite their (on average) high IQ scores.

The present essay will review what impact intelligence might have on suicide from the perspective of behavioral economics. As we will see in this essay, suicide is less common in those who are smarted as measured by intelligence tests. Thus, suicide does not appear to be a "smart" decision, and this is line with the predominant view of suicide as the result, in part, of psychiatric disorder and irrational thinking.

The research on the association between intelligence and suicide[i] will be examined first, followed by a review of two behavioral economic theories of suicide, namely Hamermesh and Soss's utility maximization theory of suicide and Yang and Lester's cost-benefit theory of suicide, in order to see whether intelligence would be expected to have an impact on suicide as an outcome. Next, the evidence that delay-discounting is associated with both suicidal behavior and intelligence will be reviewed, followed by our conclusions.

Intelligence and Suicide

Intelligence evolves over the individual's life and is affected both by the individual's innate abilities and by their experiences from infancy on. Once completed suicides are identified, it is obviously too late to obtain measures of their intelligence using standardized measuring instruments, and few suicides have data available on their scores from prior intelligence tests. In order to obtain methodologically sound data on the impact of intelligence on suicide, longitudinal follow-up studies are required. Such studies are rare and typically carried out only in Scandinavia where records on citizens are centralized and open to investigators.

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[7] This essay was first published as: Yang, B., & Lester, D. Suicide among smart people. In M. Altman (Ed.) *Handbook of behavioural economics and smart decision-making*. Cheltenham, UK: Edward Elgar, 2017, 464-475. This essay will focus on completed suicide (i.e., acts in which the person dies) and will not consider non-fatal suicidal behavior.

In one of these studies, Allebeck, Allgulander and Fisher (1988) followed up 50,465 young men (born in 1949-1951) who were conscripts in Sweden in 1969-1970 when aged 18-20, 247 of whom died by suicide during a 13-year follow-up, which indicates a suicide rate of about 38 per 100,000 per year.[8] Low intelligence test scores predicted subsequent suicide in the univariate model and, along with eleven other variables in a multiple regression contributed to the prediction of suicide.

Using a much larger sample, which probably included those in the previous study, Gunnell, Magnusson and Rasmussen (2005) studied 987,308 men born in Sweden in 1950-1976 who were tested during conscription procedures in 1968-1994 and who had intelligence test scores recorded. The only young men excluded from conscription during this period were those who had foreign citizenship, a severe chronic medical condition, or a handicap. Four basic tests covering different aspects of intelligence were given: (i) logic, (ii) identifying synonyms, (iii) visuospatial and geometric perception, and (iv) mechanical skills and mathematics problems. Of these men, 2,811 later died by suicide.[9] Better performance on each of these tests was associated with a lower rate of subsequent suicide. Among these four tests, the largest difference was on the test of logic. Dividing intelligence test scores into nine groups, the suicide rate of the lowest scoring group was three times the suicide rate of the highest scoring group, clearly indicating that a higher intelligence test score was associated with a lower suicide rate. The age-adjusted hazard ratios[10] for suicide were 0.88 for the logic test, 0.90 for the synonym test, 0.90 for the spatial test and 0.90 for the technical test, all statistically significant. In addition, focusing on the logic test, Gunnell, et al. found that the association between intelligence and suicide remained even after controlling for education, pre-existing psychiatric illness, and the educational level of the parents of the men and, therefore, the association between intelligence and suicide was robust.[11]

Because the association between intelligence and suicide was found after controlling for psychiatric illness, Gunnell, et al. suggested that the association was most likely caused by the fact that, in times of crisis, people with lower intelligence test scores are less able to identify adaptive solutions to their problems and, therefore, suicide becomes a more viable solution.

The conclusion seems to be that, in the general population, high intelligence test scores are a protective factor for suicide. Smart people make better decisions and are less likely to make the decision to die by suicide.

The Relevance of Intelligence in Behavioral Economic Theories of Suicide

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[8] In Sweden in 1980, the suicide rate for men aged 25-24 in the general population was 33.3.

[9] Gunnell, et al. did not calculate a suicide rate for this sample but, given that the follow-up period averaged 15½ years, the estimated suicide rate is 18.4 per 100,000 per year, which is somewhat lower than the suicide rate for all Swedish males during this period (e.g., 37.6 per 100,000 per year for men aged 35-44 in 1980 (Lester & Yang, 1998). Remember that conscripts excluded men with medical and psychiatric problems and handicaps.

[10] Hazard ratios are calculated by dividing the subjects into those above the median score and those below the median score and calculating the number of suicides in the higher scoring group divided by the number of suicides in the lower scoring group.

[11].Previous studies in other countries were based on only a small number of suicides, as in an Australian study based on only 76 suicides(O'Toole & Cantor, 1995).

The potential impact of intelligence on suicidal behavior might arise because smart people would be expected to have careers in which they earn more, and also they would be expected to be more successful in these careers. Lifetime income has played a role in several economic theories of suicide, notably Hamermesh and Soss's lifetime utility theory and Yang and Lester's cost-benefit analysis of suicide.

Hamermesh and Soss's Microeconomic Theory of Suicide

The economic theory of suicide developed by Hamermesh and Soss (1974) is based on a utility function which is determined by the permanent income and the current age of the individual. The permanent income is the average income expected over a person's lifetime. In the calculation of the permanent income, Hamermesh and Soss followed a formula that includes the real income of the current year plus the rest of the years of working life of an individual. Thus, this brings in a concept of opportunity cost, that is, by completing suicide,[12] an individual forgoes the opportunity of earning income in the rest of his or her life. The permanent income and the current age of an individual determine the consumption level from which an individual will derive satisfaction. The current age also determines the cost of maintaining the day-to-day life of the individual, which is a negative attribute to the utility function. A third element relevant to suicide is the taste for living or distaste for suicide, which is assumed to be a parameter normally distributed with a zero mean and constant variance. When the total discounted lifetime utility (which includes the taste for living) remaining to a person reaches zero, an individual will complete suicide.

This economic model of suicide contains the following assumptions. (1) The older the current age, the lower the total satisfaction, because the cost of day-to-day living increases with age. (2) The greater the permanent income, the higher the total satisfaction, since a higher income level warrants a higher consumption level. However, the additional satisfaction brought forth by additional income decreases with higher income.

Based on the principle of utility maximization in this economic model, we can derive several theorems about the suicide rate of a society. First, the suicide rate will increase with age. Since the marginal utility of lifetime income decreases with increased permanent income, the older that individuals become, the less additional satisfaction they are going to derive from consumption. This should increase the probability that they will choose suicide. Secondly, the suicide rate will be inversely related to permanent income. If individuals receive a greater amount of lifetime income, they are expected to have a greater amount of consumption and, therefore, a greater satisfaction from life. This should decrease the probability of completing suicide.

Hamermesh and Soss tested the usefulness of their theory by using an econometric approach that places more weight on the efficient prediction of the target variable. The equation used was:

$$S(A,t) = a_o + a_1 I(A,t) + a_2 I^2(A,t) + a_3 A + a_4 A^2 + a_5 A^3 + a_6 UN(A,t) + a_7 UN(a,t).A + v_{A,t}$$

[12] The preferred term in suicidology is "dying by suicide," and "committing suicide" is unacceptable. We will use "completing suicide" in the present essay.

where

A is the age group
t is the year
I is the discounted permanent income of age group A at time t
UN is the unemployment rate of age group A at time t
a_i are constants
v is a disturbance term

Note the presence of higher order powers in some of the terms.

Rather than conducting separate time series analyses for each age group, Hamermesh and Soss pooled the data for a 21-year period and for the nine age groups, giving 189 pooled observations. The empirical results presented by Hamermesh and Soss showed that permanent income was negatively related to the suicide rate while the unemployment rate had a positive association with the suicide rate and an increasing effect on suicide as workers become older as predicted. Yet as income rose in the postwar period, the male suicide rate fell for most age groups. Only for the youngest three age groups (those aged 20-34 years) did the suicide rate rise with rising incomes, a result that is in contrast with the prediction of the theory. Hamermesh and Soss explained this by arguing that the expansion in the number of people pursuing education into their twenties and the consequent postponement of consumption by an increased fraction of the people in these groups could affect the prediction. The decline in suicide rates for older people as their income has increased may be especially strong because of the decrease in variability of income resulting from the expansion of Social Security benefits. Indeed, Hamermesh and Soss pointed out that there was a sharp drop in the relative suicide rates of groups over age 55 in the late 1930s coincident with the introduction of Social Security.

A Cost-Benefit Analysis of Suicide

In Yang and Lester's cost-benefit analysis of suicide (Yang & Lester, 2006; Lester & Yang, 1997), completing suicide is considered to be a rational act. Individuals are acting "rationally" if, given a choice between various alternatives, they select what seems to be the most desirable or the least undesirable alternative. The decision to commit suicide depends upon the benefits and costs associated with suicide and with alternative actions. An individual will be less likely to commit suicide if the benefits from suicide decrease, the costs of suicide increase, the costs of alternative actions decrease, or the benefits from alternative activities increase. The benefits from suicide include escape from physical or psychological pain (as in the suicide of someone dying from terminal cancer), the anticipation of the impact of the suicide's death on other people (as in someone who hopes to make the survivors feel guilty), or restoring one's public image (as in the suicide of Antigone in Sophocles' play of the same name).

There are several costs in completing suicide. These include the money and effort spent in obtaining the information and equipment needed for the act of suicide, the fear and pain involved in preparing to kill oneself and in the process of completing suicide, the possible drawbacks as a result of dying by suicide such as the expected punishment predicted by most of the major religions of the world, and the opportunity costs (that is, the net gain to be expected if other alternative activities were chosen and life continued). An individual will choose suicide only if its benefits are greater than all of the costs mentioned above.

Suicide can also be examined as if it were a commodity or a service that we buy. However, it is immediately obvious that suicide is very different from the typical objects that we purchase. For example, when we buy an object, we pay a specific price to obtain it and then we enjoy it. Suicide results in death, and as a result we have to conceptualize our enjoyment of it quite differently. Suicide is somewhat similar to the purchasing of health care services. In both, we pay a price to get rid of something, life in the case of suicide and sickness in the case of health care. Yet there is a basic difference between suicide and health care in that suicide leads to death, while health care (hopefully) leads to further life. Of course, for those who believe that there will be a "life-after-death," suicide also leads to further life, but of a different kind.

Looking at matters from a demand side perspective, when we purchase a commodity (or a service), the price we pay for the commodity (or service) reflects the benefits we expect to receive from consuming that commodity. From a demand side perspective, beef costs more than chicken because the public desires beef more than chicken, and their stronger desire for beef reflects their expectation of greater satisfaction from eating beef than from eating chicken. In a demand side analysis of suicide, the notion of its "price" is different from the ordinary price of a commodity. The benefit expected by a suicide is the relief of unbearable distress, and so a scale of distress is used to measure the benefit expected by the suicidal individual. This benefit expected by suicidal individuals is reflected in the "price" they must pay for their suicide. In essence, the demand curve for suicide is a relationship indicating the probability of completing suicide as a function of the amount of distress felt by the individual. As the amount of distress increases, the probability of completing suicide increases. The demand for suicide is, therefore, an upward sloping curve, which is quite different from the typical downward sloping demand curve applicable, for example, in economic analyses of commodity markets.[13]

On the supply side, the probability of completing suicide is related to the cost of completing suicide. The cost of completing suicide includes the cost of losing your life, collecting information about how to commit the act, purchasing the means for suicide, etc. While the latter two items have a clear-cut scale of measurement, the cost of losing life is much harder to measure. It includes at least three components, namely, the psychological fear of death, the loss of income in the future which otherwise would have been earned by the suicide, and the loss of any enjoyment that would be experienced during the rest of your "natural" life. The higher the cost of completing suicide, the lower the probability that individuals will actually kill themselves. Therefore, the supply curve should be a downward sloping curve.

The demand curve is an upward sloping curve which begins from the origin[14] and ends at the point when the probability of completing suicide is equal to one. The price level for completing suicide, which corresponds to the point where the probability is equal to one, refers to the threshold level of distress that an individual can no longer tolerate. Under these circumstances, suicide becomes inevitable.

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[13] In typical analyses, the quantity demanded is inversely related to the cost of the product or service, and so the typical demand curve is downward sloping.

[14] The initial point of the demand curve means a logical origin of "zero distress" and "zero probability of suicide."

The intersection of the demand and supply curves represents an equilibrium for an individual. For that equilibrium level of distress and the corresponding costs of completing suicide, there is an equilibrium probability of completing suicide. As the supply curve might intersect any section of the demand curve, the equilibrium probability of completing suicide can, therefore, range anywhere from zero to one.

Given the aforementioned economic framework for suicide, what needs to be determined is how to measure the psychological variables (e.g., level of distress and future pleasure) in monetary units so that an equilibrium can be obtained through equating the demand and supply for suicide. For example, the level of distress can be operationalized as the cost of the psychological services required to eliminate the distress that the suicidal person is experiencing. Since there is a typical price for psychological services, each level of distress could be converted into a monetary measure representing the cost of psychological services needed to eliminate the distress. The higher the cost of treatment, the greater the level of distress.

Another issue concerns converting future pleasure for life into monetary units so that future pleasure can be made comparable to that of the level of distress, etc. This may be accomplished by compiling a list of major categories of activities that produce pleasure for individuals.

By definition, the equilibrium probability of completing suicide is determined by the intersection of the supply and demand curves. Due to the peculiar nature of the demand and supply of suicide, the equilibrium so obtained is not a stable one. Since the demand for suicide is an upward sloping line, the higher the distress level, the more likely the probability of completing suicide. Since the supply curve is downward sloping, the higher the cost of completing suicide, the less likely the probability of doing so. Let us label the equilibrium level of distress and the cost of completing suicide S_E and the corresponding equilibrium probability P_E.

Let us examine the implications of such an unorthodox combination of supply and demand curves. If the probability of completing suicide is initially at P_1, which is lower than the equilibrium probability P_E, this corresponds to a low level of distress from the perspective of the demand side and a high cost of completing suicide from the perspective of the supply side. From the demand side, the amount of distress created by life is smaller than the corresponding cost of treating the distress. This will motivate the individual to further reduce the distress created by life. As a result, the situation will lead to an even lower probability of completing suicide, and the individual will eventually withdraw from the suicidal situation.

On the other hand, if the probability of completing suicide initially is higher than the equilibrium probability P_E, say at P_2, this corresponds to a high level of distress from the demand side perspective and a low cost of completing suicide from a supply side perspective. This situation refers to a group of individuals at high risk for suicide because they have high levels of distress and because the cost of completing suicide for them is manageably low, since ending their lives will relieve their continuing suffering. Thus, this situation will lead to an even higher probability of completing suicide.

Both situations, whether the initial probability of completing suicide is higher or lower than the equilibrium level, result in movement away from the equilibrium. If the initial probability of completing suicide is lower than the equilibrium level, then the individual becomes less likely to choose suicide; while, if the initial probability of completing suicide is higher than the equilibrium level, the individual becomes more likely to choose suicide. In short, this economic model of suicide implies that suicidal behavior is an unstable behavior.

Comment

Since smart people will earn more in their lifetimes, increasing both permanent income and the cost of suicide, the prediction from the utility maximization and cost-benefit theories of suicides is that smart people should have a lower suicide rate, a prediction confirmed by the research reviewed in the first section of this essay.

Delay Discounting

Delay discounting is a phenomenon in which individuals decrease the value of an outcome if its receipt is delayed. There are three features related to the impact on decision making from delay discounting, two related to the "time" variable and one related to the size of the "outcome."

(1) Now vs. later in the time dimension
(2) A shorter vs. a longer length for the outcome
(3) A small vs. a large outcome

1. ***Now vs. Later:*** Individuals are more inclined to accept an outcome of lesser utility (or value) now rather than an outcome of greater utility (or value) later, for example, choosing a smaller amount of money immediately versus a larger amount later.
2. ***Shorter vs. Longer Delay:*** Delay discounting is often hyperbolic, that is, small delays for the receipt of the outcome have a proportionately greater impact on value than do longer delays.
3. ***Small vs. Large Outcome:*** Delay discounting may lead to impulsive behavior because individuals choose a smaller but quicker outcome over a larger but later outcome.[15]

Since delay discounting can be a stable personality trait (Odum, 2011), it is likely to have many manifestations in people's behavior. Research has shown that delay discounting is associated with a variety of problem behaviors including smoking, drug use, over-eating, failure to exercise, and taking on large amounts of credit card debt (da Matta, et al., 2012). For example, research has indicated that delay discounting as a trait is associated with antisocial personality disorder (e.g., Finn, et al., 2009), while Kirby, Petry and Bickel (1999) found that heroin addicts showed delay-discounting more than controls from the community matched for age, sex and education. However, measures of delay discounting do not always correlate with measures of impulsivity, perhaps because self-report scales of impulsivity measure different aspects of

[15] Another way to illustrate the unique features of delay discounting is to compare it with the laws of diminishing marginal utility developed to illustrate basic consumer behavior in which the marginal satisfaction from each new object steadily declines.

impulsivity (Odum, 2011). Nonetheless, in a survey of over 42,000 British television viewers who were given a single delay-discounting choice of £45 in three days versus £70 in three months, Reimers, Maylor, Stewart and Chater (2009) found that those choosing the smaller amount in three days were younger, had less income and less education, and were more likely to have engaged in impulsive behavior measured by variables such as age at first sexual activity, relationship infidelity and smoking.

Is delay discounting associated with intelligence, that is, are smarter people less likely to engage in delay discounting? The answer is positive. For example, Shamosh and Gray (2008) reported a meta-analysis of 24 eligible studies on this issue and concluded that individuals with greater intelligence were indeed less likely to engage in delay discounting, particularly in studies in which the payoffs were real.

Application to Depression

Lempert and Pizzagalli (2010) administered undergraduate students a choice test in which they had to choose between $10 to be received after a delay of 1, 2, 40, 180 and 365 days or $2 immediately. Delay-discounting was not associated with scores on a general impulsiveness scale, but students who obtained higher scores on a measure of anhedonia (a lack of reactivity to pleasurable stimuli) were more likely to choose a larger delayed reward over an immediate smaller reward.

Using a similar task, Takahashi, et al. (2008) found that psychiatric patients with a diagnosis of affective disorder, with the most recent episode being a depression, were more impulsive compared to controls for both gain and loss. Takahashi, et al. related this result to impaired neural processing of reward and punishment. In line with this, Must, et al. (2006) found that patients with a major depressive disorder showed an increased sensitivity to reward which resulted in them making poor decisions. It seems, therefore, that a tendency toward delay discounting is associated with depression.

Application to Suicide

Cutler, Glaeser and Norberg (2001) speculated that delay-discounting might explain the rising rate of youth suicide since youths are less able to discount present pain with the possibility of future pleasure, but they did not test this empirically. Pittel and Rübbelke (2009) hypothesized that suicide bombers forego utility from future life in order to acquire present utility from their present actions. The present utility for suicide bombers includes status for themselves, as well as material utility for their families. They may feel anticipatory feelings of pride and accomplishment, as well as the expectation of rewards from God or Allah. The intertemporal utility of their shortened lives exceeds the utility for lives lived to their natural end. Since Lankford (2013) has convincingly documented the miserable current lives of many suicide bombers, their choice makes even more sense.

In an empirical study on delay discounting in suicidal individuals, Dombrowski, et al. (2011) gave individuals over the age of 60 a choice between smaller immediate monetary rewards ($25-$35) and larger delayed monetary rewards ($75-$85). Delay discounting was greatest in those who had made low-lethality suicide attempts, less in those with only suicidal

ideation, and least in depressed but non-suicidal individuals and those making high-lethality suicide attempts. Delay discounting was not associated with hopelessness or depression scores or with intelligence test scores. This result is a surprising, but it suggests that the more seriously suicidal elderly have a lesser tendency toward delay discounting. It may be, however, that the more serious suicide attempters (who had, therefore, required hospitalization) were making an effort to appear hypernormal in the hospital in order to obtain their release from the hospital.[16]

Liu, et al. (2012) gave a monetary rewards task[17] to patients with a diagnosed substance abuse disorder (primarily cocaine or opioid dependence) and found that those with no history of a suicide attempt discounted small delayed rewards more than large ones, whereas those with a prior suicide attempt showed no difference in discounting rates for small versus large rewards. Overall, delayed discounting was not associated with a history of attempted suicide.

More speculatively, Van Heeringen, Bjittebier and Godfrin (2011) concluded from their review of functional and structural brain studies in suicidal individuals that suicidal individuals are more likely than non-suicidal individuals to have abnormal functioning in the orbitofrontal and dorsolateral parts of the prefrontal cortex, areas of the brain that Gray (1975) thought were the basis for sensitivity to punishment. Van Heeringen, et al. concluded from their review that suicidal individuals might be overly sensitive to social disapproval and more willing to choose options with immediate reward.

The conclusion seems to be that intelligent people show less delayed discounting which protects them against suicide.[18]

Other Considerations

Neuropsychiatric Considerations

Neuropsychologists have explored the role of the *executive function* in human behavior. Executive function refers to a set of higher-order mental processes primarily governed by the frontal lobes of the cortex. These functions include initiation, planning and self-regulation of goal-directed behavior. To a large extent, therefore, smart people would be expected to have more effective executive functioning.

In general, suicidal individuals have been found to have executive *dysfunction* as compared to non-suicidal comparison subjects. For example, Keilp, et al. (2001) studied depressed, non-medicated patient and found that those who had made serious attempts at suicide in the past performed worse on tests of executive functioning (including general intellectual functioning, attention and memory). Homaifar, Bahraini, Silverman and Brnner (2012)

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[16] Interestingly, in another study, Dombrowski, et al. (2010) found that elderly individuals who had made suicide attempts in the past (and who were currently psychiatric inpatients with major depressive disorders) discounted previous experiences to a higher degree, reacting more than control patients to what happened most recently in an experimental task.

[17] Such as $5 now versus $10 one week from now.

[18] There is a small subset of suicides who appear to make impulsive decisions, but impulsivity in suicidal behavior appears to be much more common in those individuals who make suicide attempts but who do not die than in completed suicides.

recommended, therefore, that routine assessment of for suicidal potential in patients should always include measuring executive function.

Creative People

Although "smart" typically refers to having a high level of intelligence, creative people are also smart, albeit in a different sense. Cox (1926) tried to estimate the IQ scores of famous historical individuals based on information in their biographies, such as the age at which they talked, learned languages, etc. For example, John Stuart Mill, a philosopher, was estimated to have an IQ of 190. He began to study Greek at the age of 3, could read Plato in the original Greek at age 7, and wrote a history of Rome at the age of 6.

Cox's estimates of average IQ scores were

Philosophers	170
Poets, novelists	160
Scientists	155
Musicians	145
Artists	140
Military leaders	125

Thus, creative individuals, such as writers, musicians and artists, are found to have high levels of intelligence.

Cox also reported that psychological disturbance was most common in the poets, novelists, musicians and artists (and less common in revolutionaries, statesmen, and religious leaders). Modern research has confirmed this. Andreasen (19086) found a greater incidence of psychiatric disorder in contemporary writers compared to matched controls, especially bipolar affective disorder (manic-depression). This has been confirmed by Jamison (1993) who found that creative individuals were especially productive during their periods of mania, such as the Pulitzer Prize winning poet, Anne Sexton.[19] Goodwin (1988) noted the high incidence of alcohol abuse in creating writers, suggesting either than alcohol use facilitates creative writing or that creativity increases stress which is relieved by using and abusing alcohol.

Affective disorders (both major depression and manic-depression) and alcohol abuse are risk factors for suicide. Creative people, therefore, have an increased risk of psychiatric problems that increase their risk of suicide. Since they typically have high levels of intelligence, it appears that the protective factor of high intelligence does not outweigh the risk factors arising from their creativity.

Are Richer People Happier?

In studying suicidal behavior, the role of happiness and depression appear to be central, and so, from an economic viewpoint, it is relevant to ask whether higher incomes are associated with greater subjective well-being (or happiness). Forty years ago, Easterlin (1974) argued that

[19] Sexton (1928-1974) refused to take the recommended medication for manic-depression because it suppressed her creativity, and she died by suicide in 1974 (Lester, 1993).

increased income did *not* raise subjective well-being, but more recent research has shown that Easterlin was wrong. For example, Stevenson and Wolfers (2013) found that residents of wealthier countries have greater life satisfaction and, in addition, for the 25 most populous countries, they found the same relationship at the individual level. Furthermore, Stevenson and Wolfers failed to find a satiation effect. For example, using a sample of 1,014 respondents in the United States in 2007, they found a monotonic relationship between income (from <$10k to >$500k) and both happiness and life satisfaction.

Therefore, it appears that richer people are happier, and so we may also conclude that more smarter people (who should be richer) should be happier and, therefore, less likely to be depressed and suicidal.

Conclusions

This review of research has indicated that higher intelligence and its associated traits of reduced delay-discounting and better neuropsychological executive functioning are each empirically associated with reduced rates of suicide and of the risk factors for suicide (such as depression). This conclusion ties in nicely with two economic theories of suicide, proposed by Hamermesh and Soss and by Yang and Lester, which predict that more intelligent people should be less prone to suicide because they have an increased lifetime utility and because their suicides would entail increased costs.

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