

THE EFFECTS OF PARTICIPATION OF COMMUNITY GARDENING ON THE DEVELOPMENT OF SENSE OF COMMUNITY

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1 ABSTRACT

Community gardens play a significant role in not only addressing food issues but also more importantly in facilitating social connections among community members. This study investigated the effects of participation in community gardening on developing Sense of Community (SOC), which represents a combined feeling of belonging, concern for others, and shared faith among members. Therefore, SOC emphasizes citizen's psychological bond with their communities to maintain and conserve the society.

The hypotheses are as follows: (a) the participation in community gardening will have a meaningful influence on creating sense of community; (b) SOC will represent differences according to the various categories of the participation, which include types, level, and duration of the participation. To verify the hypotheses, the survey on both 34 participants, who has cultivated the products at Hale Y community garden in Blacksburg, Virginia operated by the YMCA, and 31 non-participants of community gardening, who were randomly selected in Blacksburg community, was conducted and analyzed by T-test, F-test, and multiple regression analysis. The study concluded that the more active and longer they participate in community gardening, the higher the SOC.

This study has significance in proving the benefit of community gardening for sense of community quantitatively, which was rarely examined in previous studies. Based on the results of this study, we are able to verify the effectiveness of community gardens as a means of community vitality. Besides, the implication in this paper suggests that community garden-related policies need to be established to facilitate local communities.

1.1 Keywords

Community Garden, Sense of Community Index, Participation

2 INTRODUCTION

The increasing number of research articles regarding various aspects of community gardening proves community gardening is receiving global recognition in terms of its multiple and integrated personal, social, and environmental benefits. Hou et al summed up the role of community gardens clearly; “connection to nature, physical exercise, health and nutrition, self-esteem, environmental education, personal growth, companionship, skill development, cultural expression, income generation, empowerment” (Hou et al, 2009, 23). Owing to these enormous benefits, the number of community gardens have been increased across the world, thus expanding its influences on individuals, families and society in general.

Community gardening movements in the late of 19th and early 20th centuries were prompted by organized plans of governments and social reformers in the face of unemployment and poverty in urban area as well as two World Wars and the Great Depression. Community gardening in these periods focused primarily on food production. Recent community gardening movements are different from the past. There have been local residents' indigenous efforts to revitalize their declining urban environments by transforming vacant lots into valuable urban green spaces. Thus, community development, which refers to practices where community members identify their own issues and come together to take collective action to generate solutions, through gardening has recently gained much attention (Saldivar-tanaka & Krasny, 2004). Many scholars such as Troy D. Glover and Jonathan ‘Yotti’ Kingsley have explored the values of contemporary community gardens as potential sites for social capital (Glover, 2004; Kingsley & Townsend, 2006). Led by grassroots neighborhood groups, community gardens are proving significant venues to facilitate social capital, where people voluntarily are connected and cooperated in order to gather resources, address neighborhood issues, and promote friendship. In addition to social capital theory as a lens through which to explore community gardening movements, collective efficacy theory defined by Robert J. Sampson and his colleagues in 1997, which refers to “social cohesion among neighbors combined with their willingness to intervene on behalf of the common good”, has been applied to explain community gardening (Teig, Amulya, Bardwell, Buchenau, Marshall & Litt, 2009). They argue that the creation as well as the operation of community gardens require trusted relationship and collaboration among gardeners, related organizations, and many stakeholders, which can be seen as neighborhood's collective efficacy.

Even though previous scholars have demonstrated community gardens are more about the “community” than they are about “gardening” because community gardens involve interaction between gardeners inevitably (Kurtz, 2001; Glover, 2004), there have been few studies to prove how much community gardening engagement helps to improve community vitality quantitatively. Thus, this study aims to examine the effects of community gardening on the development of sense of community (SOC) according to the roles, periods, and levels of participation using quantitative analysis. It will figure out the determinants to enhance SOC. The contributions of this research encourage communities to take part in gardening in order to vitalize them.

2.1 Sense of Community

Sense of community, often referred to as psychological sense of community, has been predominantly associated with the McMillan and Chavis model (1986). As demonstrated by McMillan and Chavis (1986), sense of community refers to “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together” (p. 9). The following four components are essential to the definition of sense of community: (a) membership, feelings of emotional security, belonging, and identification; (b) influence, by which the community influences the individual and in turn the individual influences the community; (c) integration and fulfillment of needs, physical and psychological needs met, thereby reinforcing one's commitment to the group; and (d) shared emotional connection, positive affect and shared history related to community membership (McMillan & Chavis, 1986).

Measurement of sense of community has been studied by a wide range of people. Buckner (1988) developed an instrument to measure neighborhood cohesion. Buckner's instrument is classified into three scales, which are attraction-to-neighborhood, degree of neighboring, and psychological sense of community. Nasar and Julian (1995) also focused on sense of community in a neighborhood setting. Given that urban problems resulted from a lack of sense of community, Nasar and Julian tried to develop reliable and valid measurement to assess the sense of community and help establishing policies. In addition, Davidson and Patrick (1986) examined sense of community within the city where psychological

cohesion is less than neighborhoods or local communities. A 17-item scale was produced for evaluation of homogeneity and external validity in three studies. Long and Perkins (2007) studied sense of community as community social and place predictors. They pointed out the roles of place and place attitudes have not received much attention in research studies. The sense of community index was classified into two levels; (a) block level, including collective efficacy, participation, neighboring, and place attachment and (b) individual level, composed of length of residence, informal social control, participation, and block satisfaction and confidence.

Since most of the previous studies dealt with urban community or neighborhood settings, for our research, Sense of Community Index (SCI) for community gardening was developed through literature reviews and surveys. At first, we sampled a series of sense of community indices (SCI) from literature associated with measurement of sense of community or neighborhood cohesion. Among 113 items from eight source materials, some overlapping ones and items regarded as unnecessary for community gardens were deleted and modified by means of consideration of researchers. From a pool of items, 37 were eventually selected for further evaluation from experts. The next step was to administer a questionnaire survey to 15 experts involved in the landscape architecture program at Virginia Tech and the Community Design Assistance Center in Blacksburg in order to estimate items for measurement of sense of community that could be used in local community gardens in America. Answer responses of each item ranged from strongly agree to strongly disagree on a 7-point Likert scale. The results from the survey were analyzed over two phases. The first phase utilized descriptive statistics to show the mean and standard deviation of each item. Through descriptive statistics, items having lower mean value or higher standard deviation value was removed. The remaining items were analyzed by exploratory factor analysis for categorizing them according to the common factors. The SOC index for community gardens are configured in a similar way to existing indices, which consisted of "reinforcement of needs", "membership", "influence", and "shared emotional connection". The factor of "reinforcement of needs" includes three indices, which are (a) this community has been successful in getting the needs of its members met; (b) when I have a problem, I can talk about it with members of this community; and (c) People here know they can get help from others in the neighborhood if they are in trouble. The factor of "membership" has four indices: (a) I feel connected to this community; (b) I can recognize most of the members of this community; (c) I put a lot of time and effort into being part of this community; and (d) I feel like I belong here. In the factor of "influence", there are three indices which are (a) this community can influence other communities; (b) if there is a problem in this community, members can get it solved; and (c) this community has good leaders. Lastly, "shared emotional connection" factor is composed of five indices: (a) it is very important to me to be a part of this community; (b) I am with other community members a lot and enjoy being with them; (c) members of this community care about each other; (d) members of this community have shared various activities together, such as holidays, celebrations, or disasters; and (e) I feel hopeful about the future of this community.

3 METHODOLOGY

The primary evaluation method is a single case study with surveys of community gardening participants as an experimental group and non-participants as a control group. We attempted to select a representative sample of local community gardens which have more than 30 participants because 30 people was deemed as an appropriate number to draw valid results about the degree of SOC of gardening participants. Considering the accessibility of the site, the Hale Y community garden was chosen.

The main hypothesis of this study is as follows. (1) The participation of community gardening will have a meaningful effect on SOC. (2) SOC will be different according to the roles, period, and level of participation in community gardening.

3.1 Site and Participants

The target population of this study was identified as participants of community gardening. As a control group, we conducted survey of 32 residents who haven't participated in community gardening. The site is Hale Y community garden in Blacksburg, which has been run by the YMCA at Virginia Tech (see Figure 1). The community gardening program at the Y at Virginia Tech started in 1978, in several places around town as small and backyard gardening. A senior gardening program by which students were assigned to elderly people to help them gardening in their backyard was its first program, which lasted until the 1980s. After that, the gardening program moved to another location on Roanoke Street

behind the cemetery. In 2009, a green house was built in the current donated place, and 2010 spring was the first growing year.

The Y community gardening program aims to accomplish community development by engaging Virginia Tech students, help community members and local organizations dedicated to the community, as well as improving ecological, environmental, and educational opportunities. In order to facilitate community engagement, the program provides several opportunities for residents including garden classes, organized neighborhood harvests, and regular potlucks. Currently, the program offers 72 plots for gardeners from 17 countries. In addition to the private plots, the garden has communal spaces for demonstration and voluntary works. The targeted participants in this study include all people who are involved in gardening at Hale Y community garden as either gardeners or volunteers; given volunteering is a big part of this gardening program.



Figure 1. The Hale Y Community Garden in Blacksburg, VA. (2015) Photo by K. Kim

3.2 Research Method

The survey of participants and non-participants of community gardening was conducted to determine any differences according to participation as well as type, level, and period. Frequency analysis was conducted to investigate general characteristics of test subject population. Through reliability analysis on each questionnaire item, we addressed predictability and accuracy. For the purpose of examining the difference of SOC depending on participation and its type, level, and period, T-test and F-test are conducted by using SPSS. Correlation analysis is used to ascertain the relationship between variables. Multiple regression analysis is used to measure how the independent variables predict and address the dependent variables.

3.3 Questionnaire and Subjects

35 subjects from Hale Y community garden and 33 subjects of non-participants in community gardening were randomly selected for the questionnaire. The instrument is a 21-question survey conducted face to face by researchers. The survey was conducted during the second half of 2015 at Hale Y community garden, Blacksburg community center, and a few parks located in Blacksburg. Independent variables include four factors: demographic, socioeconomic, residential, and community satisfaction. The dependent variables are the degree of SOC, which contains reinforcement of needs, membership, influence, and shared emotional connection. A 5-point Likert scale was used to measure the degree of SOC.

Though participants in this study of community gardening were a diverse range of people between the ages of 20 to 60 and older, more than 60% of the participants were in their 40s and 50s. The distribution of age in the group of non-participant in community gardening is similar to the experimental group. Female garden participants outnumbered male participants. In both groups, the rates of people who are highly educated are relatively higher. It is possible the result was strongly influenced by the

characteristics of the site which exists in a campus town. The period of residency for participants varies widely, ranging from less than one year to over 20 years.

We identified three roles of garden participants. Gardeners, who rent a plot and garden regularly, make up nearly 40% of participants. Volunteers, who participate in community gardening irregularly without registration, occupy over 50% of the experimental group. As the YMCA at Virginia Tech is interested in volunteer work in order to help students bridge the gap between community and campus, there are a wide range of student groups and other community groups involved in gardening. There are two managers in charge of operating the program at the Hale Y community garden. The managers are responsible for coordinating various programs such as potlucks, education, volunteering and allocation of resources. Over 80% of garden participants responded they are taking part in it consistently, while a few people are involved only occasionally whenever they have spare time. Since garden membership is made on a yearly basis, people who have participated in the community garden less than a year make up the largest portion of the group. Participation level indicates how aggressively the people participate in community gardening, which is measured by the participants themselves. While only three participants responded they take part in gardening more or less passively, over 70% of those who responded said they are gardening actively.



Figure 2. Regular Community Gathering at the garden. (2015) Photo by K. Kim

4 RESULTS

Overall, the degree of the SOC is significantly different depending on the participation of community gardening. In order to compare the degree of SOC between gardening participants and non-participants, a T-test was conducted (see Table 1). The results of the T-test demonstrate a statistically significant difference between the two groups ($p < .001$). The average value of SOC in the group of gardening participants was 3.6 while the value of the control group was 3.12. Considering a 5-point Likert scale was used in the survey, a value of 3.6 can be regarded as reasonably high. In all factors in SOC, which are reinforcement of needs, membership, influence, and shared emotional connection, the gardening participants showed higher values than non-participants, which is statistically significant. In both groups, the factor of membership has the highest value (experimental group: 3.95, control group: 3.62).

Meanwhile, the degree of SOC according to demographic factors shows some interesting results. The older the participants are, the more they feel a sense of community. While the value of the SOC in the group of 20s was 3.06, the average value of a group of over 60s was 3.79 ($p < .001$). In addition, the value of SOC of the people who are married was higher than unmarried singles. Comparing the differences according to the educational background, the value of SOC in the group of highly educated people was higher than the control group. The value indicates a meaningful difference between those items as well ($p < .01$). The results of the T-test and F-test examine the degree of SOC according to the

type of role, period and level of participation and show a statistically meaningful difference between variables ($p < .05$) (see Table 2).

Table 1. The comparison of the degree of SOC between participants and non-participants

Division	Participation	N	Ave.	SD.	t	p
SOC	Participants	35	3.60	.5963	5.720	.000
	Non-Participants	33	3.12	.5579		
Reinforcement of Needs	Participants	35	3.36	.6724	4.450	.000
	Non-Participants	33	2.94	.6795		
Membership	Participants	35	3.95	.6771	3.183	.000
	Non-Participants	33	3.62	.7697		
Influence	Participants	35	3.48	.6472	6.405	.000
	Non-Participants	33	2.90	.5848		
Shared Emotional Connection	Participants	35	3.61	.7674	6.011	.000
	Non-Participants	33	2.90	.6511		

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 2. SOC of participants of community gardening depending on roles, period, and level.

Division		Ave.	SD.
Type of Role	Gardener + Volunteer	3.31	.63
	Manager	4.00	.57
t (p)		5.549***	.000
Participation Period	Occasionally whenever I get a free time	3.27	.60
	Consistently under 6 months	3.36	.64
	Consistently 6 months – 1 year	3.87	.60
	Consistently 1 year – 2 year	3.99	.54
	Consistently 2 year	3.76	.52
t (p)		6.678**	.001
Participation level	Very Passively	3.01	.59
	Passively	3.19	.58
	Normally	3.56	.43
	Actively	3.83	.62
	Very Actively	3.88	.46
t (p)		8.320**	.000

* $p < .1$, ** $p < .05$, *** $p < .01$

4.1 Reliability Analysis of the Sense of Community Index

In order to measure the stability, consistency and predictability of SOC index, which is composed of four factors, reliability analysis was conducted by using Cronbach's alpha. The value of Cronbach's alpha varies from 0 to 1 theoretically, where higher values are more desirable. However, most researchers and scholars in the field of social science agree if the value of Cronbach's alpha is over 0.7, the internal consistency might be acceptable. The results of the reliability analysis demonstrate the alpha in all factors of SOC index is over 0.7, which means the index is satisfied with the reliability.

4.2 Correlation Analysis

Correlation analysis was conducted in order to measure the correlation between the variables by using Pearson correlation coefficient by which it measures the strength of a linear relationship between paired data. This analysis illustrates the gardening participants' demographic characteristics and perception of their communities. In general, a correlation coefficient over 0.6 indicates a multicollinearity problem, which is highly problematic in construction of a correlation matrix among variables. The result of the analysis between the independent variables indicates there is no correlation between the participation in community gardening and other independent variables, including demographics, perception of local

problems, and satisfaction, which means people might take part in community gardening regardless of their age, education, or income (see Table 3). Also notable is the correlation coefficient value between age and marital status, which is 0.734. This figure illustrates these two variables have high correlation due to a multicollinearity problem; however, these two variables could generate similar responses. Except for the relationship between age and marital status, the correlation among other variables is low.

Table 3. Correlation analysis between the independent variables

Division	Participation	Gender	Age	Marital Status	Edu	Income	Resi-period	Local problem	Local satisfaction
Participation	1								
Gender	.143	1							
Age	-.034	.094	1						
Marital Status	.044	.259**	.734**	1					
Education	.039	-.148	-.345**	-.303**	1				
Income	.081	.133	-.150	-.003	.199**	1			
Residence period	-.074	.059	.274**	.234**	-.235**	-.101	1		
Local problem	-.072	-.077	-.078	-.178*	.094	-.052	.071	1	
Local satisfaction	.096	-.001	.017	-.039	.003	-.051	.034	.061	1

*p>.05, **p<.01

In the analysis of correlation between participation, demographic variables and their SOC, the roles, periods, levels of participation, age, and educational background represent a meaningful correlation with the dependent variables, which are SOC (see Table 4). The correlations among roles, periods, and levels of participation is shown high as well. In particular, the value of the correlation between periods and levels of participation illustrates the longer they participate, the more active they are.

Table 4. Correlation analysis between participation, demographical variables and SOC

Division	Roles	Period level	Gender	Age	Marital Status	Edu	Income	SOC	
Roles	1								
Period	-.332**	1							
level	-.074**	.303**	1						
Gender	-.030	-.015	-.126	1					
Age	-.239*	.124	.211*	.091	1				
Marital Status	-.222*	.102	.067	.234**	.711**	1			
Education	-.090	.056	.061	-.126	-.323**	-.311**	1		
Income	-.121	.211*	.044	.101	-.122	-.004	.113**	1	
SOC	-.345**	.383**	.482**	.022	.183**	.113	.121*	.102	1

*p>.05, **p<.01

In addition, responses to the perception of local problems and satisfaction regarding their residential areas represent a meaningful correlation with the dependent variables, which are SOC. The correlation coefficient value between SOC and perception on local problem is $-.160^{**}$, and the value between SOC and satisfaction toward their communities is $.262^{**}$. That is, people who regard their communities' criminal, environmental, and traffic issues as serious are more likely to have lower degree of SOC. In contrast, people who are satisfied with the community's amenities are more likely to have higher degree of SOC, with high correlation.

4.3 Regression Analysis of Community Gardening Participation and SOC

Regression analysis can address whether two or more variables would be systematically connected by a linear relationship. According to the results of simple regression analysis, community gardening participation has meaningful relationships with all of SOC and the four factors (see Table 5).

We conducted multiple regression analysis with the four factors of SOC. Compared with the control group, the degree of SOC in experimental group measures higher ($B=.479$). More specifically,

educational background, residential ownership, perception of local problems and satisfaction are found to affect the degree of SOC. The results of regression analysis illustrate independent variables predict dependent variables in 37% ($R^2=.371$), which represents a statistical significance ($p<.01$). Thus, the regression model is able to somewhat explain the effect of participation in community gardening on the development of SOC. In addition, as there are no values under 0.1 in the tolerance values and over 10 in the VIF values, which is the variance inflation factor, the results are thought to have nothing to do with multicollinearity. The effect of participation in community gardening on “reinforcement of needs” is measured higher than the group of non-participants ($B=.324$). Community gardening participants are more likely to feel they could get help from either their neighbors or community when they need it. We assume the Hale Y community garden successfully provides a venue to create social ties by which members receive or give support from other gardeners. Likewise, the participation in community gardening is likely to have influenced the “membership” factor more than the control group ($B=.312$). Many gardeners and volunteers perceive they feel more connected and belong to Blacksburg, and spend much time and effort to be involved in this community. A remarkable aspect in this analysis is if people do not regard local problems too seriously, they feel a stronger connection to the community ($B=-.112$). The regression analysis on the “influence” factor illustrates participation in community gardening has more of an effect on the formation of the “influence” factor than the group of non-participation ($B=.533$). Participants are likely to think the Blacksburg community might influence other communities, and residents are capable of solving community problems. We assume this result would be partly attributed to Jenny Schwanke, who is in charge of coordinating and managing the tasks in this garden, because she has earned the respect of gardeners. Like the result of the “membership” factor, serious participants thinking of local problems had a stronger feeling of “influence” ($B=-.138$). Lastly, the results of the analysis of the relationship between participation and “shared emotional connection” factors explains participation in community gardening has more of an effect on the formation of “shared emotional connection” for the experimental group than the control group ($B=.538$). Among four factors, the “shared emotional connection” factor is most relevant to participation. Given the factor includes some indices such as “I am with other community members a lot and enjoy being with them”, and “members of this community have shared various activities together”, this factor is able to illustrate how the gardeners and volunteers spend their time with other members at Hale Y garden.

Table 5. Simple Regression Analysis of Community Gardening Participation and SOC

Dependent Variable	Independent Variable	Unstandardization Coefficients		Standardization Coefficients	t	p	Model Summary
		B	SE	Beta			
SOC	(Constant)	2.897	.059	-	41.938	.000	$R^2=.315$,
	Participant	.481	.81	.384	4.728	.000	Adj. $R^2=.302$
Reinforcement of Needs	(Constant)	2.722	.069	-	49.105	.000	$R^2=.389$,
	Participant	.412	.84	.282	4.348	.000	Adj. $R^2=.338$
Membership	(Constant)	3.213	.065	-	42.215	.000	$R^2=.136$,
	Participant	.324	.111	.227	2.271	.000	Adj. $R^2=.121$
Influence	(Constant)	2.751	.057	-	41.852	.000	$R^2=.441$,
	Participant	.571	.089	.421	5.321	.000	Adj. $R^2=.397^*$
Shared Emotional Connection	(Constant)	2.728	.064	-	37.203	.000	$R^2=.432$,
	Participant	.614	.111	.393	5.089	.000	Adj. $R^2=.404$

4.4 Regression Analysis of Participants and SOC

The levels and periods of participation in community gardening have meaningful effects on SOC and its four subcategories, while participation roles do not show influence on all of the dependent variables. The outcome is assumed to be caused by the unbalanced numbers of the three roles, which are gardeners, volunteers, and managers. As the number of managers is smaller than the groups with other roles, the P-value in the regression analysis between dependent variables and participation roles

shows there is no significant relationship between them (see Table 6). Multiple regression analysis with each dependent variable also shows the same or similar results.

Table 6. Simple regression analysis of the participation of community gardening and SOC

Dependent Variable	Independent Variable	Unstandardization Coefficients		Standardization Coefficients	t	p	Model Summary
		B	SE	Beta			
SOC	(Constant)	2.938	.214	-	12.638	.000	R=.453, R ² =.208, Adj-R ² =.181 Std. Error of Estimate=.40740 F-Value=11.042***
	Roles	-.097	.135	-.062	-.545	.347	
	Levels	.238	.054	.370	2.169	.001**	
	Periods	.470	.113	.342	4.390	.001**	
Reinforcement of Needs	(Constant)	2.863	.276	-	6.214	.000	R=.327, R ² =.091, Adj-R ² =.051 Std. Error of Estimate=.52271 F-Value=5.110***
	Roles	-.098	.165	-.063	-.533	.365	
	Levels	.175	.066	.227	1.851	.031**	
	Periods	.321	.138	.217	1.887	.020**	
Membership	(Constant)	3.435	.275	-	10.141	.000	R=.339, R ² =.082, Adj-R ² =.224 Std. Error of Estimate=.43312 F-Value=13.421***
	Roles	-.092	.164	-.066	-.571	.387	
	Levels	.171	.066	.257	1.328	.005**	
	Periods	.382	.138	.272	1.586	.003***	
Influence	(Constant)	2.608	.235	-	8.613	.000	R=.488, R ² =.248, Adj-R ² =.181 Std. Error of Estimate=.40722 F-Value=11.021***
	Roles	-.031	.141	-.015	-.172	.565	
	Levels	.271	.057	.387	4.013	.000***	
	Periods	.535	.118	.417	2.542	.000***	
Shared Emotional Connection	(Constant)	2.847	.303	-	7.321	.000	R=.402, R ² =.169, Adj-R ² =.187 Std. Error of Estimate=.58125 F-Value=7.783***
	Roles	-.111	.180	-.051	-.618	.362	
	Levels	.320	.073	.411	2.912	.001***	
	Periods	.433	.151	.331	1.129	.017**	

5 DISCUSSION AND CONCLUSION

This paper pays attention to the quantitative value of participating in community gardening and the development of a sense of community, which represents reinforcement of needs, necessity of membership, influence, and shared emotional connection. Overall, the degree of SOC was significantly different depending on participation in community gardening. The result of the T-test, which compared degrees of SOC between participants and non-participants, showed the SOC score of community garden participants was higher, which was statistically significant. In addition, multiple regression analysis was conducted in order to examine the SOC degree depending on the participation of gardening. Our results showed that taking part in community gardening had a statistically meaningful effect on dependent variables which were SOC including "reinforcement of needs," "membership," "influence," and "shared emotional connection." More specifically, in order to investigate the SOC according to type of roles, level, and duration of the participation in community gardening, we conducted T-test and F-test by which the results showed significant difference in every category. In addition, the multiple regression analysis of the relationship between SOC and the participation, both of which were dependent variables, showed the variable of activeness of participation, defined as 'participation level' was only deemed statistically significant. We assume that how much participants are involved in community gardening might be closely related to their attachment to the Blacksburg community, as the Y garden program declares its mission as "a place to grow community, not just a place to grow food."

With regard to the effect of the participation on "reinforcement of needs," there was no meaningful relationship among the independent variables of participation while independent variables of participation level and period were statistically significant in both "membership" and "influence". Considering the "membership" factor consisted of indices such as "I feel connected to this community" or "I feel like I belonging here", community gardening participants who are registered as members are more likely to feel

a sense of belonging to the Blacksburg community as well as the Y garden. The fact the program has a dedicated leader, Jenny Schwanke, is assumed to have an impact on the "influence" factor.

Also notable is the fact that people who deem the residential environmental problems of Blacksburg as serious are more likely to have a lower degree of SOC. On the contrary, people who are satisfied with the community's amenities have a higher degree of SOC. This result illustrates that satisfaction toward one's whole living environment could affect the development of SOC in general.

The role of participation did not have a meaningful influence on SOC components because the number of managers was comparatively smaller than gardeners or volunteers. Briefly, the SOC degree of the group of community gardening participants was higher than the control group. The study concluded the more active a participant is and the longer they participate, the result is a higher SOC. As previous research has claimed an influence of community gardening on developing social capital qualitatively, this study demonstrates the social effects of community gardening more quantitatively.

This study has some limitations in terms of sample size and target area. Considering each groups' sample size was around 30 and located only in Blacksburg, VA, it is necessary to expand the range of subjects and area in order to generalize the results. Another expected problem is that this study did not exactly figure out whether subjects rated the SOC considering the whole Blacksburg area or within the community of gardeners specifically. Thus, additional quantitative analysis with in-depth interviews is recommended. In order to provide precise reasons why the participants' SOC is higher than non-participants, further research should be followed. Furthermore, since the fact that the SOC of gardeners was higher could be caused by other factors and people having high degree of SOC would take part in gardening actively, it is necessary to trace a causal link conversely.

Nevertheless, this study has significance as it confirmed empirically the objectives of community gardens as a way of enhancing community vitality. While previous studies have been dealing with the development of community through community involvement, this study focused more on the specific activity of community gardening. Through the result of this research, community gardens can be suggested as a means of prevention of disintegration of community. In this respect, a supporting policy regarding community gardens should be expanded for community revitalization.

6 REFERENCES

1. Buckner, J. C. (1988). The development of an instrument to measure neighborhood cohesion. *American Journal of Community Psychology*, 16(6), 771-791.
2. Davidson, W.B. and Patrick R. Cotter. (1986) Measurement of sense of community within the sphere of city, *Journal of applied social psychology*, 16(7): 608-619
3. Glover, T. D. (2004). Social capital in the lived experiences of community gardeners. *Leisure Sciences*, 26(2), 143-162.
4. Hou, J., Johnson, J. M., & Lawson, L. J. (2009). *Greening cities, growing communities. Learning from seattle's urban community gardens.*
5. Kingsley, J. Y., & Townsend, M. (2006). 'Dig in'to social capital: community gardens as mechanisms for growing urban social connectedness. *Urban Policy and Research: an Australian and New Zealand guide to urban affairs*, 24(4), 525-537.
6. Kurtz, H. (2001). Differentiating multiple meanings of garden and community. *Urban Geography*, 22(7), 656-670.
7. Long, D. Adam and Douglas D. Perkins. (2007) Community social and place predictors of sense of community: A multilevel and longitudinal analysis, *Journal of community psychology*, 35(5): 563-581
8. McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of community psychology*, 14(1), 6-23.

9. Nasar, Jack L. and David A. Julian. (1995) The psychological sense of community in the neighborhood. *Journal of the American planning association*, 61(2): 178-184
10. Saldivar-tanaka, L., & Krasny, M. E. (2004). Culturing community development, neighborhood open space, and civic agriculture: The case of Latino community gardens in New York City. *Agriculture and Human Values*, 21(4), 399–412.
11. Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, 277(5328), 918-924.
12. Teig, E., Amulya, J., Bardwell, L., Buchenau, M., Marshall, J. A., & Litt, J. S. (2009). Collective efficacy in Denver, Colorado: Strengthening neighborhoods and health through community gardens. *Health & Place*, 15(4), 1115-1122.