SCHOOL AGROECOLOGY AND HEALTH-RELATED QUALITY OF LIFE TO ADOLESCENTS

AGROECOLOGÍA EN LA ESCUELA Y CALIDAD DE VIDA RELACIONADA A LA SALUD DE LOS ADOLESCENTES

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Abstract:

The study's objective was to evaluate the contribution of school agroecology to quality of life linked to health of adolescents from a school in Cordoba, Argentina. This feasibility study was a quasi- experimental one, including a control group. It was carried out at a middle-level public school. The sample consisted of 58 adolescents being part of the intervention group and 77 of the control group.

After the intervention, we observed an increase in the consumption of agro-ecological food (from 26% to 74% $p<0.05$). The theoretical and practical knowledge regarding agroecology acquired in the classroom raised from 37% to 63% ($p< 0.05$). Significant changes regarding environmental awareness were observed ($p<0.05$).

It was evidenced that the implementation of school agroecology can provide effective contributions to some of the health problems that affect the life quality of adolescents.

We concluded that the implementation of school agroecology may provide effective contributions to some of the health problems that affect the life quality of adolescents.

Keywords: adolescents; school; life quality; agroecology.

Resumen:

El estudio tuvo como objetivo evaluar la contribución de la agroecología escolar a la calidad de vida relacionada a la salud de los adolescentes de una escuela de Córdoba, Argentina. Estudio de factibilidad con diseño cuasi experimental y con grupo control llevado a cabo en una escuela pública de nivel medio. La muestra fue de 58 adolescentes en el grupo intervención y 77 en el grupo control.

Después de la intervención se observó un incremento significativo en el consumo de alimentos agroecológicos (de un 26% a un 74% $p<0,05$). Los conocimientos teóricos-prácticos adquiridos sobre agroecología a nivel áulico aumentaron de un 37% a un 63% ($p<0,05$). Se detectaron cambios significativos en la sensibilización con el ambiente y en la dimensión de relacionamiento ($p<0,05$).

Se concluye que implementar agroecología escolar puede brindar aportes resolutivos a algunas de las problemáticas de la calidad de vida relacionada a la salud de adolescentes.

Palabras clave: adolescentes; escuela; calidad de vida; agroecología.

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Introduction

During the last few decades, the world began to recognize child and adolescent rights. This was the beginning of transformations in the practices, institutions and politics aimed at these groups, recognizing children as holders of rights.

Although some improvements were observed in the quality of life of adolescents, current evidence suggests the existence of various issues that adversely affect their life quality and have negative repercussions in their healthy and balanced growth, leading to a violation of their rights. [1-4] In Argentina, children and adolescents (0 to 17 years old) represent a 30.7% of the population [2], being 10.3% of this group below the poverty line. [3]

To talk about quality of life during adolescence means thinking of it as both 'process' and 'state', using a multidimensional approach, selecting both objective and subjective conditions. [4] In such context, the school seems to constitute a strategic environment.

Agroecology is defined as a scientific discipline, a set of practices and a social movement that will achieve certain transformations at a level of the school that students assist (FAO, 2014).

School agroecology is considered one of the socio-pedagogical strategies with the largest impact and potential to achieve complex approaches, and, as a result generating channels that are participative, inclusive and of experiences and knowledge exchange, both inside and outside the classroom (FAO,2014), where adolescents became the main protagonists in a significant learning process. [(5)]

Some recent experiences reported that school agroecology promotes healthy food consumption and nutritional learning environments. Furthermore, it would allow the improvement of some unsatisfactory health situations, as the case of obesity and other risk factors. [6-16]

Other antecedences showed that school agroecology can act on some subjective and objective dimensions of life quality such as education, environment, individual and collective subjective aspects, being those key to define the processes of health-disease during adolescence. [2,17-22]

Due to the lack of documented evidence in the country's explored field and the region, it is essential to find evidence to show the impact of 'real world' intervention that start at the school and that are aimed to improve the quality of life of adolescent from an comprehensive perspective.

The main objective of this study was to evaluate how the implementation of school agroecology can contribute to the related to health quality of life of the adolescents that assisted to a public school from 2015 to 2016 in Cordoba city, Argentina.

Materials and Methods

Type of study

This was a feasibility study that was part of a multidisciplinary initiative that gave origin to an intervention project that took place during 2015-2016. This initiative was the result of a partnership between different public sectors intended to collaborate with the 'Sustainable Schools' initiative proposed by the Food and Agriculture Organization of the United Nations (FAO).

The study's design was quasi-experimental with a control group. The analysis unit was a public urban middle school from Cordoba City, Argentina, selected through purposive sampling based social vulnerability and context criteria. [2]

Participants

Students that attended a middle level school that was previously selected were invited to participate in the study following inclusion criteria: to belong or have belonged to the selected school during the last 3 years, to be through adolescence/youth (between 10 and 14 years old) and to live in the school's neighborhood.

Since this was a feasibility study, the sample size estimate was not applied, in this study, to the intervention group (IG) were included all the students from all genders that attended the last 3 academic years (4º, 5º y 6º) and to the control group (CG) students from the second and third academic year and former students who finished their studies during 2012, 2013 and 2014.

In order to collect data on the health related quality of life (HRQL) of adolescents a semi-structured self-administered survey was implemented (Annex 1). To collect data on the subjective aspects we used some indicators from the validated instrument Comprehensive Quality of Life Scale, School Version [23]. The global design of the instrument corresponded with Material, Environmental and Relationship dimensions [28,29] that are considered main health determinants.

School Intervention

The intervention period in the adolescents group was 12 months (with basal measures and after 12 months). The programmed activities were executed in the Science class space, after formal agreements were made with the institution.

The planning and execution methodology of the activities done during the intervention were based on the methodological Learning Community Model (LC) [5] whose main protagonist is the adolescent. This methodology stems from a large previous work about spontaneous conceptions and from significant learning [24,25], that were the platform to approach different dimensions of the HRQL promoted from the school (fig.1).

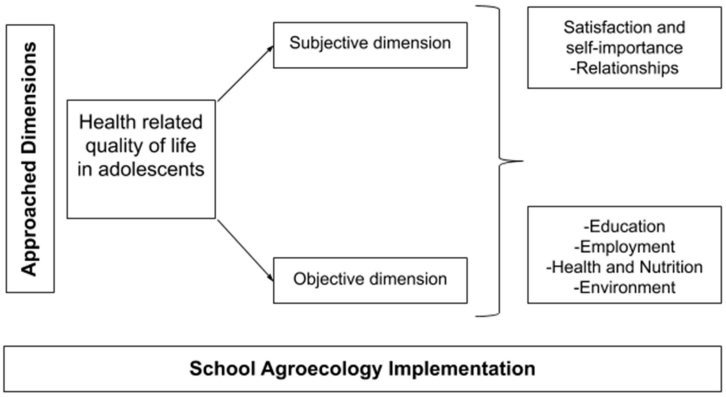

Figure 1 Intervention's implementation framework

The following aspects were taken into account: to build on processes in progress, adolescents as addressees and protagonists, participative projects in the work plan's design, execution and evaluation, collaborative project and establishment of partnerships, learning oriented and highlight on innovative pedagogy, revitalization and renewal of the public education system, the adolescents and their comprehensive development, systemic intervention and articulations search, experiences' evaluation, systematization and sharing, continuity and sustainability of efforts.

The activity was proposed as theoretical-practical workshops or participative seminars in which the researchers made interventions in the material, environmental and relational dimensions of health related quality of life of adolescents through the selected strategy (school agroecology).

The activities were: participative workshops on implementation and supervision of ecological vegetable orchards, movie projection and roundtable related to the agronomical production approach, the ecological kitchen, a healthy diet, analysis lab for environmental contamination: implementation of agroecological contents linked to the different dimensions of HRQL in the classroom, training and awareness raising workshops about food microbusinesses. The activities took place at the school as well as different community spaces, every time it was possible, with the presence of teachers and/or members of the school board. We used different didactic tools and materials to back the development of the different topics.

Regular education

Adolescents that were part of the control group followed their regular curriculum and did not experience any intervention related to the agroecological strategy. We did the basal measure to this group and 12 months after like it was done with the intervention group.

Statistical analysis

A descriptive univariate statistical analysis was made using location and dispersion measures. We used Student's t-test, ANOVA, Kruskal Wallis and bivariate analysis through the chi-squared test ($p<0,05$). The used statistical software was Infostat.

Results

Implementation indicators

During the 12 intervention months, 100% of the planned activities were fulfilled. From all the curricular spaces, the total percentage of hours dedicated to the implementation of the planned activities was: 15% for the 4th year, 27% for the 5th and 28% for the 6th.

100% of the 4th, 5th, 6th year students participated in one or more of the project's activities. 32% of the intervened classes' teachers participated in at least one activity and 49% of the IG adolescents grew an agroecological vegetable garden in their homes.

94% of the intervention' participants indicated a satisfaction level between "acceptable", "good" and "very good".

Primary Outcomes

At the beginning of the intervention (before the test), 136 adolescents participated: 58 in the IG and 77 in the CG. At the end (after the test), 100 adolescents were participating (43 in the IG and 57 in the CG), where 43% were men and 57% were women. The loss rate during the intervention tracking was of 26% of individuals. The causes of this loss in the IG were school dropout, while in the CG it was due to dropouts and truancy during the after-test instance of the study.

72% of the adolescents from the IG were between 14 and 17 years old, and 28% were older than 17. Women's average age was inferior to men's (16.64 vs 17.39) ($p<0.05$). While the CG age average was 15.5 years old.

Statistically significant differences were observed ($p<0.05$ with an CI of 95%) between the period before-test and the one after the test in the IG regarding different health related life quality dimensions (Table 1).

Table 1. Before and After Test Analysis Regarding the HRLQ Dimensions in the Intervention Group

HRQL Dimensions		**Before-test**		**After-test**		**Total**		
Education		**N**	**%**	**N**	**%**	**N**	**%**	**p**
Theoretical and practical knowledge on agroecology*	*No*	34	87	5	13	39	100	**0,0001**
	Yes	23	37	39	63	62	100	
	Total	57	56	44	44	101	100	
Theoretical and practical acquired knowledge during the last year about agroecology and environment*	*No*	47	84	9	16	56	100	**0,0001**
	Yes	11	24	35	76	46	100	
	Total	58	57	44	43	101	100	
Theoretical and practical acquired knowledge during the last year about agroecology and job market*	*No*	53	84	10	16	63	100	**0,0001**
	Yes	5	13	33	87	38	100	
	Total	58	57	43	43	101	100	
Theoretical and practical acquired knowledge during the last year about agroecology and food consumption*	*No*	44	83	9	17	53	100	**0,0001**
	Yes	14	29	34	71	48	100	
	Total	58	57	43	43	101	100	
Theoretical and practical acquired knowledge during the last year about agroecology and health/nutrition	*No*	39	85	7	15	46	100	**0,0001**
	Yes	17	32	36	68	53	100	
	Total	56	57	43	43	99	100	

Labor Insertion		**N**	**%**	**N**	**%**	**N**	**%**	**p**
Creation of agroecologically oriented micro - bussines	*Yes*	39	67	19	33	58	100	**0,01**
	No	18	42	25	58	43	100	
	Total	57	56	44	44	101	100	
Healthy Diet		**N**	**%**	**N**	**%**	**N**	**%**	**p**
Knowledge about agroecological foods*	*No*	48	92	4	8	52	100	**0,0001**
	Yes	8	17	40	83	48	100	
	Total	56	56	44	44	100	100	
Beliefs on the benefits of agroecological foods*	*No*	34	89	4	11	38	100	**0,0001**
	Yes	7	15	39	85	46	100	
	Total	41	49	43	51	84	100	
Incorporation of new plant based products (fruits and vegetables) during the last year	*No*	21	66	11	34	32	100	0,16
	Yes	34	51	33	49	67	100	
	Total	55	56	44	44	99	100	
Have they ever consume an agroecological fruit and/or vegetable*	*No*	32	76	10	24	42	100	**0,0001**
	Yes	12	26	34	74	46	100	
	Total	44	50	44	50	88	100	
Environment		**N**	**%**	**N**	**%**	**N**	**%**	**p**
Beliefs about the relationship between food production and environmental care*	*No*	36	77	11	23	47	100	**0,0001**
	Yes	15	32	32	68	47	100	
	Total	51	54	43	46	94	100	
Beliefs about the influence of environmental factors on health and quality of life	*No*	9	69	4	31	13	100	0,29
	Yes	45	54	39	46	84	100	
	Total	54	56	43	44	97	100	
Involvement in activities about environmental care	*No*	9	82	2	18	11	100	0,06
	Yes	46	52	42	48	88	100	
	Total	55	56	44	44	99	100	
Social Relationships/Team work		**N**	**%**	**N**	**%**	**N**	**%**	**p**
Position of responsibility in the group*	*No*	45	63	26	37	71	100	**0,01**
	Yes	10	36	18	64	28	100	
	Total	55	56	44	44	99	100	
Engagement during the last year to tea mor group activity with classmates	*No*	8	73	3	27	11	100	0,23
	Yes	48	54	41	46	89	100	
	Total	56	56	44	44	100	100	
Social relationships between classmates through interactions like help or advice	*No*	13	50	13	50	26	100	0,47
	Yes	43	58	31	42	74	100	
	Total	56	56	44	44	100	100	

The figures were expressed as percentages for categorical variables.
*When applying the chi-squared test, statistically significant associations were found between the two studied variables, with a significance of 95%.

A partir de la intervención implementada se visualizan cambios estadísticamente significativos en el GI en torno a la dimensión educación, donde los conocimientos adquiridos en el último año sobre agroecología pasaron de un 37% a un 63% (Tabla 1). Mientras que en el GC los alumnos reportan que estos conocimientos no fueron adquiridos, visualizando porcentajes similares en ambas instancias de relevamiento (46% vs. 54%).

En cuanto a la adquisición de conocimientos en el último año en el GI sobre agroecología relacionada al ambiente o con otros dominios como es el caso del mercado de trabajo, el consumo de alimentos y/o nutrición y salud, también se observaron aumentos entre las etapas antes y después de la intervención (p=0,0001). En este mismo grupo y en el marco de la dimensión alimentación saludable se constató un aumento en los conocimientos sobre alimentos agroecológicos (de 17% a 83%), siendo este cambio estadísticamente significativo (p=0,0001); además las creencias sobre los beneficios de los alimentos agroecológicos también aumentaron de manera significativa durante el periodo de intervención, pasando de un 15% a un 85% (p=0,0001) (Tabla 1). No se encontraron cambios estadísticamente significativos en el GC.

En el GI la incorporación de nuevos productos de origen vegetal a la alimentación se mantuvo de manera similar en el pre-test y post-test (51% vs. 49%). Sin embargo, se observó un aumento significativo en el consumo del subgrupo de alimentos agroecológicos pasando de un 26% a un 74% (p=0,0001) (Tabla 1). Mientras que en el GC el consumo de estos alimentos se tuvo un leve descenso (59% y 41%), no obstante no fue una diferencia estadísticamente significativa.

Al analizar la dimensión ambiente también se encontraron diferencias sobre las creencias de los adolescentes en torno a la relación entre producción de alimentos y cuidado del ambiente en el GI donde aumentó del 32% al 68% (p=0,0001) (Tabla 1). Estas diferencias también se observaron en el GC, aunque los valores descendieron de un 70% a un 30% (p=0,0001).

En el GI las categorías de creencias sobre la influencia de los factores ambientales en la salud y calidad de vida y la de realización de actividades sobre el cuidado del ambiente, se mantuvieron en porcentajes similares en ambas etapas.

Dentro de la dimensión relaciones sociales/trabajo en equipo, la categoría de posición de responsabilidad dentro de un grupo antes y después de la intervención en el GI tuvo diferencias estadísticamente significativas (p=0,01), pasando de un 36% a un 64% (Tabla 1), mientras que en el GC no se encontraron estas diferencias. La categoría de no realizar en el último año alguna actividad en equipo con los compañeros de la escuela bajó de 73% a 27% y las relaciones sociales a través de ayuda o consejo se mantuvieron constantes en las dos etapas de relevamiento (Tabla 1).

La frecuencia del consumo de frutas entre las etapas de pre-test y pos-test se mantuvo en valores similares en cuanto a la ingesta de un día a la semana (53% y 47%), aunque en el resto de categorías tendió a disminuir en ambos puntos temporales; esto se observó de manera similar en torno a la frecuencia del consumo de jugos de fruta natural en casi todas las categorías, aunque la categoría de un día a la semana paso del 40% al 60%; mientras que en el consumo de verduras no feculentas la categoría de 1-3 días a la semana tuvo un aumento de un 43% a un 57%, la categoría nunca bajó de un 67% a un 33%; en el consumo de verduras feculentas se observó una disminución entre ambas instancias de relevamiento en casi todas las categorías en especial de 4-5 días a la semana (pasando de un 60% a un 40%) y la de más de 5 días a la semana (65% a un 35%) (Tabla 2).

Tabla 2. Plant based food consumption frequency before and after the intervention

Consumption frequency		Before-test		After-test		Total	
		N	%	N	%	N	%
Fruits	Never	0	0	2	100	2	100
	1 day	8	53	7	47	15	100
	1-3 days	23	58	17	43	40	100
	4-5 days	9	64	5	36	14	100
	5 days +	15	56	12	44	27	100
	Total	55	56	43	44	98	100
	Never	12	57	2	43	21	100
	1 day	10	40	15	60	25	100

Natural Fruit Juice	1-3 days	10	56	8	44	18	100
	4-5 days	9	75	3	25	12	100
	5 days +	11	61	7	39	18	100
	Total	52	55	42	45	94	100
Non-starchy Vegetables	Never	4	67	2	33	6	100
	1 day	14	48	15	52	29	100
	1-3 days	10	43	13	57	23	100
	4-5 days	15	75	5	25	20	100
	5 days +	9	53	8	47	17	100
	Total	52	55	43	45	95	100
Starchy Vegetables	Never	4	36	7	64	11	100
	1 day	12	63	7	37	19	100
	1-3 days	10	48	11	52	21	100
	4-5 days	6	60	4	40	10	100
	5 days +	20	65	11	35	31	100
	Total	52	57	40	43	92	100

The figures were expressed as percentages for categorical variables.

Regarding the subjective dimension of self-care, significant changes were observed in the IG regarding the importance of diet, where the "important" category moved from 45% in the before test to 55% in the after test. In respect of interpersonal relationships with classmates, the 'important' and 'very important' categories showed a rising tendency. Regarding the environment importance, a decreasing tendency was observed, for instance, the 'important' category moved from 57% to 43%. Similar numbers were observed regarding health importance (Table 3).

Table 3. Self-importance and personal satisfaction before and after the intervention

Self-importance		**Before-test**		**After-test**		**Total**	
		N	%	N	%	N	%
Health's importance	Very important	51	57	39	43	90	100
	Important	4	57	3	43	7	100
	A bit important	0	0	1	100	1	100
	Slightly important	0	0	0	0	0	100
	Not important	0	0	0	0	0	100
	Total	55	56	43	44	98	100
Nutrition/diet importance	Very important	41	61	26	39	67	100
	Important	13	45	16	55	29	100
	A bit important	1	50	1	50	2	100
	Slightly important	0	0	0	0	0	100
	Not important	0	0	0	0	0	100
	Total	55	56	43	44	98	100
Environment's importance	Very important	32	54	27	46	59	100
	Important	20	57	15	43	35	100
	A bit important	2	100	0	0	2	100
	Slightly important	1	50	1	50	2	100
	Not important	0	0	0	0	0	100
	Total	55	56	43	44	98	100

Close relationship with classmates importance	Very important	15	47	17	53	32	100
	Important	18	49	19	51	37	100
	A bit important	14	78	4	22	18	100
	Slightly important	5	63	3	38	8	100
	Not important	3	100	0	0	3	100
	Total	55	56	43	44	98	100
Paid work's importance	Very important	17	50	17	50	34	100
	Important	23	58	17	42	40	100
	A bit important	9	60	6	40	15	100
	Slightly important	2	50	2	50	4	100
	Not important	3	100	0	0	3	100
	Total	54	56	42	44	96	100
Importance of activities shared with classmates	Very important	13	76	4	24	17	100
	Important	19	51	18	49	37	100
	A bit important	17	50	17	50	34	100
	Slightly important	3	75	1	25	4	100
	Not important	3	43	4	57	7	100
	Total	55	56	44	44	99	100
Personal Satisfaction							
Health satisfaction	Too Satisfied	30	60	20	40	50	100
	Satisfied	8	32	17	68	25	100
	Partially satisfied	15	75	5	25	20	100
	Partially dissatisfied	1	50	1	50	2	100
	Dissatisfied	1	50	1	50	2	100
	Total	55	56	44	44	99	100
Diet satisfaction	Too Satisfied	26	68	12	32	38	100
	Satisfied	8	24	25	76	33	100
	Partially satisfied	16	80	4	20	20	100
	Partially dissatisfied	2	50	2	50	4	100
	Dissatisfied	3	75	1	25	4	100
	Total	55	56	44	44	99	100
Environmental satisfaction	Too Satisfied	11	65	6	35	17	100
	Satisfied	5	23	17	77	22	100
	Partially satisfied	23	62	14	38	37	100
	Partially dissatisfied	10	77	3	23	13	100
	Dissatisfied	6	60	4	40	10	100
	Total	55	56	44	44	99	100
Relationship with classmates satisfaction	Too Satisfied	6	43	8	57	14	100
	Satisfied	9	27	24	73	33	100
	Partially satisfied	38	81	9	19	47	100
	Partially dissatisfied	0	0	2	100	2	100
	Dissatisfied	2	67	1	33	3	100
	Total	55	56	44	44	99	100

Activities engaged with classmates' satisfaction	Too Satisfied	7	41	10	59	17	100
	Satisfied	16	38	26	62	42	100
	Partially satisfied	29	81	7	19	36	100
	Partially dissatisfied	2	100	0	0	2	100
	Dissatisfied	1	50	1	50	2	100
	Total	55	56	44	44	99	100

The figures were expressed as percentages for categorical variables.

When analyzing the subjective dimension 'personal satisfaction', the most relevant aspects were 'health satisfaction', where the 'satisfied' category moved from 32% to 68%, 'nutrition' (from 24% to 76%), 'environment' (from 23% to 77%) and the 'relationship with classmates' (from 27% to 73%) in the same category. In the activities with classmates' dimension, the 'too satisfied' category increased from 41% to 59% (Table 3).

Discussion

According to evidence of documented experiences at an international level, it can be state that implementing comprehensive activities from a nutritional perspective can create positive impact in different dimensions of adolescents life quality [30, 31].This statement was validated in this study.

School agroecology as a strategy can have a positive impact in some of these dimensions, as in the case of nutrition and healthy nutrition, food security and student's health, as seen in previous studies [32-36]. Following that tendency, this study's findings are in concordance with those postulates, where we observed that after the intervention some nutritional aspects improved. As a result, the consumption of agroecological foods increased, as well as the consumption of non-starchy vegetables and a decrease in the consumption of starchy vegetables. However, the introduction of new plant based foods to their diets did not show any significant changes, this could be due to the fact that achieving changes to dieting habits requires more time and to establish sustained actions in different places that are not related to the school.

Agroecological practices in school can have impact regarding environmental learning, the ecosystem and to conserve and preserve the Earth [32, 37-38]. Observing how adolescents' environmental awareness grew through the implementation of school agroecology evidenced this point. However, significant changes regarding this component from the different indicators was not observed. This event may be linked to the fact that the studied school had previous experience implementing activities aimed to create environmental awareness.

Another outstanding aspect of the strategy is that it constitutes an interesting socio-educational tool that allows students to enhance individual and social development. As a result, they generate channels to exchange experiences and knowledge that fosters sociabilization, team work and other personal subjective aspects of the people involved. These aspects were partly confirmed in the intervention group through the standing of the group in regard of responsibility and realization of group activities, also through social relationships and positive changes in the adolescents' self-importance and personal satisfaction, mostly related to nutrition, interpersonal relationships, health and environment.

Scientific background may indicate that school agroecology adds a theoretical and practical dimension, that helps strengthen, relate and articulate the different classes in the curriculum, turning the institutional educative project into an strategy in a transversal axis [32,37]. This would provide adolescents with a comprehensive and significant analysis of procedural and theoretical knowledge. This fact was made evident, for instance, by the fact that the young students that took part in the intervention reported changes in the theoretical and practical knowledge of agroecology acquired during the year.

School agroecology is also known to have transforming effects for adolescents regarding their future labor insertion from a solidary and social economy perspective, contributing to local and personal development [32]. However, this dimension was not demonstrated in the results of this study. The cause

may be that the process of creating change in labor insertion as well as awareness raising of young people to create food micro-enterprises would take more companionship and action's sustainability.

Although all students were exposed at least once to the explained intervention because its execution took place in the institutional curricular program, the study was limited by the loss of students' track (in both the intervention and control group), mostly caused by social-learning contextual problems like dropout and absenteeism. This situation is in concordance with the educational reality of Argentina. According to Unicef (n.d.), although access to education is granted by a large net, a large number of students that start middle school do not finish it and/or experience situations that jeopardize their progress and lead to abandonment. For example, between 2009-2010, the repetition rate in the whole country was 10.5%, the dropout 10.6% and over-grade age 38.3% (INDEC, 2009/2010).

Furthermore, as explained by Beltran (2003), dissociation exists between the obtained evidence in experimental studies and the application in the real world and an scenario where the loss of track caused by context elements could be considered acceptable and realistic in this type of more flexible design.

Another limitation was linked to the differences in age between the intervention group and the control group, as well as the proportion on women and men, clearly explained by the feasibility feature of the study. Though the gender differences may be in concordance with middle level reality in Argentina, where an 'inverted gender gap' is exhibited (OCDE, 2013). This translates as larger number of women assisting to school than men. This is possibly linked to the fact that men tend to join the labor market at a younger age. As a consequence, the studied sample may represent the real population that is inserted in the country's public education system.

The main strength of this piece of work, by evaluating a complex intervention, is that it becomes a relevant supply in the field of public health and education policies. In addition, this study provides evidence regarding an investigation problem that has scarce documented antecedences in the country and the region.

Conclusion

The importance of creating awareness about the interaction between environment, in this case the school, and other aspects of the quality of life and health of a population, as seen from a sustainable paradigm, has been cause of worry and consideration at an international level since a few decades.

This study identifies positive results regarding objective and subjective elements of health related quality of life in adolescence by creating an intervention based on school agroecology that was implemented in the 'real world', in addition the indicators used to throw light on the socio-educative reality of adolescents that affect the implementation and that will be taken into account to think successful interventions. In conclusion, the intervention has potential to be replicated in other contexts.

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References

1. *Fondo de Población de las Naciones Unidas. El Estado de la población mundial 2014. New York, USA: UNFPA; 2014.*
2. *Instituto Nacional de Estadísticas y Censos. Sistema de estadísticas sociodemográficas. Área educación. [Internet]. Buenos Aires: INDEC [citado 5 jul 2016]. Disponible en: http://www.indec.gov.ar/indicadores-sociodemograficos.asp*
3. *Fondo de las Naciones Unidas para la Infancia. Datos sobre Infancia en Argentina. 2013. [Internet]. Buenos Aires: UNICEF [citado 5 may 2016]. Disponible en: http://www.unicef.org/argentina/spanish/overview_11124.htm*
4. *Mieles MD, Acosta A. Calidad de vida y derechos de la infancia: un desafío presente. Rev Latinoamericana de Ciencias Sociales, Niñez y Juventud. [Internet]. 2012. [citado 18 sep 2016]; 10:205-217. Disponible en http://www.redalyc.org/articulo.oa?id=77323982012*
5. *Torres MR. Comunidad de Aprendizaje. Repensando lo educativo desde el desarrollo local y desde el aprendizaje. [Internet]. Simposio Internacional sobre Comunidades de Aprendizaje, Barcelona Forum 2004. Barcelona, España: Fundación Forum. [citado 11 abr 2016]; 43:16-36. Disponible en: http://www.upch.edu.pe/rector/durs/images/Biblio/MarcoConceptual/ComunidadesAprendizajeDesarrollo/repensandoloeducativodesdeeldesarrollolocal.pdf*
6. *McAleese JD, Rankin LL. Garden-based nutrition education affects fruit and vegetable consumption in sixth-grade adolescents. J Am Diet Assoc. 2007;107(4):662-5.*
7. *Ratcliffe MM, Merrigan KA, Rogers BL, Goldberg JP. The effects of school garden experiences on middle school-aged students' knowledge, attitudes, and behaviors associated with vegetable consumption. Health Promot Pract. 2011;12(1):36-43.*
8. *Tamiru D, Argaw A, Gerbaba M, Nigussie A, Ayana G, Belachew T. Improving dietary diversity of school adolescents through school based nutrition education and home gardening in Jimma Zone: Quasi-experimental design. Eat Behav. 2016;23:180-6.*
9. *Utter J, Denny S, Dyson B. School gardens and adolescent nutrition and BMI: Results from a national, multilevel study. Prev Med. 2016;83:1-4.*
10. *Berezowitz CK, Bontrager Yoder AB, Schoeller DA. School Gardens Enhance Academic Performance and Dietary Outcomes in Children. J Sch Health. 2015;85(8):508-18.*
11. *Gatto NM, Martinez LC, Spruijt-Metz D, Davis JN. LA sprouts randomized controlled nutrition and gardening program reduces obesity and metabolic risk in Latino youth. Obesity (Silver Spring, Md). 2015;23(6):1244-51.*
12. *Wansink B, Hanks AS, Just DR. A plant to plate pilot: a cold-climate high school garden increased vegetable selection but also waste. Acta Paediatr (Oslo, Norway : 1992). 2015;104(8):823-6.*
13. *Barnidge EK, Hipp PR, Estlund A, Duggan K, Barnhart KJ, Brownson RC. Association between community garden participation and fruit and vegetable consumption in rural Missouri. Int J Behav Nutr Phys Act. 2013;10:128.*
14. *Gatto NM, Ventura EE, Cook LT, Gyllenhammer LE, Davis JN. LA Sprouts: a garden-based nutrition intervention pilot program influences motivation and preferences for fruits and vegetables in Latino youth. J Acad Nutr Diet. 2012;112(6):913-20.*
15. *Evans A, Ranjit N, Rutledge R, Medina J, Jennings R, et al. Exposure to multiple components of a garden-based intervention for middle school students increases fruit and vegetable consumption. Health promot pract. 2012;13(5):608-16.*
16. *Somerset S, Markwell K. Impact of a school-based food garden on attitudes and identification skills regarding vegetables and fruit: a 12-month intervention trial. Public Health Nutr. 2009;12(2):214-21.*
17. *Hale J, Knapp C, Bardwell L, Buchenau M, Marshall J, et al. Connecting food environments and health through the relational nature of aesthetics: gaining insight through the community gardening experience. Soc Sci Med (1982). 2011;72(11):1853-63.*
18. *Van Lier LE, Utter J, Denny S, Lucassen M, Dyson B, Clark T. Home Gardening and the Health and Well-Being of Adolescents. Health Promot Pract. 2016;18(1): 34-43*
19. *Black JL, Velazquez CE, Ahmadi N, Chapman GE, Carten S, et al. Sustainability and public health nutrition at school: assessing the integration of healthy and environmentally sustainable food initiatives in Vancouver schools. Public Health Nutr. 2015;18(13):2379-91.*
20. *Davis JN, Spaniol MR, Somerset S. Sustenance and sustainability: maximizing the impact of school gardens on health outcomes. Public Health Nutr. 2015;18(13):2358-67.*
21. *Chawla L, Keena K, Pevec I, Stanley E. Green schoolyards as havens from stress and resources for resilience in childhood and adolescence. Health & place. 2014;28:1-13.*
22. *Ahmed AT, Oshiro CE, Loharuka S, Novotny R. Perceptions of middle school educators in Hawai'i about school-based gardening and child health. Hawaii Med J. 2011;70(7 Suppl 1):11-5.*
23. *Cummins RA. Comprehensive quality of life scale– School version. Australia: School of Psychology Deakin University; 1997.*
24. *Freyre P. Concientización. Buenos Aires: Ed. Búsqueda, 1974*
25. *Ausubel DP, Hanesian H, Novak JD. Psicología Educativa. Un punto de vista cognitivo. México: Trillas, 1976.*
26. *The World Health Organization Quality of Life Assessment (WHOQOL). Position Paper from the World Health Organization. Soc Sci Med. [Internet]. 1995. [citado 3 abr 2016]; 41:1403-9. Disponible en http://www.ncbi.nlm.nih.gov/pubmed/8560308*
27. *Baldi López G, García Quiroga E. Calidad de vida y medio ambiente. La psicología ambiental. Rev Universidades. [Internet]. 2005. [citado 23 sep 2016]; 30: 9-16. Disponible en: http://www.redalyc.org/articulo.oa?id=37303003*
28. *Palomba, R. Calidad de Vida: Conceptos y medidas. [Internet]. 2002; Roma, Italia: Institute of Population Research and Social Policies. [citado 11 abr 2016]. Disponible en: http://www.cepal.org/celade/agenda/2/10592/envejecimientorp1_ppt.pdf*
29. *Fernández Mayoralas G, Rojo Pérez F. Calidad de vida y salud: planteamientos conceptuales y métodos de investigación. Territoris. [Internet]. 2005. [citado 21 sep 2016]; 5:117-135. Disponible en: http://dialnet.unirioja.es/servlet/articulo?codigo=2139763*
30. *Food and Agriculture Organization of the United Nations. School Feeding and the Possibilities for Direct Purchases from Family Farming – Case Studies in Eight Countries. Santiago de Chile: FAO; 2013.*
31. *Food and Agriculture Organization, Brazilian Cooperation Agency. Strengthening School Meal Programmes under the Hunger Free Latin America and the Caribbean 2025 Initiative. Brazil: FAO/ABC; 2008.*
32. *Organización de las Naciones Unidas para la Agricultura y la Alimentación. Nueva política de huertos escolares. Roma, Italia: FAO; 2010.*

33. *Robinson-O'Brien R, Story M, Heim S. Impact of garden-based youth nutrition intervention programs: A review. J Am Diet Assoc. [Internet]. 2009. [citado 18 sep 2016]; 109: 273-280. Disponible en: https://www.ncbi.nlm.nih.gov/pubmed/19167954*
34. *Heim S, Stang J, Ireland M. A garden pilot project enhances fruit and vegetable consumption among children. J Am Diet Assoc. [Internet]. 2009. [citado 4 ago 2016]; 109:1220-1226. Disponible en: https://www.ncbi.nlm.nih.gov/pubmed/19559139*
35. *Parmer SM, Salisbury-Glennon J, Shannon D, Struempler B. School gardens: An experiential learning approach for a nutrition education program to increase fruit and vegetable knowledge, preference and consumption among second-grade students. J Nutr Educ and Behav. [Internet]. 2009. [citado 18 sep 2016]; 41:212-217. Disponible en: https://www.ncbi.nlm.nih.gov/pubmed/19411056*
36. *Ozer EJ. The effects of school gardens on students and schools: Conceptualization and considerations for maximizing healthy developmente. Health Educ Behav. [Internet]. 2007. [citado 18 sep 2016]; 34:846-863. Disponible en: http://heb.sagepub.com/content/34/6/846.abstract*
37. *Instituto Nacional de Tecnología Agropecuaria. Las hurtas escolares como un espacio de aprendizaje y servicio solidario. Una aproximación desde las experiencias. Buenos Aires, Argentina: INTA; 2010.*
38. *Skelly SM, Bradley JC. The growing phenomenon of school gardens: Measuring their variation and their affect on students' sense of responsibility and attitudes toward science and the environment. Educ & Communication. [Internet]. 2007. [citado 11 abr 2016]; 6:97-104. Disponible en: http://www.kohalacenter.org/HISGN/pdf/Thegrowingphenomofschoolgardens.pdf*
39. *Waliczek TM, Bradley JC, Zajicek JM. The effect of school gardens on children´s interpersonal relationships and attitudes toward school. Horttechnology. [Internet]. 2001. [citado 2 abr 2016]; 11:466-468. Diponible en: http://horttech.ashspublications.org/content/11/3/466.full.pdf*
40. *Morgan PJ, Warren JM, Lubans D, Saunders K, Quick G, Collins CE. The impact of nutrition education with and without a school garden on knowledge, vegetable intake and preferences and quality of school life among primary-school students. Public Health Nutr [Internet]. 2010. [citado 18 sep 2016]; vol. 13, núm. 11, pp. 1931-1940.*
41. *Castellanos GA. Implementación de huertos escolares basada en el modelo de educación ambiental en el ámbito formal a través del enfoque transversal educativo. La Paz: umsa; 2003.*
42. *Skinner EA, Chi U. Intrinsic motivation and engagement as 'active ingredients' in garden-based education: Examining models and measures derived from self-determination. J Env Educ. [Internet]. 2012. [citado 11 abr 2016]; 43:16-36. Disponible en: https://www.pdx.edu/psy/sites/www.pdx.edu.psy/files/2012Skinner,%20Chi,%20%26%20the%20LEAG_JEE_2012%20copy%20(1).pdf*
43. *Naciones Unidas. (2012). El futuro que queremos: documento final aprobado en Río+ 20. Disponible en: http://www.un.org/es/comun/docs/?symbol=A/RES/66/28*

Annex 1

Data collection instrument about health related quality of life in adolescents

Survey Nº:…….
First and Last Name:…….
Age:……
Class:……..

We are carrying on this survey as part of an intervention project named ": School agroecology health-related quality of life in adolescents", supported by the Nutrition School, in the Medical Science Faculty in the National University of Cordoba (UNC). The main objective is to acquire information about some aspects related to health-related quality of life. There is not right or wrong answer. You are included in a sample of students that we will survey and your participation is voluntary. The collected information is confidential and anonymous.

MATERIAL DIMENSION

1.	Education	YES	NO	
1.1	Do you think that during the last year you have acquiered theoretical and practical knowledge about school food production?			If the answer is positive, include which. …….. …….. ……..
1.2	Do you think that during the last academic year you have acquired theoretical and practical knowledge about food production related to the environment in school?			If the answer is positive, include which. …….. …….. ……..

1.3	Do you think that during the last year you have acquired theoretical and practical knowledge about food production related to the job market in school?			If the answer is positive, include which. …… ……	
1.4	Do you think that during the last academic year you have acquired theoretical knowledge about food production related to food consumption in school?			If the answer is positive, include which. …… …… ……	
1.5	Do you think that during the last academic year you have acquiered theoretical and practical knowledge about food production related to our nutritional and health state in school?			If the answer is positive, include which. …… …… ……	
1.6	Do you think that during the last academic year you have acquiered theoretical and practical knowledge about food production relatedto other school aspects?			If the answer is positive, include which. …… …… ……	
2.	**Job market state**	**YES**	**NO**		
2.1	At present, are you engaged in any rented activity?				
2.2	Have you ever engaged in any labor activity as part of a micro bussines?			If the answer is positive, include which. …… …… …… …… ……	If the answer is positive, where? ○ Home ○ Neighbourhood ○ School ○ Other, which?……..
2.3	If you have never engaged in a microbussines, would you be interested in doing it at some point oriented to the production and/or selling of food taking into account ecological aspects?	○ Very interested ○ Interested ○ A Little interested ○ Slightly interested ○ Not interested			Do you feel trained to implement it? Very little ○ A little ○ Aceptable or regular ○ Sufficient ○ Too much
3.	**Nutrition - Diet**	**YES**	**NO**		
3.1	Have you included new fruits and/ or vegetables to your diet during the last year?				
3.2	Do you know what agroecological foods are?			If the answer is possitive, name some examples- …… …… ……	
3.3	If you know agroecological foods, do you think they are benefitial to health and nutrition?			If the answer is positive, include which. …… …… ……	

3.4	Have you ever consumed agroecological fruits and/or vegetables?			If the answer is positive, include which. ……. …….	Where? ○ Home ○ School ○ Others, name which……..	How frequent? ○ A few times ○ Daily ○ Weekly ○ Monthly

3.5	How frequent per week do you consume the following foods? (Indicate with an X)	Food	Never	1 day	1 to 3 days	3 to 5 days	More tan 5 days
		Fruits					
		Fruit's natural juice					
		Vegetables: potato, sweet potato, cassava, corn					
		Vegetables: any ones different from the former.					

ENVIRONMENTAL DIMENSION

1.	**School environment sustainable and healthy**	**SI**	**NO**		
1.1	Do you think environmental care is important where you live?			If your answer is possitive, please indicate the degree of importance ○ Very little ○ Little ○ Aceptable ○ A lot ○ Too much	
1.2	Do you think is important to improve your school environment?			If your answer is possitive, please indicate the degree of importance: ○ Very little ○ Little ○ Aceptable ○ A lot ○ Too much	If the answer is positive please detail the strategies and/or activities you would implement in order to improve it: …… …… …… …… …… ……
1.3	Do you believe that there are environmental elements that influence your health and life quality?			If the answer is positive, please indicate which: ○ Physical (temperatura, noise, radiation, etc.) ○ Chemical (Pesticides, heavy metals, etc.) ○ Biological (pathogenic bacterias, virus and other microorganisms) ○ Psychp-social (stress, substance use, etc.) ○ Social and cultural (education, work, diet and life style, violence, insecurity, etc.)	
1.4	Do you recognize the presence of some type of contamination in the environment where you live?			If the answer is positive, please indicate which: …… …… …… …… …… ……	If the answer is positive, where do you find them? ○ Home ○ Neighbourhood ○ School ○ Other, indicate which: ……..
1.5	Have you ever participated in any activity related to caring and/or improving the environment where you are?			If the answer is positive, please indicate which: …… …… …… …… …… …… ……	If the answer is positive, where did those activities took place? ○ Home ○ Neighbourhood ○ School ○ Other, indicate which: ……..

1.6	Do you believe that food production is related to environmental care in the place where you live?			If the answer is positive, please indicate why: …… ……
				…… …… …… ……

RELATIONSHIPS DIMENSION

1.	Social relationships/team work	YES	NO	
1.1	Have you participated during the last year in any team or group with your classmates in the school?			If your answer is positive, indicate how frequent: ○ Daily ○ Few times a week ○ Once per week ○ Once per month ○ Less than once a month
1.2	Do your school classmates ask for your advice or opinion?			If your answer is positive, indicate how frequent: ○ Almost every day ○ Very frequently ○ Sometimes ○ Not very frequently ○ Seldom
1.2	During the last year, have you had any responsible position in a team or group in the school?			If your answer is positive, indicate the position: ○ President / Coordinator ○ Treasurer / Secretary, other. Active member of the team
1.5	The following is an activities list. Indicate how many days per month you participate in each.	○ Club / team / NGO ○ Activities with classmates IN school ○ Activities with classmates OUTSIDE the school ○ Activities with other friends ○ To go to sport events ○ To go to a religious place ○ Being in social networks ○ To eat out ○ To visit family ○ To do sports ○ To do activities at home (buying food, cooking, etc.) ○ Other activities (include): ……		
2.	**Self-importance**			
2.1	How importan are your MATERIAL BELONGINGS to you?	○ Very important ○ Important ○ A little important ○ Slightly important ○ It is not important		

2.2	How important id YOUR HEALTH to you?	○ Very important ○ Important ○ A little important ○ Slightly important ○ It is not important
2.3	How important is YOUR DIET to you?	○ Very important ○ Important ○ A little important ○ Slightly important ○ It is not important
2.4	How important is the ENVIRONMENT WHERE YOU LIVE to you?	○ ○ Very important ○ Important ○ A little important ○ Slightly important ○ It is not important
2.5	How important is PAID WORK to you?	○ ○ Very important ○ Important ○ A little important ○ Slightly important ○ It is not important
2.6	How important is the RELATIONSHIP WITH YOUR CLASSMATES to you?	○ Very important ○ Important ○ A little important ○ Slightly important ○ It is not important
2.7	How important is to MAKE ACTIVITIES WITH YOUR CLASSMATES to you?	○ Very Important ○ Important ○ A Little important ○ Slightly important ○ It is not important
3.	**Personal Satisfaction**	

3.1	How satisfied are you with YOUR MATERIAL BELONGINGS?	○ Too satisfied ○ Satisfied ○ Partialy satisfied ○ Partialy dissatisfied ○ Dissatisfied
3.2	How satisfied are you with YOUR HEALTH?	○ Too satisfied ○ Satisfied ○ Partialy satisfied ○ Partialy dissatisfied ○ Dissatisfied
3.3	How satisfied are you with YOU DIET?	○ Too satisfied ○ Satisfied ○ Partialy satisfied ○ Partialy dissatisfied ○ Dissatisfied
3.4	How satisfied are you with the ENVIRONMENT WHERE YOU LIVE?	○ Too satisfied ○ Satisfied ○ Partialy satisfied ○ Partialy dissatisfied ○ Dissatisfied
3.5	How satisfied are you with your INTERPERSONAL RELATIONSHIPS?	○ Too satisfied ○ Satisfied ○ Partialy satisfied ○ Partialy dissatisfied ○ Dissatisfied
3.6	How satisfied are you with the ACTIVITIES YOU MAKE WITH YOUR CLASSMATES?	○ Demasiado satisfecho ○ Satisfecho ○ Parcialmente satisfecho ○ Parcialmente insatisfecho ○ Insatisfecho