

**PANDEMIC CRISIS AND EATING BEHAVIOUR IN SCHOOL AGE CHILDREN:  
PILOT STUDY AND ANALYSIS OF THE IMPACT  
CRISI PANDEMICA E COMPORTAMENTO ALIMENTARE  
NEI BAMBINI IN ETÀ SCOLARE:  
INDAGINE ESPLORATIVA E ANALISI DELLE  
RIPERCUSSIONI**

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**Abstract**

This research wants to evaluate the possible repercussions that the pandemic period has produced on the eating behaviours of children aged between 8 and 11 years.

The time of the meal plays a fundamental role in the life of each of us. It is linked to the satisfaction of a physiological need, but also to a psychological and social one. Food is therefore a means by which individuals implement, even unconsciously, their communication strategies, satisfy their needs and live their emotions.

Because of the pandemic, schools have also had to implement new containment measures and, as a result, meal times have changed significantly. The sample, made up of 90 children from a primary school in Rome, showed the presence of 90% critical values in the eating behaviours, through the DEBQ-C. The future aim is the possible deepening of the topics in order to allow teachers and educators to make use of tools, in order to compensate for any children's problems.

La presente ricerca si prefigge di valutare le eventuali ripercussioni che il periodo pandemico ha prodotto sul comportamento alimentare di una popolazione infantile con età compresa tra gli 8 e gli 11 anni. Il momento del pasto ricopre un ruolo fondamentale nella vita di ognuno di noi. Esso non è semplicemente legato al mero soddisfacimento di un bisogno fisiologico ma anche psicologico e sociale. Il cibo diviene così un mezzo attraverso il quale il soggetto mette in atto, anche inconsapevolmente, le proprie strategie comunicative, soddisfa i propri bisogni e vive le proprie emozioni. A seguito della crisi pandemica, le scuole hanno dovuto mettere in atto importanti misure contenitive e, di conseguenza, il momento del pasto è cambiato significativamente.

Il campione, composto da 90 bambini provenienti da una scuola primaria di Roma, ha mostrato la presenza di valori critici nel comportamento alimentare al 90%, rilevato tramite il DEBQ-C.

Ci si pone come futuro obiettivo l'eventuale approfondimento dei temi trattati per permettere alla scuola di avvalersi di strumenti al fine di compensare le eventuali problematiche infantili.

**Key-words**

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<sup>1</sup> Author of Introduction, paragraphs n.1, 2.1, 3.1, 3.2, 3.3, 3.4, Conclusion

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Anti-covid rules, primary school, DEBQ-C test, food education, meal time

Norme anti-covid, scuola primaria, DEBQ-C test, educazione alimentare, momento del pasto

## Introduction

The COVID-19 pandemic has spread rapidly throughout the world's population, which has had to adapt to a new reality, characterised by great and often painful changes. On 11 March 2020, the WHO acknowledged the state of a pandemic which, even today, represents a major challenge for humanity (WHO, 11 march 2020).

As evidenced by several systematic reviews, the closure of schools has been a key measure to control and contain the spread of the pandemic (Cowling et al., 2020; Jackson et al., 2014; Nafisah et al., 2018; Rashid et al., 2015).

School represents a place in which students increase skills and knowledge and also develop skills in the relation and social field, so their closure has been very painful (Lancet Child Adolesc Health, 2020).

With the DPCM of 4 March 2020, containment measures were introduced, including the closures of schools of all levels.

This restriction has a strong impact on the lives of students, parents and teachers. So also the school had to adapt to the new situation and, through the introduction of distance-teaching, it avoided the abrupt interruption of school activities, even if there has been a strong limit in the absence of real social contact (Zhu et al., 2020).

According to UNESCO the epidemic of Covid-19 has led to a serious educational crisis, because of the fact that schools provide social protection, nutrition, health and emotional support.

Moreover the UNESCO data reports that schools closed, because of the pandemic, affected about 91% of the world student population (UNESCO 2020).

In the pre-pandemic period the school canteens were extremely crowded places so, also in these places, students and teachers were forced to adapt to new stricter rules.

Shift lunches were introduced and, in the cases in which the canteens were too crowded, meals have been consumed within the same classrooms.

The aim of this research starts from the high importance of food in the life of each of us, linked to the satisfaction of a physiological need, but also to a psychological and social one.

Eating behaviour is one of the most important actions taken by the individual in order to satisfy various needs. In fact, from early childhood, the child establishes its first bond with the mother and enters into contact with the outside world also through food (Nuvoli, 2010).

The time of the meal becomes increasingly rich in social and cultural stimuli.

Food thus becomes a means by which the individual, even unconsciously, implements his communication strategies, satisfies his needs and experiences his emotions (Spinelli et al., 2021).

Through the search or rejection of food, the child makes the others understand his own desires and discomforts.

Food is communication and language. Following the perception of stressful events, it can be a means by which to implement a wide range of behaviours, sometimes comforting or compensating (Nuvoli, 2010).

So the relationship with food assumes an essential role in the life of individuals.

The pandemic has had strong psychological and social repercussions and, in some cases, the relationship with food has also been affected by these changes (Campbell et al., 2021; Grant et al., 2021; Pietrobelli et al., 2020; Di Renzo et al., 2020).

Taking into account the important role of food and the strong psychological and social repercussions due to the pandemic, this research evaluates the possible repercussions caused by the pandemic on the eating behaviours of Italian children aged between 8 and 11 years.

## **1. Bio-psychosocial role of feeding**

### **1.1 Meal time as a mean for communication, culture and emotions**

The time of meal is linked to the satisfaction of a physiological need, but also to a relational, cultural and social one (Balsamo, 2015).

During his life the individual develops a greater self-awareness of his needs and discovers the surrounding reality. So, also the eating habits that arise in the family, are complemented by the child's experiences outside the family environment (i.e. school) (Pan, 2010).

The time of meal also plays a crucial role from a social and cultural point of view. Which food we consume, how we consume it and with whom, represents a strong indicator of how the individual conceives the value of uses and customs of his own society (Balsamo, 2015).

Furthermore, the "social facilitation" refers to the strong relational value of food, in fact its consumption is facilitated by the mere presence of other people (Ruddock et al., 2021).

The cultural aspect of food is fundamental in food choices and in the development of taste sensations. So the way we perceive tastes and smells, as well as the preferences and foods we usually eat, change from culture to culture (Bellati, 2019).

The Covid-19 pandemic has led to rapid and sometimes abrupt changes that have also affected the approach to food. Several studies have shown how the new reality has increased the consumption of high-calorie snacks (Pietrobelli et al., 2020; Adams et al., 2020; Jansen et al., 2021), but also the consumption of home cooking (Carroll et al., 2020; Berge et al., 2021).

The daily routine has been greatly modified, the quarantine period has disrupted life, the equilibrium and the relationship between parents and children (Toran et al., 2021, 2022).

It emerges that stress experienced by parents during the pandemic also affected the domestic food environment (Loth et al., 2022), modifying the daily routine and increasing the nutritional responsibilities of parents (Trofholz et al., 2022).

### **1.2 Food education**

The school environment must be conceived as an open, interactive and dynamic place where different cultures, histories and realities meet each other.

In fact the school, as well as the family, is the main educational agency within which the child develops and increases competences in the field of learning and life skills, that will allow him to face challenges of daily life (Ligorio et al., 2013).

Teaching must be carried out with an optimal level of inclusion among children. The teacher has to allow the development of the skills and knowledge of his students through cooperative processes (Isosomppi et al., 2015).

The school environment is essential in the development of socialisation and inclusion processes. In it students learn to collaborate with each other, think critically and creatively, make decisions, manage stress and emotions, solve problems and face criticalities (Molinari et al., 2018).

The school allows the student to face the continuous evolutionary challenges, establish relationships, interact with peers and activate important processes of mentalization that allow him to define his own self and acquire new skills. The school is an environment in which children also learn competences in the social and values field. In fact the students are interested

in systems of relationship where they can create bonds and social conduct (Molinari et al., 2018).

Even the meal time at school plays an important role for the development and the growth of the child. In fact, it enriches the home food model by providing different foods and new flavours, but also it represents a place in which students share and socialise during the interruption of educational activities.

The consumption of meals in canteens has a positive impact on the consumption of healthy foods and decreases that of unhealthy ones (Locatelli et al., 2018; Samek, 2019).

In addition, some studies have pointed out how it produces improvements in the educational outcomes of students (Belot et al., 2011).

Thanks to this moment, the child socialises and, sometimes, overcomes difficulties related to the intake of food that they never consumed before. In this way, they increase their social abilities and also delineate their food tastes and preferences.

Nutrition must be considered as an educational process that allows the students to develop healthy and balanced eating habits, avoiding waste, learning to sit on the table and sharing the same space with their peers while respecting the rules of behaviour.

In fact, children are constantly looking for new knowledge, taste and smell different foods and acquire new information that outlines their preferences (Fraccaro et al., 2007).

Children thus develop skills and knowledge in relation to food consumption, even unconsciously (Benn et al., 2014).

In addition, the teachers and educators had a significant role in promoting healthy eating behaviour (Ward et al., 2015).

The meal time at school is full of meaning. It is also through it that children learn the art of sharing, cooperation, solidarity and altruism. Inside the school canteens the students, even just observing, learn to taste foods that they would never have thought to eat, just because that particular dish is appetising for other children.

In addition, children in this way give value to the meal time and learn how to prepare a table, how to sit, what gestures to avoid, how to serve, choose, taste and respect food. All this allows children to build their own self, define their autonomy and establish the first and fundamental interpersonal relationships.

## **2. Pandemic crisis and impact on food**

The first cases of SARS-CoV-2 occur in China, in the city of Wuhan, as early as December 2019. On 31 December 2019, the Chinese authorities reported the spread of the disease to the WHO and in early January 2020 the strain responsible for the future pandemic, SARSCoV-2 or the new Coronavirus, was identified.

On January 30, 2020 the first cases of Covid-19 were confirmed in Italy and soon the infection spread to the rest of the world. The WHO declares a state of public health emergency of international concern and in early February the new disease is called Covid-19 and the virus is called SARS-CoV-2.

The spread of the infection is growing at a high rate, so much so that in Italy the government decides to close schools and universities. With the D.P.C.M. of 9 March 2020, the whole nation becomes a protected zone: travel, demonstrations and events are forbidden; educational services, schools of all kinds and grades and the activities of public offices are closed. The only activities they continue to carry out are those providing basic necessities and the only movements allowed (wearing safety devices) were purchasing of basic necessities (food or medicines).

On 11 March, Ghebreyesus, Director-General of the WHO, referring to the epidemic that has been present globally and has been going on for several months, says that COVID-19 can be characterised as a pandemic (WHO).

On 14 September the schools reopened in accordance with precise protocols aimed at protecting public health and preventing the spread of contagious diseases.

## **2.1 New containment measures and their impact on children**

The pandemic, and the measures applied, has imposed many changes in several areas of daily life: work, family, social, school and relationships. These changes have had many repercussions, including psychological ones.

Physical distance and isolation have had a strong impact on children's lives, influencing in particular dietary habits and daily behaviours (Di Renzo et al., 2020). The closure of kindergartens, schools and social services, the removal from important figures such as grandparents and friends and the confinement within the home have changed the quality of life and the balance of the whole family (Uccella et al., 2020). This has led to sedentary behaviour, poor eating habits and the use of multimedia devices such as TVs, smartphones and video games.

Recent studies have shown that 65% of children under 6 years of age and 71% of those between 6 and 18 years of age have experienced behavioural problems and regression symptoms (Cipolla, 2021; Segre, 2021; Spinelli, 2020).

The main repercussions were: difficulty concentrating (76.6%), boredom (52%), irritability (39%), restlessness (38.8%), nervousness (38%), loneliness (31.3%), discomfort (30.4%) and worry. In addition, the results show that children spent less time doing physical activity and slept more hours during quarantine (Pisano, 2020; Cellini, 2021). Similarly, another study (Cellini, 2021) suggested that children showed a marked delay in sleep time and a slight deterioration in sleep quality during isolation. They were less inclined to stick to daily routines or to keep track of the timeline. An increase in emotional, behavioural and hyperactivity symptoms has been reported in children, along with regressive behaviours, due to changes in sleep quality, boredom and psychological difficulties in families.

Social exclusion and quarantine have obviously reduced opportunities for physical activity among children, particularly for children in urban areas who live in small flats, leading to increased sedentary behaviour and food consumption (Rundle, 2020; Becker, 2020).

For most children and young people, the normal routine has been disrupted: with the implementation of social distancing interventions, direct human contact has become highly limited, with most of the activities that typically occupy young people's lives – school, extracurricular activities, and socialising with peers – only bound online. Routine normally gives young people a greater sense of security in the context of uncertainty. Consistent evidence shows that the structured weekday environment can help protect children by regulating obesogenic behaviours, most likely through opportunities for compulsory physical activity, limiting calorie intake, reducing screen time opportunities, and adjusting sleep times (Brazendale, 2017). With schools closed, young people lose a point of reference and their sense of identity may falter. Going to school might have been a pain before the pandemic, but at least it was a routine to follow.

In addition, reduced outdoor activities and social interaction may have been associated with an increase in children's emotional and behavioural difficulties. In the 6-9 age group there was a great demand for more physical contact with parents with whom they probably tried to compensate for the deprivation of the social, emotional, physical and relational contact they were experiencing.

Moreover, there is data on the negative change in eating habits, combined with that of weight gain, mainly of males, which suggest a psychological discomfort resulting in the need, of children-boys, to take food for sedative and/or consolatory purposes (Cipolla, 2021).

One of the reasons for the worsening of the diet was the reduction in the consumption of fresh foods, accompanied by a deficiency of vitamins and minerals (vitamin C, vitamin E and beta-



carotene) due to severe measures and economic blockade. Deficiency of these micronutrients is associated with both obesity and a reduced immune response, making individuals more susceptible to viral infections (Childs et al., 2019).

Another reason for poor diet was the increase in carbohydrate consumption. In particular, during isolation, more than half of the subjects had increased their consumption of homemade cakes, bread, pasta and pizza, baked to fill time. In fact, the problem of time filling and boredom played a very important role during the pandemic: people often woke up at night looking for food, ate out of boredom and spent more time playing video games.

## **2.2 Meal time at school and restrictions due to covid**

Important restrictions have also been imposed on the time of meals at school, which has always played a fundamental role in the development and growth of the child. Schools enrich the home food model by providing new flavours and it represents a space of important sociality. Inside the school canteens, students come into contact with tastes and smells of different foods. It is enough to think that only through the repeated exposure of children in kindergarten to new foods, can intervention on a long-term strengthening of healthy eating practices (Helland et al., 2021; Hausner et al., 2012).

Before the pandemic, the mealtime represented an important break during which the classes went to the canteens and the children had moments of leisure and serenity with their classmates. Going to a different environment from their own classroom allowed them to experience a moment of leisure from the daily routine. In fact, despite the presence of the teachers, they felt free to express themselves and relate to their friends.

In the last two years, due to the restrictions imposed by the pandemic period, significant limitations have also been placed on this time of recreation and socialisation. In some school canteens it was not possible to respect social distancing, so classrooms were also used as refreshment points. Therefore, in addition to spending the time of their classes, students eat lunch at their own desks, without being able to exchange further gestures of socialisation or sharing with their classmates. Children and teachers had to comply with the provisions contained in the preventive regulations by leaving the classrooms and waiting for the work of the staff responsible for cleaning the surfaces. Moreover, during the meal, in order to communicate with each other, they had to wear the mask repeatedly and, at the end of the meal, to wait for the further sanitization of the benches and chairs.

In this new reality, the students eat in a new setting, sitting individually at their own desks, respecting the safety distance which limits physical contact and communication exchanges between them.

In this way, there is a risk of losing the conviviality and sociality that have always characterised the moment of school lunch. Children, not being able to share and relate freely, can experience this moment in a different way, with the risk of negatively affecting the approach with food. In fact, it is strongly influenced by the mere presence of other people who, in this new reality, can be perceived differently (Ruddock et al. 2021). The new daily life rigidity limited sociality, leading to the impossibility of implementing various eating behaviours supported by it.

The new normality can lead children to experience negative emotions that sometimes pour out in the relationship with food.

## **3. Research**

The Covid-19 pandemic, after which the whole world's population experienced several changes in health and lifestyle, led to the implementation of major restrictions in the workplace, in schools and in education.

Isolation at home and the resulting social distancing have had considerable repercussions in the social and psychological sphere, such as in the economic one. In addition to the damage suffered

by the world economy, there have been considerable emotional consequences: stress, fear, loss and isolation have exacerbated existing problems and, in some cases, created new ones.

School closures have brought a significant change in the lives of students, parents and teachers; although distance learning has led to continuity.

After the reopening, students and teachers live in a new reality permeated by restrictive rules that limited and delineated the pattern of the days. Physical distance was applied in classrooms, corridors and other school premises, continuous hygiene of spaces and hands and the use of safety devices in order to prevent the spread of the virus.

### **3.1 Research hypothesis**

The above scientific evidence underlines how the relationship with food takes on a primary role in the life of the individual. The pandemic has led to the implementation of severe restrictions which have also affected meal time at school.

Starting from the discomfort experienced by the Italian population following the COVID-19 pandemic, and considering the fundamental importance of food in the lives of children, the aim of this research is to investigate the presence of possible repercussions, that the pandemic period has produced, in the eating behaviours of a student population of a primary school in Rome.

### **3.2 Sample**

The sample, composed of a total of 90 children belonging to 7 classes of a primary school in Rome, is divided into: 28 children attending the third elementary divided into 2 classes, 45 the fourth belonging to 4 classes and 17 the fifth belonging to a single class, of which 48% are male and 52% female.

Children in the first and second classes were not included in the sample because of the exclusion criteria for Dutch Eating Behaviour Questionnaire Children (DEBQ-C).

In order to ensure complete anonymity, no individual information has been collected with the exception of gender and age identification.

### **3.3 Tools**

For the realisation of this study, in order to examine the greatest number of variables involved in the wide and articulated processes inherent in the act of eating, an experimental protocol was created composed of different assessment tools.

In order to understand how they relate to food, the children were asked to fill in the DEBQ-C, through which there investigated the three areas of “emotional eating”, “eating outdoors” and “food restriction”. After the sample, a qualitative human figure test was presented, thanks to which it was possible to identify the presence of any discomfort experienced by the children. Finally, a closed-response questionnaire was sent to teachers via Google forms, to be completed online in order to obtain, through their personal perceptions, an external view of any changes in children’s behaviour as a result of the restrictions.

#### **3.3.1 Dutch Eating Behaviour Questionnaire Children**

The Dutch Eating Behaviour Questionnaire Children (DEBQ-C) was developed and validated by Tatiana Van Strien and Paul Oosterveld of Radboud University in Nijmegen, the Netherlands in 2008. Subsequently adapted to the child population, it provided a reliable measurement tool to assess eating habits in the population aged 7-12 years, including emotional aspects and the tendency to overweight and obesity in healthy adolescents or adolescents with multifactorial diseases.

The test, which has the characteristics of a three-point Likert questionnaire, consists of 20 fixed-answer questions with three options: no (1), sometimes (2), yes (3). Each question investigates a specific area of dietary behaviour:

- Emotional Eating, which refers to the implemented behaviour regulated by a negative emotional response. It is linked to situations or negative states that affect food intake, whether in individuals who are overweight, normal or underweight (Gelibter, 2003).
- External Eating, which occurs when the individual eats in response to the sight or smell of food; generally in fact people perceive as more tasty unhealthy food instead of healthy, feeling therefore more attracted by it (Hejiden et al., 2020).
- Dietary Restriction, concerning the implementation of self-control processes in food consumption. Moreover the variability in inhibitory control could help identify individuals who are predisposed to obesity risk; the current findings also highlight the importance of parenting practices as potentially modifiable factors that exacerbate or attenuate this risk (Anzman et al., 2009).

The DEBQ-C can be used at home, school or health care facilities and can be self-compiled on paper or online in about 20 minutes.

In addition to the standard questionnaire, emoticons related to the three response options have been included in order to provide greater clarity to test subjects (Baños et al., 2011).

### **3.3.2 Human Figure Drawing Test**

The Human Figure Drawing Test is administered individually and is generally intended for subjects between 5 and 6 years of age and early adolescence, in whom the boundaries between conscious and unconscious are not yet so clearly delineated and the presence of social and cultural stereotypes is not well established. The execution of the drawing is carried out after the delivery “Draw a human figure” or “Draw a person” and any requests for clarification from the children must be met in a reassuring and vague way with expressions such as: “As you want”, “As you like”, “As you wish.” There are no lead times and the material available consists of pencil, foil and eraser.

As the purpose of the survey was focused on the recognition of possible problems in the food field, the analysis of the design focused on how the children designed their mouths. Its multiple modes of representation reveal vast communicative messages.

The evaluation of the drawings was based on the test manual, which contained detailed descriptions and representative images of the drawings in which the mouth appeared to be emphasised.

### **3.3.3 Questionnaire for teachers**

In order to obtain an external point of view, the teachers who took part in the initiative were given an online questionnaire using Google forms. This tool explores the views of the 13 teachers on the recognition of possible problems encountered in students following the pandemic period. Specifically, items have been created to investigate the general perception of the limits imposed by restrictions and the repercussions of these on sociality and the ways in which they relate to food within the school environment. This tool has thus made it possible to get in touch with the perceptions and feelings experienced by teachers in relation to any discomfort experienced by their children.

## **3.4 Method**

For the realisation of this study, it was essential the participation of the teachers of the school group within which the research was conducted.

The questionnaires were distributed to the teachers because, due to the security measures implemented after the pandemic period, it was not possible to enter the building. Specific guidelines were provided for the administration of the tests: in relation to the DEBQ-C, teachers



were asked to hand over a sheet containing the pre-printed test and to explain to the students how to complete the test, consisting of inserting an X in the answer option most suited to them; for the second test carried out, the Drawing of the Figure Human, the teachers were given a blank sheet of paper with the heading “Draw a person of your choice” to which they did not have to add any information, except to respond to the children’s requests for further clarification with expressions such as: “As you want”, “As you like”, “As you wish.”  
 In addition, a closed-response questionnaire was sent to teachers via Google forms to collect the views of the faculty.

### 3.5 Data analysis

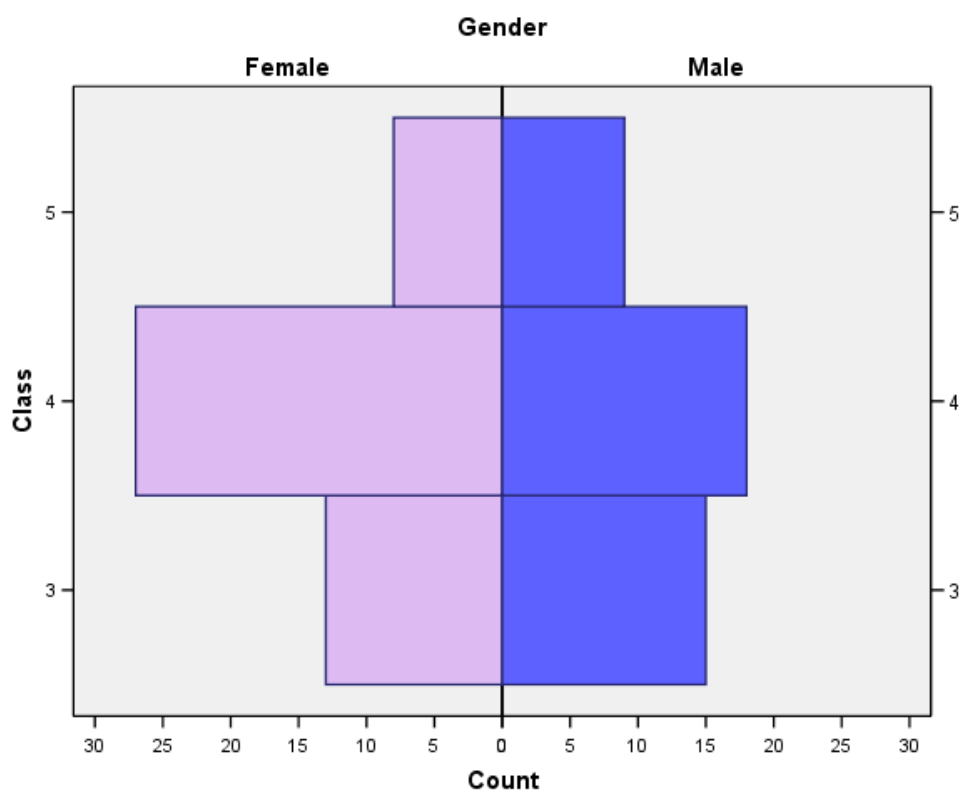
#### Descriptive Statistics

Class					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	28	31.1	31.1	31.1
	4	45	50.0	50.0	81.1
	5	17	18.9	18.9	100.0
	Total	90	100.0	100.0	

*Table 1 - Class*

Section					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	27	30.0	30.0	30.0
	B	24	26.7	26.7	56.7
	C	30	33.3	33.3	90.0
	D	9	10.0	10.0	100.0
	Total	90	100.0	100.0	

*Table 2 - Section*

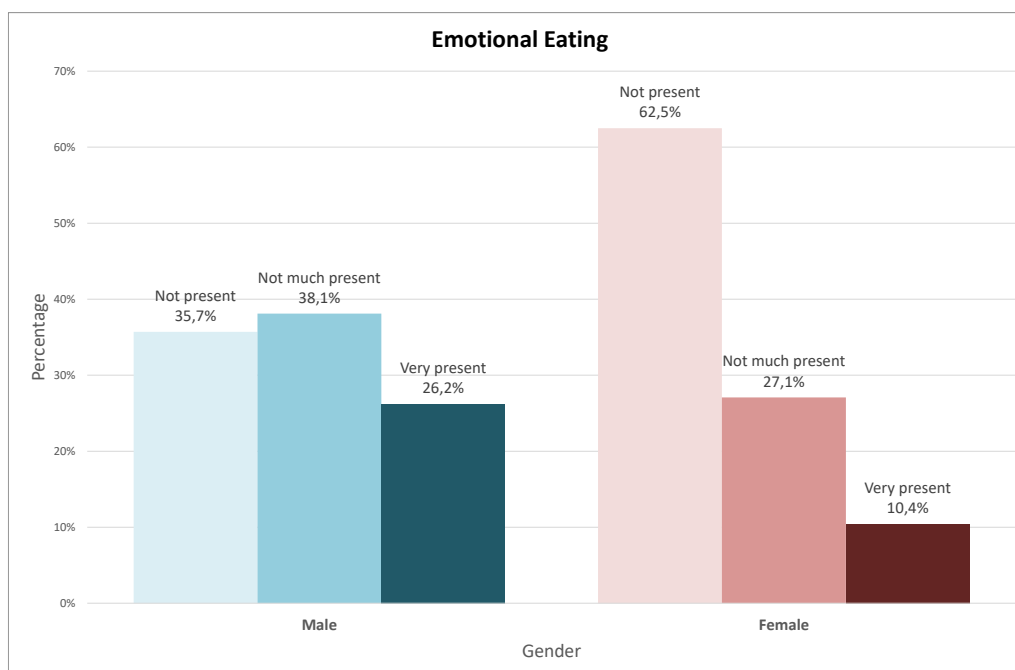


		Gender			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	48	53.3	53.3	53.3
	Male	42	46.7	46.7	100.0
	Total	90	100.0	100.0	

*Table 3 - Gender*

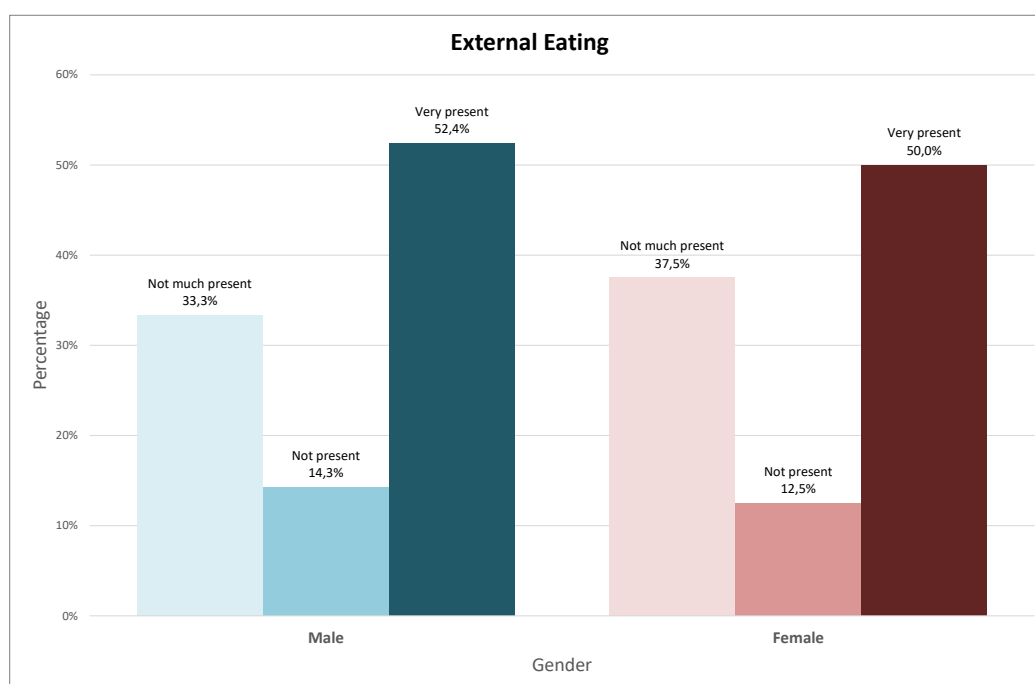
*Figure 1 - Gender vs Class*

The sample, consisting of 90 statistical units, was evenly distributed between males (46.7%) and females (53.3%), with a prevalence of class IV pupils (50%).



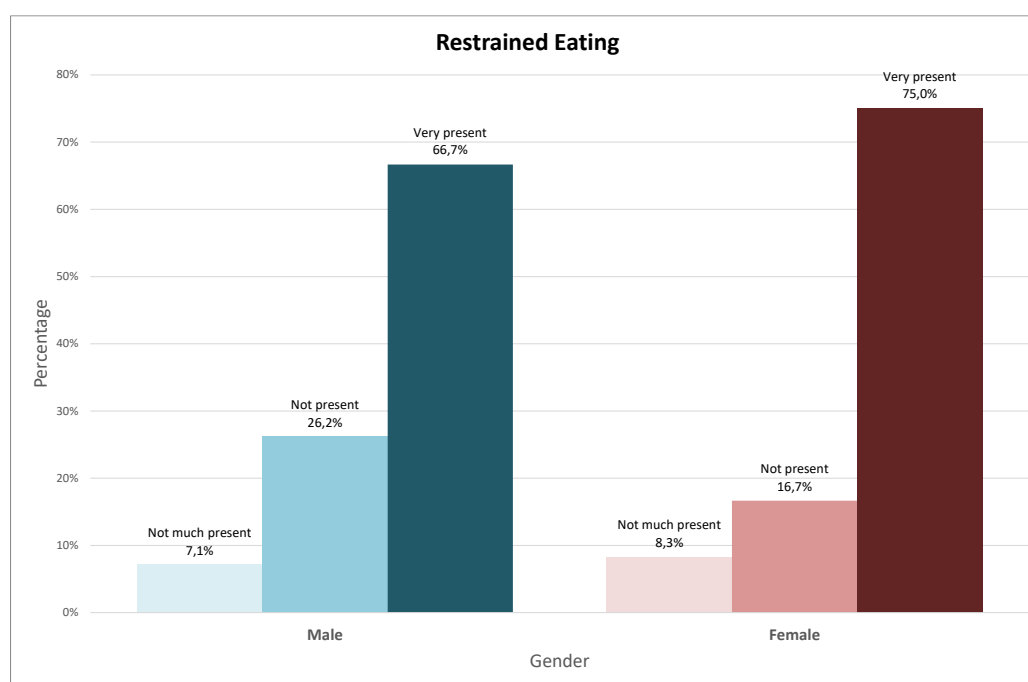
*Figure 2 - Percentage per Gender - Emotional Eating*

It can be seen from Figure 2 that for Emotional Eating the areas of increasing criticality are fairly evenly distributed among males, while for females the percentage of non-critical area is decidedly majority.



*Figure 3 - Percentage per Gender - External Eating*

It can be seen from Figure 3 that for the External Eating area the criticality areas are mirrored between males and females, with the preponderance of critical areas.



*Figure 4 - Percentage per Gender - Restrained Eating*

From Figure 4 it can be seen that for Restrained Eating the arrears are mirrored between males and females with the preponderance of critical areas for both groups

## Data analysis

### Applicability conditions of the tests used

The following tests were used for data analysis:

#### Independent Samples T-Test (SPSS)

[1] This is used when the independent variable is of a qualitative type with 2 categories.

[2] The applicability conditions of the test are

- Independent observations

Each statistical unit represents a different person. The condition applies to our data.

- Normality

The dependent variable must follow a normal distribution in the population. This is only necessary for samples smaller than about 25 units. With 90 statistical units, the normality test is deemed unnecessary.

- Homogeneity

The standard deviation of our dependent variable must be equal in both populations. We only need this assumption if our sample size is (clearly) unequal. SPSS checks whether this is true when we perform our t-test. If not, we can still report the correct test results.

In conclusion, we can consider the conditions verified.

### **One-Way Anova Test (SPSS)**

[3] It is used when the independent variable is qualitative with more than 2 categories.

[4] A requirement for the ANOVA test is that the variances of each comparison group are equal. This condition is tested using the Levene statistic. What is sought here is a significance value greater than 0.05, as a different result would suggest a real difference between the variances (Homogeneity of Variances).

[5] To obtain the test result, one looks for whether the value of F reaches the significance level (Sig. < 0.05). If this is not the case, the null hypothesis cannot be rejected.

[6] If the null hypothesis can be rejected, we still do not know specifically in which of the categories this difference is significant. We can find this out in the table of multiple comparisons containing the results of Tukey's post hoc test.

### **Statistical Analysis between Sample Gender and DEBQ-C TEST**



The Independent Samples T-Test (SPSS) [1] [2] was used to analyse the data and compare the results between the different areas of the DEBQ-C test and gender.

The sample shows different averages for males and females in the different areas, albeit minimal. We want to test whether these differences are statistically significant.

Inferential statistics show us the following results

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower Upper
Emotional eating	Equal variances assumed	3.848	.053	-2.250	88	.027	-.22449	.09978	-.42278 -.02621
	Equal variances not assumed			-2.219	79.042	.029	-.22449	.10116	-.42586 -.02313
External eating	Equal variances assumed	.108	.743	-.053	88	.958	-.00494	.09383	-.19141 .18153
	Equal variances not assumed			-.052	82.899	.958	-.00494	.09455	-.19301 .18313
Restrained eating	Equal variances assumed	1.897	.172	.958	88	.341	.07188	.07503	-.07724 .22099
	Equal variances not assumed			.947	80.402	.347	.07188	.07592	-.07920 .22295

*Table 4 - Independent Samples T-Test - DEBQ test results*

Levene's test for homogeneity of variances presents  $p > 0.05$ , so the values on the first line of each area are considered. The only statistically significant difference between the averages is that of the Emotional Eating test,  $p = 0.027$  ( $< 0.05$ ) and null value not within the confidence interval (-0.42278 and -0.02621). Males had a higher mean value of 0.22449 than females.

### Statistical analysis between sample age (class) and DEBQ test (Emotional Eating)

We now want to test the null hypothesis  $H_0$  that the mean results for age are equal in the Emotional eating test The One-Way Anova test [3] is used.

Test of Homogeneity of Variances			
Emotional eating			
Levene Statistic	df1	df2	Sig.
5.359	2	87	.006

*Table 5 - Test of Homogeneity of Variances - Class vs DEBQ test Emotional Eating*

[4] In our sample [Table 5], the significance value of Levene's statistic based on a comparison of medians is less than 0.05 (0.006). This is a significant result, which means that the requirement for homogeneity of variance was NOT met and therefore the standard one-way ANOVA cannot be interpreted. In this example, the Welch ANOVA is used.

#### Robust Tests of Equality of Means

Emotional eating				
	Statistic <sup>a</sup>	df1	df2	Sig.
Welch	1.831	2	37.304	.174

a. Asymptotically F distributed.

*Table 6 - - Welch ANOVA - Class vs DEBQ test Emotional Eating*

From the Welch ANOVA we deduce that  $p > .05$  (0.174) and thus there are no statistically significant differences between the averages of the different classes for Emotional eating test.

#### Statistical analysis between sample age (class) and DEBQ TEST (External Eating & Restrained Eating)

We now want to test the null hypothesis  $H_0$  that the mean results for age groups are equal in the External eating & Restrained eating tests. The One-Way Anova test [3] is used.

#### Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
External eating	.473	2	87	.625
Restrained eating	2.507	2	87	.087

*Table 7 - Test of Homogeneity of Variances - Class vs DEBQ test External & Restrained Eating*

[4] In our sample [Table 7], the significance value of Levene's statistic based on a comparison of medians is always greater than 0.05. This is not a significant result, which means that the requirement of homogeneity of variance was met and the ANOVA test can be considered robust.

#### ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
External eating	Between Groups	.858	2	.429	2.261	.110
	Within Groups	16.497	87	.190		
	Total	17.355	89			
Restrained eating	Between Groups	.179	2	.090	.706	.496
	Within Groups	11.034	87	.127		
	Total	11.213	89			

*Table 8 - Anova test – Class vs DEBQ test External & Restrained Eating*

[5] In our sample, we obtain that F achieves a significant p-value (Sig.) (greater at the .05 alpha level) for both tests. This means that there is no statistically significant difference between the averages obtained in these tests for different ages.

#### DEBQ Test Correlation Matrix

Analysis of the correlation matrix between the 3 tests (Emotional, External and Restrained eating) shows that:

- There is a strong positive correlation between Emotional and External eating;
- There is a negative correlation between Emotional and Restrained eating.

**Correlations**

		Emotional eating	External eating	Restrained eating
Emotional eating	Pearson Correlation	1	.323**	-.237*
	Sig. (2-tailed)		.002	.025
	N	90	90	90
External eating	Pearson Correlation	.323**	1	-.177
	Sig. (2-tailed)	.002		.094
	N	90	90	90
Restrained eating	Pearson Correlation	-.237*	-.177	1
	Sig. (2-tailed)	.025	.094	
	N	90	90	90

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

*Table 9 - Correlation matrix - DEBQ test Areas*

### Correlation matrix between critical areas of DEBQ tests and design tests

**Correlations**

		Critical areas	Mouth shape	Smile	Color red	Tongue	Surgical mask
Critical areas	Pearson Correlation	1	.044	-.171	.230*	-.185	-.041
	Sig. (2-tailed)		.683	.106	.029	.081	.699
	N	90	90	90	90	90	90

\*. Correlation is significant at the 0.05 level (2-tailed).

*Table 10 - Correlation matrix - DEBQ test vs Drawing test*

The analysis of the correlation matrix between the number of critical areas of the DEBQ test and the characteristic elements of the drawing test shows that there is a positive correlation between drawing red-coloured lips and an increase in the presence of the number of critical areas.

### 3.6 Discussion

The figures above show that the sample is divided into three age groups, where 50% are 9 years old, 31% are 8 years old and 19% are 10. This age group was chosen because it is particularly affected by the repercussions caused by the pandemic (Imran, 2020).

The sample is divided equally between males (47%) and females (53%).

Figure 2 shows that in the area of Emotional Eating, males showed a greater presence of dysfunctions, while females showed a 62.5% of “not presence.” Regarding External Eating (fig.3) the scores are quite similar between males and females. Finally, in the area of Dietary

Restriction, figure 4 shows how this is largely dysfunctional for both males and females, who present the discomfort to 66.7% and 75% respectively.

A very interesting fact emerges from table 4 in which males achieved a higher mean score in all areas of the test than females. This figure is very interesting because traditionally eating disorders are more associated with females than males. The literature shows that indeed in the adult sample the prevalence of eating disorders affects women, with an estimate of 8-9 women per 100,000 and 0.02-1.4 per 100,000 among males (SISDCA). Despite this widespread prevalence in the female sample, the statistics show that this ratio is changing, as more and more young pre-teen males are suffering from it. Some “new” pathological forms, such as bigorexia, an eating disorder that leads to the desire to have an increasingly muscular body, contribute to this increase. This type of disorder affects more the male population (Tovt et al., 2021).

An interesting study involving 619 young people between the ages of 6 and 18 with eating disorders showed that males tended to manifest symptoms before females (Kinasz et al. 2016). In line with the literature, male subjects presented a more problematic profile and this could be given by an early onset.

A final relevant figure is shown in table 9, where there is a positive correlation between Emotional Eating and External Eating. This data could be interesting if applied to an intervention project where these two variables can be manipulated to help the child in the relationship with nutrition. In addition, the same table showed a negative correlation between Restrictive Eating and External Eating. Here, too, educational applications could be evaluated. Analysis of the correlation between the critical areas of the DEBQ-C test and the characteristic elements of the design test shows a positive correlation between the red colour used to draw the lips and the critical areas found. The literature highlights how red is associated with signs of danger, feelings of anger, frustration and thus avoidance. Moreover, this association seems to be deeply rooted at the biological level, which is why it has been found also in different cultures (Güneş et al., 2020; Ikeda, 2019; Gil et al., 2016). In addition, red, because of its wavelength, is a highly conspicuous colour, which is detected very quickly by the human eye, as it is associated with a hazard message (Kramer et al. 2019; Takahashi et al. 2017). All these elements suggest how the subjects manifest attitudes of anger and frustration towards food, through the choice of red for the lips. Another explanation could be given by the desire to highlight, consciously or unconsciously, the presence of a discomfort in the relationship with food. Finally, starting from the assumption that these subjects have problems related to their nutrition, the use of red, strongly associated with a process of avoidance, could confirm their desire to avoid the moment of the meal and highlight the presence of problems of another nature.

## Conclusions

This research evaluated the repercussions that the pandemic period has produced on the eating behaviours of children aged between 8 and 11 years.

The time of the meal plays a fundamental role in the life, because it is linked to the satisfaction of a physiological need, but also to a psychological and social one. Food is therefore a means by which individuals implement, even unconsciously, their communication strategies, satisfy their needs and live their emotions.

In the last two years, due to the restrictions imposed by the pandemic period, significant limitations have also been placed on this time of recreation and socialisation. In some school canteens it was not possible to respect social distancing, so classrooms were also used as refreshment points. Therefore, in addition to spending the time of their classes, students eat lunch at their own desks, without being able to exchange further gestures of socialisation or sharing with their classmates. In this way, there is a risk of losing the conviviality and sociality that have always characterised the moment of school lunch. Children, not being able to share

and relate freely, can experience this moment in a different way, with the risk of negatively affecting the approach with food. The new daily life rigidity limited sociality, leading to the impossibility of implementing various eating behaviours supported by it. The new normality can lead children to experience negative emotions that sometimes pour out in the relationship with food.

The sample, made up of 90 children from a primary school in Rome, showed the presence of 90% critical values in the eating behaviours, through the DEBQ-C. In addition, the male sample presented greater discomfort in relation to nutrition.

A relevant data was the positive correlation between Emotional Eating and External Eating and the negative correlation between Restrictive Eating and External Eating. This data could be interesting if applied to a project of intervention, through which you can manipulate these two variables to help the child in the relationship with nutrition.

Finally, a positive correlation emerged between the red colour used to draw the lips and the critical areas found. This data suggests how the subjects manifest attitudes of anger and frustration towards nutrition; also emerges the desire to highlight, consciously or unconsciously, the presence of an discomfort in the relationship with nutrition. Finally, the use of red could confirm their desire to avoid the moment of the meal and highlight the presence of problems of another nature.

The aim of this research is not only link certain eating habits to the pandemic crisis, but to highlight its important role in the perception of new normality. Food education must therefore be part of the educational practices promoted by educators and teachers, who, relying on the reinforcement of positive behaviours towards the relationship with food and the food process, support their knowledge and implementation. This process should not be limited to teaching the properties of the various foods consumed. It will be important to allow the student to be aware of the fundamental role of food taken from the childhood. Giving food its emotional and social value will therefore allow the child to be more aware of their choices and tastes, including in the field of food. Through games, videos and group work, teachers and educators must therefore promote the development of awareness of the role of food in the life of the individual.

In school, a possible application could be that of the conscious use of colour in the canteens. The literature in fact shows how the colours in these environments are able to influence the eating behaviour and therefore suggest the use of the orange colour, as it naturally stimulates the appetite (Wang, 2021). For example, you might think of involving children in painting the walls and personalizing them with drawings, as personal elements create a sense of belonging. Starting from this, we suggest to possibly avoid the excessive use of red colour. Taking into account the fact that emotions strongly influence eating behaviour, a caution could be to avoid generating moments of stress in conjunction with the consumption of meals. One example could be to avoid having children checked or questioned near snacks and lunch.

Considering that the daily presence of outside food, not always healthy, naturally affects the eating behavior of the child, it could be proposed the exclusive use of healthy food within schools. For example, during snacks, it is advisable to use only foods offered by the schools and limit the introduction of junk food, that is, all those foods that have a high calorie content but a low nutritional intake. Junk food is rich in sugars, carbohydrates, saturated fats and hydrogenates that are quickly absorbed by the body which is therefore led to require more and more, which is why it can adversely affect the diet (Mirhadyan et al., 2020). In this perspective it is proposed to promote an educational project based on Mindful Eating and then devote the right attention to nutrition, choosing and eating with awareness (Grider et al., 2020)



On the basis of these possible applications, the aim is to deepen the topics covered in order to create training protocols for teachers and learners and allow the school to make use of tools in order to compensate for any childhood problems.

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