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The association between emotional and instrumental social support and risk of suicide death: A population-based cohort study

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ABSTRACT

Suicide is an important public health issue and previous studies have suggested that social support can one preventive factor. However, the association between emotional and instrumental social support and suicide death has not been investigated in detail. The purpose of this study was to investigate the association between each type of social support and suicide death based on a population-based cohort study. We analyzed follow-up data for 47,223 subjects (aged ≥40 y) participating in a community-based, prospective cohort study. At the baseline, the subjects were asked five questions about social support. The end point of the study was suicide mortality, based on data from the National Vital Statistics. The Cox model was used to estimate the multivariate-adjusted hazard ratios of suicide death. In addition, stratified analysis was conducted to test the interaction of each type of social support with gender (male/female) and age (< 65/≥65 y) separately. Among 320,880 person-years of follow-up, 90 cases of suicide death were documented. There were significant association between instrumental social support and lower risk of suicide death, and the hazard ratio was 0.60 (95% CI: 0.38–0.94). Emotional social support was also associated with a lower risk of suicide death, but not to a significant degree, and the hazard ratio was 0.70 (95% CI: 0.42–1.17). It is suggested that instrumental social support was significantly associated with a lower risk of suicide death, and emotional social support tended to be associated with a lower risk of suicide death.

1. Introduction

Suicide is an important public health issue. In 2015, there were an estimated 788,000 suicide deaths worldwide and an annual global age-standardized suicide rate of 10.7 per 100,000 population. As suicide deaths are preventable, there is an urgent need for preventive interventions that are effective. According to a report from the WHO (WHO, 2014), risk factors for suicide encompass areas that cover a wide range of systemic, societal, community, relationship (social connectedness to immediate family and friends) and individual factors. Among relationship risk factors, lack of social support has been highlighted as a key target for development of strategies aimed at suicide prevention.

Social support is thought to be a protective factor for mental health. In addition to the direct effect of support, the buffering hypothesis (Cohen and Wills, 1985) has proposed that mobilization of social support to help a person to cope with a stressor can reduce its negative effects on health. A previous study has suggested that the perception of support by recipients is more closely linked to their health and well-being than the objective behavior involved in such interaction (Wethington and Kessler, 1986). Studies employing a cross-sectional design have examined the association between social support and various forms of suicidal behavior such as attempted suicide (Batterham and Christensen, 2012; Hirsch and Barton, 2011; Miller et al., 2015; Rojas et al., 2017) and suicidal ideation (Awata et al., 2005; Batterham and Christensen, 2012; Beutel et al., 2017; Hirsch and Barton, 2011; Miller et al., 2015; Noguchi et al., 2014; Park et al., 2010), and some employing a longitudinal design have also examined the same issues (Kleiman and Liu, 2013; Mackin et al., 2017; Teismann et al., 2016). Their findings have suggested that social support may be one of the most important factors for suicide prevention. However, the relationship of social support to actual suicide death has not been well studied; to our knowledge only one such study employing a longitudinal design has been reported (Poudel-Tandukar et al., 2011), and the results suggested that social support aimed at boosting self-esteem and confidence could be effective for suicide prevention, particularly in women.

Social support represents the functional content of relationships that can be categorized into four broad types of supportive behavior or

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action: emotional, instrumental, informational and appraisal social support (House et al., 1985), and is thought to have two dimensions, emotional and instrumental, since emotional, appraisal and informational support are often difficult to disaggregate, and instrumental support can be provided by resources different from emotional, appraisal and informational support (Berkman et al., 2000). Moser and Beutel have reported the development and validation of the psychometric properties of a short instrument for assessment of social support focusing on two aspects of social support: emotional and instrumental (Beutel et al., 2017; Moser et al., 2012). However, previous studies have shown that there are differences in association between the two types of social support and mental health. Sheikh et al. reported that instrumental support made a greater contribution to mental health than emotional support (Sheikh et al., 2016). A recent meta-analysis found that emotional support was more closely associated with depression than instrumental support (Gariepy et al., 2016). Moreover, several studies have investigated the association between emotional and instrumental social support, and mental health (Hansen et al., 2017; Morelli et al., 2015), separately. Several studies have investigated the association between emotional and instrumental social support, and mental health (Hansen et al., 2017; Morelli et al., 2015). Beutel et al. suggested that emotional social support appeared to be more important for prediction of mental health (Beutel et al., 2017), and longitudinal studies have reported that emotional and appraisal social support (Poudel-Tandukar et al., 2011) or social integration (Tsai et al., 2014, 2015; Turvey et al., 2002) are associated with a lower rate of suicide death. These studies investigated only the association between emotional social support and suicide death (Poudel-Tandukar et al., 2011; Tsai et al., 2014, 2015; Turvey et al., 2002), and not that between instrumental social support and suicide death. Although some studies have investigated the association between instrumental social support and suicide (Bryan and Hernandez, 2013; Hedley et al., 2017; Park et al., 2010), only suicidal ideation, and not suicide death, was considered. In particular, to our knowledge, no study has investigated the association between instrumental social support and suicide death employing a longitudinal design. As the two aspects of social support, emotional and instrumental, might influence suicidal behavior through different pathways, it might be important to investigate the association of emotional and instrumental social support with suicide death independently when considering provision of social support in the community (Berkman et al., 2000). In addition, age- and sex-specific relationships might exist between social support and suicidal behavior (Park et al., 2010).

The purpose of this population-based cohort study was to investigate (1) the association between social support and the risk of suicide death employing a longitudinal design and (2) the association between different types of social support – emotional and instrumental – (Beutel et al., 2017; Moser et al., 2012) and the risk of suicide death.

2. Materials and methods

2.1. Study cohort

The design of the Ohsaki Cohort 2006 Study has been described in detail elsewhere (Kuriyama et al., 2010). In brief, the source population for the baseline survey comprised all citizens resident in Ohsaki City, Miyagi Prefecture, northeastern Japan, on December 1, 2006, i.e. 77,235 men and women aged ≥40 years. The survey included questions about items on history of disease, blood pressure, body weight, height, smoking, drinking, education level and time spend walking per day.

The baseline survey was conducted between December 1, 2006, and December 15, 2006, and the follow-up survey between December 16, 2006, and March 31, 2014. A questionnaire was distributed by the heads of individual administrative districts, and then collected by mail. From this analysis, 49,603 individuals who provided valid responses formed the study cohort (response rate: 64.2%). We excluded 18 individuals who had moved or died before the start of follow-up (December 15, 2006), and 2,362 individuals for whom information about social support had been unavailable. Thus, 47,223 individuals were analyzed for the purpose of this study.

2.2. Emotional and instrumental social support

The degree of social support available to each person was assessed by asking the following questions (Muraoka et al., 1996). (Q1) “Do you have someone to consult when you are in trouble?”, (Q2) “Do you have someone to talk to about your health when you are in bad physical condition?”, (Q3) “Do you have someone to ask for help with your daily housework?”, (Q4) “Do you have someone to ask to take you to a hospital when you are sick?” and (Q5) “Do you have someone to ask to take care of you when you are in bed with a bad physical condition?”. Each question required an answer of “yes” or “no”. We considered Q1 and Q2 to yield information on emotional social support, and Q3, Q4 and Q5 to yield information on instrumental social support. We categorized subjects who answered “yes” to both Q1 and Q2 as having emotional social support (+), and those answering otherwise as lacking emotional social support (−). We also categorized subjects who answered “yes” to all of Q3, Q4 and Q5 as having instrumental social support (+), and those answering otherwise as lacking instrumental social support (−) (Hozawa et al., 2009; Mori et al., 2017; Tomata et al., 2012).

The reliability and validity of the social support questionnaire (Muraoka et al., 1996) was tested via correlation with the Japanese version of the abbreviated Lubben Social Network Scale (Kurimoto et al., 2011; Lubben et al., 2006). Testing our categorization of the five questionnaires into two groups, we conducted factor analysis on the five questions for social support using the Varimax rotation algorithm. From the results of this analysis, we identified two independent factors: factor 1 for Q1 and Q2, and factor 2 for Q3, Q4 and Q5 (Supplementary Table 1). On this basis, Q1 and Q2 in our study were considered to correspond to emotional social support, and Q3, Q4 and Q5 were considered to correspond to instrumental social support.

2.3. Follow-up

The end-point in this study was suicide death. We followed up the participants for mortality and emigration by reviewing the Residential Registry Record of Ohsaki City from 16 December 2006 to 31 March 2014. To determine the causes of death for decedents, we used the National Vital Statistics with permission from the Ministry of Health, Labour and Welfare, Japan. Cause of death was classified according to the International Classification of Diseases, 10th revision (ICD-10). Suicide death was identified as ICD-10: X60-X84.

2.4. Statistical analysis

We calculated the person-years of follow-up for each subject from December 16, 2006, until the date of death, the date of emigration from Ohsaki City, or the end of the follow-up period (March 31, 2014), whichever occurred first.

We used the multiple adjusted Cox proportional hazards model to calculate the hazard ratios (HRs) and 95% confidence intervals (CIs) for suicide according to the status of emotional social support and instrumental social support. In each model, social support (−) was set as the reference category. Multivariate models were adjusted for the following variables. Model 1 was adjusted for age (40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, or ≥85 y) and sex. To examine whether the association between social support and suicide death was attributable to a healthy physical status or other lifestyle factors, Model 2 was adjusted for several variables. We considered the following variables to be potential confounders besides age and sex: history of disease (stroke, hypertension, myocardial infarction and cancer),

smoking (never + former, current and missing), drinking (never + former, current and missing), body mass index BMI in kg/m^2 (< 18.5, 18.5–24.9, ≥25.0 and missing), education level (age at final graduation from school < 19, ≥19 y and missing) and time spent walking per day (< 60 min, ≥60 min and missing).

In addition, we conducted competing risks regression considering completed other causes in Model 3. We also conducted stratified analysis to test the interaction of sex (male/female) and age (< 65 years/ ≥65 years) with the status of emotional social support and instrumental social support in Model 2. We calculated the HRs and 95% CI for suicide according to the status of each social support; Q1-Q5.

All data were analyzed using SAS version 9.4 (SAS Inc., Cary, NC). All statistical tests described here were two-sided, and differences at $p < .05$ were accepted as significant.

2.5. Ethical issues

We considered the return of completed questionnaires to imply consent to participate in the study involving the baseline survey data and subsequent follow-up of death and emigration. The Ethics Committee of Tohoku University Graduate School of Medicine (Sendai, Japan) reviewed and approved the study protocol.

3. Results

3.1. Subject characteristics

As a result of emigration from the study area, 1,249 individuals were lost to follow-up, and thus the follow-up rate was 97.4%. From the resulting 320,880 person-years, suicide death was documented for 90 persons.

Among the 47,223 subjects, the proportion of men was 45.4% (21,447 vs 25,776), and the mean age (SD) was 62.7 (12.8) years. Table 1 compares the characteristics of the study subjects according to social support status: emotional social support and instrumental social support. The number of subjects with emotional social support (+) was 40,542 (85.9%) and that of subjects with instrumental social support (+) was 37,093 (78.5%). Subjects with emotional social support (+) had a younger mean age and a lower proportion of males than those lacking emotional social support (−), and subjects with instrumental social support (+) had an older mean age and a higher proportion of males than those lacking instrumental social support (−). As for history of disease, the proportion of individuals with a history of stroke and cancer was higher among those with emotional and instrumental social support (+) than among those lacking social support (−). The proportion of individuals who spent more than one hour per day walking was higher, and the proportions of those who were current smokers and drinkers were lower both among subjects with emotional and instrumental social support (+) than among subjects lacking social support (−). With regard to education level, the proportion of individuals who continued until the age of 19 years was slightly lower among subjects with both emotional and instrumental social support (+) than among those who lacked social support (−).

3.2. Association between suicide death and emotional and instrumental social support

The association between suicide death and emotional and instrumental social support status is shown in Table 2 (Kaplan–Meier plots are shown in Supplementary Fig. 1 and Supplementary Fig. 2). Instrumental social support was associated with a significantly lower risk of suicide death, the HR (95% CI) being 0.60 (0.38–0.94) in Model 1. The association was not altered even after considering multiple adjustment in Model 2, the HR (95% CI) being 0.60 (0.38–0.94), or after competing risk regression analysis considering death by other causes in Model 3, the HR (95% CI) being 0.60 (0.38–0.95). On the other hand, emotional social support was associated with a lower risk of suicide death, but not to a significant degree, the HRs (95% CI) being 0.71 (0.43–1.18) for Model 1, 0.70 (0.42–1.17) for Model 2 and 0.71 (0.42–1.19) for Model 3.

The association between each social support item and suicide death is shown in Table 3. Among the five questions, Q3 was associated with a significantly lower risk of suicide death, the HR (95% CI) being 0.57 (0.35–0.92) in Model 2. In addition, Q5 was associated almost significantly with a lower risk of suicide death, the HR (95% CI) being 0.59 (0.34–1.02) in Model 2. The HRs for the other social support items also tended to indicate a lower risk of suicide death, the HRs (95% CI) being 0.81 for Q1, 0.63 (0.35–1.12) for Q2 and 0.89 (0.44–1.77) for Q4.

Table 4 shows the results of stratified analysis to examine the interactions for sex (male/female) and age (< 65/≥65 years). The p-interactions were not significant for sex or age, being 0.258 and 0.863, respectively. Although there was no significant p-interaction for sex, the HRs for both types of social support tended to be lower for females than for males. For instrumental social support, the HR for females was significantly lower: 0.41 (0.18–0.91).

4. Discussion

In this population-based cohort study, we investigated the association between emotional and instrumental social support, and suicide death. To our knowledge, this is the first study to have investigated the association between emotional and instrumental social support separately, and suicide death. We conducted time-to-event data analysis and observed that social support was associated with a lower risk of suicide

Table 1
Baseline characteristics according to social support (n = 47,223).

Characteristic	total		Emotional Social Support				p-value[a]	Instrumental Social Support				p-value[a]
			No		Yes			No		Yes		
Age (y), mean (SD)	62.7	(12.8)	63.2	(12.8)	59.9	(12.2)	< 0.001	61.6	(12.2)	63.0	(12.9)	< 0.001
Male (%)	45.4		59.3		43.1		< 0.001	45.3		45.5		0.741
History of disease (%)												
Stroke	2.6		2.4		2.6		0.354	2.0		2.7		< 0.001
Hypertension	42.4		40.9		42.6		0.008	42.0		42.5		0.402
Myocardiac infarction	2.8		2.8		2.8		0.740	2.7		2.8		0.574
Cancer	5.7		4.8		5.8		< 0.001	5.1		5.8		0.007
Current smoker (%)	23.2		31.2		21.9		< 0.001	26.9		22.2		< 0.001
Current drinker (%)	49.1		56.1		47.9		< 0.001	49.6		48.9		0.243
Body mass index (kg/m2), mean (SD)	23.6	(3.3)	23.6	(3.3)	23.7	(3.4)	< 0.001	23.6	(3.5)	23.6	(3.3)	0.195
Education until age ≥19 y (%)	29.2		29.4		29.1		0.709	30.0		28.9		0.052
Time spent walking ≥1 h/d (%)	28.0		24.9		28.6		< 0.001	25.4		28.8		< 0.001

[a] Probability values for trend were calculated by the Mantel-Haenszel $\chi 2$ test for variables of proportion and by *t*-test for continuous variables.

Table 2
Association between social support and suicide (n = 47,223).

	Emotional Social Support			Instrumental Social Support		
	No	Yes		No	Yes	
Number of events	28	62		19	71	
Person-years	45,344	275,536		69,006	251,875	
Model 1[a]	1.00 (reference)[d]	0.71	(0.43–1.18)	1.00 (reference)	0.60	(0.38–0.94)
Model 2[b]	1.00 (reference)	0.70	(0.42–1.17)	1.00 (reference)	0.60	(0.38–0.94)
Model 3[c]	1.00 (reference)	0.71	(0.42–1.19)	1.00 (reference)	0.60	(0.38–0.95)

[a] Adjusted for age (40–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, and ≥85 y) and sex.
[b] Adjusted for Model 1 + history of disease (stroke, hypertension, myocardial infarction, cancer), drinking (never + former, current, missing), smoking (never + former, current, missing), body mass index (in kg/m^2; < 18.5, 18.5–24.9, ≥25.0, missing), education level (age at final graduation from school < 19 y, ≥19 y, missing), time spent walking per day (≥60 min/d, < 60 min/d, missing).
[c] Competing risk regression in Model 2 (death by other causes).
[d] Hazard ratio (95% confidence interval).

Table 3
Association Between each Social Support and Suicide (n = 47,223).

	Social Support		
	No	Yes	
Q1 "Do you have someone to consult when you are in trouble?"			
Number of events	75	15	
Person-years	39,251	281,629	
Model 1*	1.00 (reference)[c]	0.82	(0.47–1.43)
Model 2†	1.00 (reference)	0.81	(0.46–1.42)
Q2 "Do you have someone to talk about your health when you are in bad physical condition?"			
Number of events	76	14	
Person-years	30,373	290,507	
Model 1[a]	1.00 (reference)	0.63	(0.35–1.11)
Model 2[b]	1.00 (reference)	0.63	(0.35–1.12)
Q3 "Do you have someone to ask to help with your daily housework?"			
Number of events	67	23	
Person-years	49,783	271,097	
Model 1[a]	1.00 (reference)	0.56	(0.35–0.90)
Model 2[b]	1.00 (reference)	0.57	(0.35–0.92)
Q4 "Do you have someone to ask to take you to a hospital when you are sick?"			
Number of events	81	9	
Person-years	28,325	292,555	
Model 1[a]	1.00 (reference)	0.88	(0.44–1.76)
Model 2[b]	1.00 (reference)	0.89	(0.44–1.77)
Q5 "Do you have someone to ask to take care of you when you are in bed with bad physical condition?"			
Number of events	74	16	
Person-years	41,909	278,971	
Model 1[a]	1.00 (reference)	0.59	(0.34–1.01)
Model 2[b]	1.00 (reference)	0.59	(0.34–1.02)

[a] Adjusted for age (40–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, and ≥85 y) and sex.
[b] Adjusted for Model 1 + history of disease (stroke, hypertension, myocardial infarction, cancer), drinking (never + former, current, missing), smoking (never + former, current, missing), body mass index (in kg/m^2; < 18.5, 18.5–24.9, ≥25.0, missing), education level (age at final graduation from school < 19 y, ≥19 y, missing), time spent walking (≥60 min/d, < 60 min/d, missing).
[c] Hazard ratio (95% confidence interval).

death, even after adjustment for various covariates. Instrumental social support was significantly associated with a lower risk of suicide death, and emotional social support tended to be associated with a lower risk of suicide death. We also observed that (Q3) "Do you have someone to ask for help with your daily housework?" was significantly associated with a lower risk of suicide death. (Q5) "Do you have someone to ask to take care of you when you are in bed with a bad physical condition?" was almost significantly associated with a lower risk of suicide death, and other items assessing social support tended to have such an association. In our stratified analysis, we did not observe any significant interaction between suicide death and sex (male/female) or age (< 65/≥65 years). However, there was a significant association between instrumental social support and suicide death in women.

Table 4
Association between social support and suicide stratified by sex and age (n = 47,223).

	Social Support			p-interaction
	No	Yes		
sex				
Emotional Social Support				
male	1.00 (reference)[a]	0.74	(0.42–1.33)	0.752
female	1.00 (reference)	0.58	(0.20–1.70)	
Instrumental Social Support				
male	1.00 (reference)	0.71	(0.41–1.22)	0.274
female	1.00 (reference)	0.41	(0.18–0.91)	
age				
Emotional Social Support				
< 65 y	1.00 (reference)	0.89	(0.45–1.73)	0.425
≥65 y	1.00 (reference)	0.51	(0.23–1.11)	
Instrumental Social Support				
< 65 y	1.00 (reference)	0.60	(0.33–1.07)	0.813
≥65 y	1.00 (reference)	0.63	(0.31–1.26)	

Adjusted for Model 2.
[a] Hazard ratio (95% confidence interval).

4.1. Strengths

This study had several strengths. First, we used suicide death as an outcome value, not suicidal ideation or attempted suicide. Second, we obtained information on different types of social support – emotional and instrumental – separately, in daily life. Third, this was a large population-based cohort study involving 47,223 persons. Fourth, it had a follow-up rate of almost 100%. Fifth, many confounding factors were taken into account.

4.2. Association between instrumental social support and suicide death

In this study, the association between instrumental social support and suicide death was statistically significant. However, the mechanism of this association was unclear. Instrumental social support refers to help, aid or assistance with tangible needs such as getting groceries, getting to appointments, phoning, and cooking, cleaning or paying bills. It has been reported that instrumental social support has stress buffering effects, both directly (i.e. reducing situational demands and solving problems) and indirectly (i.e. bolstering one's sense of importance and self-esteem) (Thoits, 2011). Cohen mentioned that it is assumed to be effective when the resources they provide are closely linked to the specific need elicited by a stressful event compared to emotional social support which is likely to be relevant for a broad range

of stressful events (Cohen and Wills, 1985). From these features, the advantage of instrumental social support in terms of suicide prevention might be its direct and practical provision of support. Some studies have investigated the relationship between instrumental social support and mental health (Åslund et al., 2014; Bassuk et al., 2002; Dinenberg et al., 2014; Glass et al., 2007), depression (Hedley et al., 2017; Hou et al., 2015) and suicidal ideation (Bryan and Hernandez, 2013; Park et al., 2010). The direct effect of instrumental social support might help a person facing difficulties to escape their stressful situation and provide a margin, e.g. time, money or even mentality, that would enable him/her to avoid suicide.

4.3. Limitations

There were several limitations to our study. First, the issue of power in this study needs to be considered, since there were too few events, i.e. only 90 suicides. It is possible that the association between emotional social support and suicide risk was not statistically significant due to this low power. Second, the changes in social support during the following period could have influenced the association with risk for suicide. We were unable to assess changes in social support during this period, as we measured social support only at the baseline. Third, we assessed social support using only five questions relating to everyday life and the answers were subjective, since the subjects were self-rated. Forth, we were unable to distinguish whether the social support was received or perceived. Since Wethington has suggested that perceived social support is more important than received social support in predicting adjustment to stressful life events (Wethington and Kessler, 1986), it is important to identify the social support as being perceived or received. Fifth, there was no information about existing mental disorders of the participants at the baseline and during the follow-up, nor was the reason for suicide clarified. Therefore, we were unable to adjust for the influence of prior psychological ill health when calculating the HRs in this analysis. It is generally acknowledged that over 90% of those who commit suicide have a psychiatric diagnosis at the time of death, and thus the presence of a mental disorder is an important risk factor for suicide (Bertolote and Fleischmann, 2002). It also needs to be considered that individuals who have poor mental health tend to report a low level of social support. Finally, not all potential confounding factors were considered. With regard to the association between instrumental social support and suicide death, some studies have examined the association between social support, depression and well-being, and reporting that there are no differences among the types of social support (Grav et al., 2012; Patten et al., 2010; Wareham et al., 2007) or any evidence of superiority for emotional social support (Lin et al., 1999; Morelli et al., 2015; Zunzunegui et al., 2001). Therefore, more studies are needed to examine the association between the types of social support and suicide death.

5. Conclusion

Our findings indicate that instrumental social support was significantly associated with a lower risk of suicide death, and emotional social support tended to be associated with a lower risk of suicide death. It is suggested that direct effects of instrumental social support might be important for prevention of suicide death. When considering measures for preventing suicide, it is important to provide direct and practical support for individuals who are in need of help.

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Consent for publication

Consent for publication had been obtained from all participants used for analysis in the present study.

Contributors

Study concept and design (T.O., Y.T., and I.T.). Acquisition of subjects and/or data (Y.T. and I.T.). Analysis and interpretation of data (T.O., Y.T., F.T., S.Z., Y.S., and I.T.). Preparation of manuscript (T.O., Y.T., and I.T.).

Conflicts of interest

The authors declare that they have no competing interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychires.2019.04.012.

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