

Social-Environmental Factors and Suicide Mortality: A Narrative Review of over 200 Articles

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Suicide mortality in a population has long been thought to be sensitive to social, economic and cultural contexts. This review examined research on the relationship between social-environmental variables and suicide mortality published over a ten-year period. The main areas covered in the review included: the economy and income, unemployment, relationship status, fertility and birth rates, female participation in the workforce, religion, migration, location of residence, modernisation, media reporting, alcohol, and access to suicide methods. Results of the review indicated that rates of suicide mortality (deaths per 100,000 in a population) were sensitive to a wide range of social factors. There were relatively stable associations noted between divorce and unemployment with suicide mortality, while many of the reported associations between suicide mortality and other social variables (such as religion, fertility and female participation in the workforce) were influenced by contextual factors and time. These findings indicate the importance of considering the relationship between social factors and suicide as dynamic phenomena.

Keywords: Suicide; Social Factors; Economic Factors; Review; Durkheim; Suicide Prevention

Introduction

The relationship between suicide mortality within social, economic and cultural contexts has been a long-standing area of interest to suicide researchers. As far back as the late 1800s, it was argued that the burden of suicide in a society reflected the political, religious, economic and social environment in which the behaviour was embedded (Durkheim, 1897). According to Durkheim's (1897) social-environmental approach, a marked change to any of these environmental factors may disrupt protective and normative social roles, values and relationships, and is associated with greater risk of suicide. This seminal work has influenced hundreds of other studies, as summarised in past review papers (Moksony, 1990; Stack, 1982; Stack, 2000a, 2000b).

With the last review paper on the topic published over ten years ago, the present article aimed to provide updated evidence about the relationship between social-environmental variables and suicide in a narrative way. The central focus of the review was on those factors responsive to changes in social environments, rather than those related to climatic elements, internal psychological states or biology (e.g., mental illness and genetic differences between populations). The article particularly focused on studies assessing economic strain (changes in national income, income inequality, unemployment and modernisation) and social bonds in society (such as relationship status, ferti-

ity/birth rates, gender role shifts, religion and migration). This narrative review also covered research into several other social-environmental factors shown to have an influence on suicide, including alcohol use in society (Ramstedt, 2001) and media reports of suicide (Pirkis & Blood, 2001a, 2001b). Differences in access to lethal means used in suicide were also considered, as these have been shown to vary across social contexts (Ajdacic-Gross et al., 2008).

Search Strategy

The search strategy was conducted through five main databases: Scopus, PubMed, Proquest, Sociological Abstracts and Web of Knowledge. These databases were chosen based on the content of research covered and the scope and number of journals indexed. The search terms used in the review targeted studies focusing on the relationship between suicide and indicators of economic strain (changes in national income, unemployment etc.) and social bonds (relationship and family status etc.). Decisions about the indicators to include in the review were based on discussion with several expert suicide researchers and the study authors. The selection of search terms and was guided by past reviews and research (Stack, 2000a, 2000b) and included "suicide mortality" and "suicide rates" in relation to the following: "economy", "income", "unemployment", "relationship status", "fertility rate", "birth rate", "female labour

force participation”, “gender role”, “religion”, “migration”, “rural”, and “modernisation”. The review also considered evidence about the prevalence of alcohol, access to common suicide methods, and the influence of media reporting on suicide (terms included: “alcohol”, “access to means” and “media”) as all of these areas were deemed to be sensitive to social and cultural contexts.

The search parameters of this review were set for research published from the year 2000 onwards; however, we considered older literature if no recent research was available or if an older article made an important empirical or theoretical contribution to knowledge.

The initial search results presented more than 4000 articles. Out of these, articles published in English peer-reviewed journals were considered as eligible. As empirically-based studies were the focus of the review, papers making purely conceptual or theoretical contributions were excluded. We only examined studies explicitly considering social and environmental influences on suicide mortality (usually in the form of suicide “rates” or deaths in a population).

Articles were then grouped according to subject area. Visual inspection of all abstracts was conducted in order to determine relevance to the review. At the end, there were 222 articles that were read in full for this narrative review.

The Ecological Correlates of Suicide: Empirical Evidence

The Economy and Income (n = 39)

Findings from both cross-sectional and longitudinal ecological studies indicate that suicide rates are associated with improvements and downturns in economic functioning (Baller, Levchak, & Schultz, 2010; Berk, Dodd, & Henry, 2006; Chuang & Huang, 2007; Hintikka, Saarinen, & Viinamaki, 1999; Lester & Yang, 1997; Moniruzzaman & Andersson, 2008; Tapia Granados & Diez Roux, 2009; Yang & Lester, 2001; Zhang et al., 2010). An increase in suicide rates appears to be particularly observable in locations that have experienced rapid social, political and cultural change (Maag, 2008; Milner, McClure, & De Leo, 2012; Milner, McClure, Sun, & De Leo, 2011), such as countries of the former USSR (Babones, 2008; Brainerd, 2001; King, Hamm, & Stuckler, 2009) and in Asia (Chang, Gunnell, Sterne, Lu, & Cheng, 2009; Khang, Lynch, & Kaplan, 2005). Research also suggests the association between the economy and suicide may change over time. For example, suicide rates may initially decrease during times of economic improvement but stabilise or increase after a specific level of economic development has been reached (Yang & Lester, 2001).

Aside from fluctuations in the economy, suicide may also be influenced by the level of income obtained in a population (Chang et al., 2011; Sareen, Afifi, McMillan, & Asmundson, 2011; Sher, 2006). A longitudinal (1980-1998) investigation in over 60 countries found that suicide initially decreased as income per capita rose, but increased after a certain level of income was obtained (Neumayer, 2003). These results support the ‘Easterlin hypothesis’, which argues that human wellbeing is contingent on material conditions only until a specific level of wealth has been achieved, after which wellbeing may depend on psychological or lifestyle factors (Easterlin, 1974; Graham & Pettinato, 2002; Pugno, 2009).

Another area of research concerns the relationship between income inequality and suicide. Researchers have argued that

income inequality creates greater risk for adverse health outcomes by generating class and social differences in access to income, education, and health services (Pompili et al., 2011). The detrimental effect of income inequality may also be connected to a loss of social capital, as well as deprivation and stress (Kawachi, Kennedy, Lochner, & Prothrow-Smith, 1997; Wilkinson, 1997). Certainly, research evidence seems to indicate that suicide is highest in those groups most disadvantaged in society (e.g. lower educational and socio-economic groups) (Daly & Wilson, 2009; Lorant et al., 2005; Mäki & Martikainen, 2009; Miller et al., 2005; Page, Morrell, Taylor, Carter, & Dudley, 2006). However, there is mixed evidence about effect of income inequality at country-level, with a number of studies reporting no significant relationship with suicide mortality (Leigh & Jencks, 2007; Lynch et al., 2001; Rodríguez Andrés, 2005), while others indicated an increase in suicide mortality (De Vogli & Gimeno, 2009; Fernquist, 2003; Gunnell, Middleton, Whitley, Dorling, & Frankel, 2003; Inagaki, 2010). These conflicting results may be related to methodological factors, such as problems in the use of proxy variables used to measure inequality (Babones, 2008). Variation in the relationship between inequality and suicide is also likely to reflect country-level factors, such as existing economic and political backgrounds.

Unemployment (n = 30)

While most studies have reported that higher unemployment is accompanied by an increase in suicide rates (Abe, 2004; Andres & Halicioglu, 2010; Berk et al., 2006; Blakely, Collings, & Atkinson, 2003; Chang, Sterne, Huang, Chuang, & Gunnell, 2010; Chen, Yip, Lee, Fan, & Fu, 2010; Chuang & Huang, 2007; Corcoran & Arensman, 2011; Fernquist, 2007; Kuroki, 2010; Lewis & Sloggett, 1998; Lin, 2006; Milner, McClure, et al., 2012; Preti & Miotto, 1999; Tsai & Cho, 2011; Yamasaki, Sakai, & Shirakawa, 2005; Ying & Chang, 2009), a smaller number of studies have found no or mixed evidence of this association (Chang, Sterne et al., 2010; Crawford & Prince, 1999; Lucey et al., 2005; Platt, Micciolo, & Tansella, 1992).

These differences may be due to the fact that unemployment is influenced by individual factors associated with both the loss of a job and suicide, such as mental illness (Agerbo, 2003; Blakely et al., 2003; Jin, 1995; Noh, 2009). It is also possible that there are differences based on the length of unemployment, with several past studies finding the highest risk of suicide occurs within the first few years of unemployment and then decreases up to 16 years after the loss of a job (Lundin, Lundberg, Hallsten, Ottosson, & Hemmingsson, 2010; Milner, Page, & Lamontagne, 2012). The adverse effect of job-loss may be particularly accentuated during times of low unemployment in a population, as this represents a deviation from social norms (more than in times of high unemployment, when unemployment may be normative) (Lundin et al., 2010; Martikainen & Valkonen, 1996; Milner, Page, et al., 2012). The relationship between unemployment and suicide may also be affected by other factors such as income per capita. For example, Noh (2009) found that unemployment was related to an increase in suicide rates when examined in relation to a higher income, but not when examined in relation to lower income. Political context, employment conditions and media reporting of suicide in the country have also been found to be relevant factors (Chen et al., 2010).

Past research indicates that unemployment has a stronger in-

fluence on male suicide than female suicide (Berk et al., 2006; Blakely et al., 2003; Chan, Yip, Wong, & Chen, 2007; Kuroki, 2010; Preti & Miotto, 1999; Pritchard, 1992; Qin, Mortensen, Agerbo, Westergaard-Nielsen, & Eriksson, 2000). However, other research casts some doubt on these gender-specific findings (Chen et al., 2010; Kposowa, 2001). Therefore, despite some differences in results, most research suggests that unemployment increases suicide risk, but this relationship likely to be influenced by various individual and contextual factors.

Relationship Status (n = 27)

Findings from studies at both the aggregate and individual level show that divorce (Andres & Halicioglu, 2010; Chang et al., 2011; Corcoran & Nagar, 2010; Denney, Rogers, Krueger, & Wadsworth, 2009; Gunnell et al., 2003; Kposowa, 2000; Leenaars & Lester, 1999; Masocco et al., 2010; Masocco et al., 2008; Wu & Bond, 2006), separation (Barstad, 2008; Ide, Wyder, Kolves, & De Leo, 2011; Wyder, Ward, & De Leo, 2009) and widowhood (Ajdacic-Gross et al., 2007; Corcoran, 2009; Denney et al., 2009; Luoma & Pearson, 2002; Masocco et al., 2010; Masocco et al., 2008) result in a higher likelihood of suicide. In comparison, marriage is commonly found to be negatively related to suicide (Cutright & Fernquist, 2007; Cutright, Stack, & Ferquist, 2007; Griffiths, Ladva, Brock, & Baker, 2008; Masocco et al., 2008; O'Reilly, Rosato, Connolly, & Cardwell, 2008; Qin, Agerbo, & Mortensen, 2003). Some research has suggested that male suicide is more sensitive to macro-level indicators of relationship breakdown than female suicide (Andres & Halicioglu, 2010; Corcoran & Nagar, 2010; Cutright & Fernquist, 2004; Gunnell et al., 2003; Rodríguez Andrés, 2005).

However, it is likely that the protective effect of marriage is culturally specific, as research from China shows that family and relationship stress can increase the risk of suicide in married women (Zhang, 2010). Research also suggests that the association between relationship status and suicide is sensitive to social change, as well as age, gender and the time period under analysis (Messner, Bjarnason, Raffalovich, & Robinson, 2006; Pampel, 1998; Trovato, 1987). Other individual and contextual factors also considered to be important to the association between relationship status and suicide include stigma towards help-seeking, social isolation, unemployment, and alcohol and drug use (Masocco et al., 2010). Therefore, it appears that the protective effects of relationships on suicide are related to social and cultural norms and individual factors.

Birth Rates (n = 11)

Proxy variables such as fertility and birth rates at the country level are usually found to be negatively related to suicide (Andres & Halicioglu, 2010; Bhandarkar & Shah, 2008; Fernquist & Cutright, 1998; Leenaars & Lester, 1999; Shah, 2008). These findings follow Durkheim's (1897) suggestion that parent-child relationships provide an important source of protection against suicide (Stack, 1996-1997; Umberson, 1987). However, the relationship between higher fertility/birth rates and lower suicide rates may be contingent on normative family structures in society. For example, research using the indicator of non-marital births (a proxy used to represent the weakening of the family institution) has been associated with higher suicide rates in wealthy areas of the world (Messner et al., 2006;

Stockard & O'Brien, 2002). However, research conducted in Ireland suggests that this association was also sensitive to changes in social norms over time (Lucey et al., 2005).

Female Participation in the Workforce (n = 18)

Studies conducted in the 1970s and 1980s found that gender role shifts, measured through indicators such as female labour force participation (FLFP), were related to higher suicide rates in wealthy areas of the world (Davis, 1981; Krupinski, 1980; Lester & Yang, 1991; Newman, Whittemore, & Newman, 1973). Some other studies report a mixed or changing relationship between FLFP and suicide (Burr, McCall, & Powell-Griner, 1997; Lucey et al., 2005; Stack, 1987; Trovato & Vos, 1992), which may be because social norms and values have adjusted to female employment in high-income countries over time (i.e., as female employment does not pose a threat to normative values or roles in society) (Austin, Bologna, & Hayama Dodge, 1992; Stack, 2000b). However, other research supports the idea that female participation in the workforce has an adverse influence on male and female suicide rates (Aliverdinia & Pridemore, 2009; Cutright & Fernquist, 2001a; Fernquist, 1999; Fernquist & Cutright, 1998; Milner, McClure, et al., 2012; Neumayer, 2003; Yamasaki, Araki, Sakai, & Voorhees, 2008). Some of the reasons for these differences may be connected to social, economic or cultural differences in the settings under study. For example, the context of female employment and suicide in Iran (Aliverdinia & Pridemore, 2009) would be markedly different from that in high-income western countries (Cutright & Fernquist, 2001b). These mixed findings suggest the need for more in-depth research into the relationship between suicide and gender role changes in the workforce across cultural and income groups.

Religion (n = 17)

Studies on the relationship between suicide and religion generally report a negative association, both when measured indirectly (e.g. religious book production, proportion of a specific religion in the population, ordained clergy rate) (Baller & Richardson, 2002; Ellison, Burr, & McCall, 1997; Fernquist, 2007; Fernquist & Cutright, 1998) and more directly (e.g. church adherence, active membership in a religious group, strength of religious beliefs in society) (Baller & Richardson, 2002; Cutright & Fernquist, 2004; Ellison et al., 1997; Helliwell, 2007; Neeleman, 1997; Van Tubergen, Te Grotenhuis, & Ultee, 2005). As with other ecological factors relevant to suicide, the relationship between religion and suicide also appears to be influenced by cultural contexts (e.g., European versus Asian areas of the world), gender and age (Clarke, Bannon, & Denihan, 2003; Colucci & Martin, 2008; Gearing & Lizardi, 2009), as well as changing societal contexts and norms (Cleary & Brannick, 2007). For example, it has been noted that religions with stronger affiliations, values and family traditions may offer greater protection against suicide (Neeleman, 1998; Neeleman & Lewis, 1999). In agreement with Durkheim (1897), Faria and colleagues (Faria, Victora, Meneghel, De Carvalho, & Falk, 2006) identified higher male suicide rates in predominantly Protestant regions in Rio Grande do Sul. A possible explanation is that integration and social cohesion is not as strong in Protestant societies as in Catholic societies. A study by Pritchard and Baldwin (Pritchard & Baldwin, 2000) also

reported important differences in respect to age, as elderly people in traditional Catholic or Orthodox locations were found to have higher suicide rates than those in less traditional states. It is also necessary to consider that religions with a strongly prohibitive attitude toward suicide may reinforce stigma, leading to greater concealment and inaccurate reporting (van Poppel & Day, 1996).

Migrants (n = 20)

There is mixed evidence about the influence of migration on suicide. While some research supports the premise that migration is associated with higher suicide rates (Burvill, 1998; Johansson, Sundquist, Johansson, Qvist, & Bergman, 1997; Stack, 1981; Stack, 2000b; Whitley, Gunnell, Dorling, & Smith, 1999), this relationship appears to be contingent on individual factors related to the migrant and their country of origin (Ferrada-Noli, 2007; Hjern, Lindblad, & Vinnerljung, 2002; Johansson, Sundquist, Johansson, Bergman, et al., 1997; Kliewer, 1991; Voracek & Loibl, 2008; Westman, Sundquist, Johansson, Johansson, & Sundquist, 2006). Migrant suicide is also likely to be influenced by ethnicity, gender, age, socioeconomic status and residence in urban or rural area of residence of the host country (Kliewer & Ward, 1988; Morrell, Taylor, Slaytor, & Ford, 1999; Shah, Lindsay, & Dennis, 2009; Singh & Siahpush, 2006; Taylor, Morrell, Slaytor, & Ford, 1998; Trovato & Jarvis, 1986). Factors such as shorter duration of residence (Hjern & Allebeck, 2002) and relationship status (i.e., single immigrants may have higher risk) (Kposowa, McElvain, & Breault, 2008) could also have an influence on migrant suicide rates. A study by Ott and colleagues (Ott, Winkler, Kyobutungi, Laki, & Becher, 2008) also suggests that second generation immigrants are at greater risk of suicide than their parental generation.

Rural Locations (n = 26)

Studies from a number of different cultural contexts report that those living in rural areas are more at risk of suicide than those living in urban areas (Dudley, Kelk, Florio, Howard, & Waters, 1998; Gartner, Farewell, Roach, & Dunstan, 2011; Hempstead, 2006; Kapusta et al., 2008; Kim, Jung-Choi, Jun, & Kawachi, 2010; Phillips, 2009; Singh & Siahpush, 2002; Yip, Callanan, & Yuen, 2000). For example, research in Australia and New Zealand suggests that younger and older males in rural areas have higher suicide rates than their metropolitan counterparts (Caldwell, Jorm, & Dear, 2004; Dudley et al., 1998; Morrell et al., 1999; Yip et al., 2000), while older adults and females are reported as being more "at risk" in rural areas of Asia (Liu, Tein, Zhao, & Sandler, 2005; Phillips, Li, & Zhang, 2002; Pritchard, 1996; Yip et al., 2000). There are a number of explanations for these geographical differences, some of which focus on exposure to risk factors (e.g. drugs and alcohol abuse), prevalence of treatment and support services (e.g. availability of mental health services), and access to lethal suicide methods (Caldwell et al., 2004; Hempstead, 2006; Hirsch, 2006; Judd, Cooper, Fraser, & Davis, 2006; Klieve, Barnes, & De Leo, 2009; Klieve, Sveticic, & De Leo, 2009; Konradsen, Hoek, & Peiris, 2006; Konradsen et al., 2003; Roberts et al., 2003; Saunderson, Haynes, & Langford, 1998). Other researchers focus on the role of cultural norms in rural and urban areas, and the importance of values and relationships in the surrounding psycho-social environment (Alston, 2010;

Baller & Richardson, 2002; Dudley et al., 1998; Hirsch, 2006; Pritchard, 1996). The relationship between rural residence and suicide has also been found to be sensitive to societal change, as studies have reported changes in the rural-urban suicide ratio over time (Chang, Gunnell, Wheeler, Yip, & Sterne, 2010; Kapusta et al., 2008; Page, Morrell, Taylor, Dudley, & Carter, 2007; Pearce, Barnett, & Jones, 2007).

Modernisation (n = 8)

Durkheim's (1897) research investigated the influence of modernisation (conceptualised as the process of industrialisation, urbanisation and secularisation) on suicide rates in European nations in the late 1800s. According to Durkheim, the changes modernisation brought to society disrupted regulatory mechanisms and the social and community bonds that protected against suicide: "every disturbance of equilibrium, even though it may involve greater comfort and a raising of the general pace of life, provides an impulse to voluntary death" (Durkheim, 1897: pp. 206-207). More recent studies on the relationship between modernisation and suicide rates have produced different results (Stack, 2000b). Stack (2000b) presents two possible reasons for this. Firstly, he argues that after the "initial shocks" of modernisation have passed, suicide rates in society will cease to be sensitive to this process. Secondly, the high degree of correlation between indicators traditionally used as proxies for modernisation creates methodological complications.

Several recent approaches have attempted to address these limitations by modifying the concept to include variables that may better reflect contemporary societies. For example, Fernquist and Cutright (1998) used indicators such as telephone lines per 100 persons and tertiary education enrolments to provide an updated understanding of modernisation in developed nations. A study by Vijayakumar and colleagues (2005) provides another perspective on this topic. These researchers found that countries with a medium "human development index" (an aggregate measure of human development in terms of life expectancy, literacy, and income) had lower suicide rates. Zhang (1998) measures modernisation through variables such as birth rate and age distribution of the population, life-expectancy, urbanisation, percentage of married women using contraception, and per capita GNP. An alternative approach is presented by Mäkinen (1997), who measures modernisation through variables such as marriage and divorce, the percentage of births occurring outside marriage, female employment, unemployment, and the ownership of television sets. In 2007, Graeff and Mehlkopf defined modernisation as a "technical form of social change" and measured this through indicators such as intensification of communication processes and size of the government (implying the effect of the government on social welfare). Most recently, a study using an aggregate measure of globalisation found that this was associated with higher suicide rates in 35 areas of the world (Milner et al., 2011). However, it is worth noting that the studies presented above deviate from the original concept of modernisation described by Durkheim (1897).

Media Reporting of Suicide (n = 19)

Media guidelines for the reporting of suicide are commonly included in national intervention efforts because of the concern that insensitive descriptions may result in an increase in suicide deaths (Cheng, Hawton, Lee, & Chen, 2007; Fu & Yip, 2007; Pirkis, Blood, Beautrais, Burgess, & Skehans, 2006; Stack,

2009). There is some evidence to support this perspective, as recent research papers identify an increase in suicide rates after damaging media reports (Chen et al., 2010; Chen, Chen, & Yip, 2011; Fu, Chan, & Yip, 2011; Gould, 2001; Hagihara, Tarumi, & Abe, 2007; Niederkrotenthaler & Sonneck, 2007; Pirkis & Blood, 2001a, 2001b; Stack, 2005; Sudak & Sudak, 2005; Tsai & Cho, 2011). This relationship appears to be stronger for factual media reports (Cheng, Hawton, Chen et al., 2007; Cheng, Hawton, Lee et al., 2007; Niederkrotenthaler et al., 2009; Pirkis & Blood, 2001a; Yip et al., 2006) than for fictional reports of suicide (e.g. films, television, music etc.) (Pirkis & Blood, 2001b). Further, a meta-analysis of 55 studies on non-fictional accounts found that stories related to entertainment or political suicides were more often associated with a rise in suicide (Stack, 2005). This review also found substantially more imitative effects for female suicide rates than male rates, and less likelihood of imitative effects in younger or middle aged groups. The association between media reporting and suicide is also dependent on the length of time between the occurrence of the suicide and publishing of the story, the number of media sources covering the event, and the specific characteristics of case (Pirkis et al., 2006). Recent research by Niederkrotenthaler and colleagues (2010) reports that printed media articles that focused on specific suicide deaths and “myths” of suicide had a detrimental effect, while those articles on coping behaviours and suicide ideation (not accompanied by suicidal behaviours) were not associated with an increase in suicide. Niederkrotenthaler and Sonneck (2007) also reported that implementing media guidelines was related to more appropriate media reporting of suicide and reduced suicide rates. The mode of coverage is also likely to be important, with television stories being less conducive to imitative effects than newspaper stories (Stack, 2005).

Alcohol (n = 17)

Alcohol has been linked to increased country-level suicide rates in Europe, Canada (Hintikka et al., 1999; Inelmen, Gazzo, Inelmen, Sergi, & Manzato, 2010; Landberg, 2008; Mann, Zalcman, Smart, Rush, & Suurvali, 2006; Ramstedt, 2001) and in Japan (Nakaya et al., 2007). Alcohol is also thought to be associated with higher rates of suicide in some Indigenous groups and in the Pacific, although empirical data on this relationship is scarce (De Leo, Milner, & Svetlicic, 2012; Laliberté & Tousignant, 2009; Rubinstein, 1992). At a social level, these associations may vary depending on gender, the prevalence and type of alcohol available, and the attitude toward alcohol consumption in society (Bloomfield, Stockwell, Gmel, & Rehn, 2003; Kuendig et al., 2008; Landberg, 2008, 2009; Norström & Skog, 2001; Peele, 1997; Rossow, 1996). For example, the relationship between suicide and alcohol consumption per capita appears to be more noticeable in countries where spirit consumption is high (such as those in Eastern Europe), compared to countries with moderate drinking practices (Inelmen et al., 2010; Landberg, 2008; Pridemore, 2006; Stickley, Jukkala, & Norstrom, 2011). These findings indicate the importance of considering the national cultural attitude toward alcohol, as well as the actual prevalence of alcohol in a country.

Access to Suicide Methods (n = 21)

In western countries, a large number of suicide deaths occur by hanging, while pesticide poisoning is a major cause of death

in Asia and Latin America (Ajdacic-Gross et al., 2008; Konradsen et al., 2006; Konradsen et al., 2003; Mohamed et al., 2009; Roberts et al., 2003). There are also noticeable gender differences in the use of suicide methods in many countries, with females more likely to overdose on drugs or poisons, while men tend to use methods such as hanging and firearms (Hawton, Fagg, Simkin, Harriss, & Malmberg, 1998; Payne, Swami, & Stanistreet, 2008). It is likely that these differences reflect both cultural and social attitudes towards specific method choice, as well as more pragmatic considerations about the availability of methods (Kanchan, Menon, & Menezes, 2009; Lin, Chang, & Lu, 2010).

Reducing access to commonly used methods (e.g. tighter regulation and access to firearms, illegal and legal drugs, agricultural pesticides and domestic gas) has been associated with lower suicide within some populations (Beautrais, Fergusson, & Horwood, 2005; Daigle, 2005; Hawton, 2007; Nordentoft, Qin, Helweg-Larsen, & Juel, 2006, 2007; Rodríguez Andrés & Hempstead, 2011; Skegg & Herbison, 2009; Wong, Chan, Lau, Morgan, & Yip, 2009). However, research also suggests the importance of considering the risk of method substitution (whereby suicidal persons prevented from using one method will shift consideration to an alternate method) and the other possible influences such as the degree of familiarity with the method, gender, age and geographical location (De Leo, Dwyer, Firman, & Neulinger, 2003; De Leo, Evans, & Neulinger, 2002; Klieve, Barnes et al., 2009; Klieve, Svetlicic et al., 2009; Roberts et al., 2003).

Discussion

This review covered an extensive number of studies, all of which used different approaches and methodologies to examine the relationship between social-environmental factors and suicide mortality. The outcomes of the review indicate that suicide is influenced by a wide range of factors such as income (national income, income per capita), employment trends (unemployment and female labour force participation), family bonds and relationships (fertility, relationship status), religion, location of residence, media reporting of suicide, access to alcohol in society, and lethal means used to suicide. The loss of a spouse (either through divorce or widowhood) appears to be associated with an increase in suicide rates, while female workforce participation, fertility/birth rates, and religion appear to vary over time and between contexts.

As a methodological comment, the research discussed in this paper was conducted using different designs at both the aggregate and individual level. Numerous studies used ecological designs (e.g., Babones, 2008; Berk et al., 2006; Brainerd, 2001; Chang et al., 2009; Chuang & Huang, 2007; Durkheim, 1897; Hintikka et al., 1999; Milner, McClure et al., 2012; Milner et al., 2011; Milner, Page et al., 2012) either measured over time while fewer used cohort designs (Lundin et al., 2010; Mäki & Martikainen, 2009; Pritchard, 1992; Qin et al., 2003; Qin et al., 2000). The rationale for using ecological designs as they are able to measure social phenomena or states in relation to death in a population, while cohort studies can control for possible individual confounding factors, such as education or occupation.

Various limitations may have influenced the findings of this review. First, the holistic nature of it means that our review did not discuss methodological or analytic aspects of research arti-

cles. However, the aim of this paper was to provide an overview of the general findings on these topics rather than providing specific detailed information on a topic. Indeed, each on the topics discussed in this paper could be (and potentially should be) the topic of a whole other paper. Another limitation is that the review did not distinguish between compositional (e.g. the characteristics of individuals concentrated within particular places) or contextual effects (e.g. factors in the local physical or social environment) (Macintyre, Ellaway, & Cummins, 2002). As we focused only on suicide mortality, it is not possible to generalise the outcomes of this review to non-fatal suicidal behaviours. There are also limitations concerning the design of the study and a number of relevant research papers may have been missed due to the selection of search terms or databases used. Further, the search strategy was skewed towards research from high-income areas due to lack of published data from low-income areas of the world (Bertolote, Fleischmann, De Leo, & Wasserman, 2004).

Another issue was the continued reliance on material published from before the year 2000. This may have reflected differences in research interest over time. For example, there has been relatively little attention to the topic of gender role change in recent years, while topics like media reporting or unemployment have been the focus of a number of recent research articles. It is also necessary to note that investigation into some social factors, such as economic change, have a longer history of research than others.

The dynamic relationship between social-environmental factors and suicide indicates the importance of longitudinal and contextually specific studies able to identify time intervals at which the relationship between social variables and suicide is most salient. These findings can also be important for suicide prevention. For example, research on “acute” points during which unemployment, migration or divorce are associated with the greatest likelihood of suicide may be able to inform risk assessment and the development of targeted population-level interventions. Research by Stuckler, Basu, Suhrcke, Coutts and McKee (2009) provide evidence of the public health effects of economic crises, in particular in terms of increasing suicide rates. The authors underline the importance of active labour market programs (e.g., those that keep and reintegrate workers in jobs) in mitigating some adverse health effects of economic downturns.

The high suicide risk among people living in rural areas underlines the need to invest in prevention programs specifically targeting rural areas, such as those aimed at improving the skills of the general population in order to manage mental health emergencies including suicidal behaviour (Ellis & Philip, 2010). However, in general, evidence suggests that reductions in suicide of a population can be achieved through programs containing multiple levels of intervention and which target several at-risk groups (Hegerl, Althaus, Schmidtke, & Niklewski, 2006).

Conclusion

Social and environmental contexts present a range of possible and heterogeneous influences on suicide mortality. This review covered recent research about a wide range of factors including income (national income, income per capita), employment trends (unemployment and female labour force participation), family bonds and relationships (fertility and rela-

tionship status), religion, location of residence, media reporting of suicide, access to alcohol in society, and lethal means used to suicide. The strength and direction of some of these associations (e.g., female labour force participation, fertility and religion) appear to vary over time and between contexts. The influence of other factors such as relationship status and unemployment appear to be comparatively more stable. Aside from being of interest to social researchers, the findings of this review could be of relevance to policy develop as they highlight the importance of social-environmental factors as protective and risk factor for suicide mortality across population.

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