

Reported Adherence To COVID-19 Non-Pharmaceutical Interventions In Young People

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Abstract

"Non-pharmaceutical Interventions" (NPIs) are effective public health interventions for COVID-19, but NPIs' compliance could be low in younger individuals. We determine whether NPIs' adherence in a young population is associated with COVID-19 infection, describe beliefs about the effectivity, and barriers to adherence.

A case-control study was conducted among 18-29-year-old subjects exposed to COVID-19 outbreaks in social events. Self-reported adherence to NPIs during the event was studied in confirmed COVID-19 cases and controls (close contact of confirmed cases).

6 outbreaks were studied. 40 cases and 40 controls were interviewed. The adherence during the social event was low, with higher non-compliance in COVID-19 cases (98% report not using a face mask and 88% not maintaining physical distance, than in controls (58% and 55% respectively, all $p < .05$). Interestingly, >90% of the participants believe that these NPIs were effective, but more cases state that they are not susceptible to the disease (88% cases vs. 45% controls), all $p < .05$. The main barrier to adherence was "low-risk perception in the friends' group."

Self-reported adherence, and perception of susceptibility to the disease is low, but higher adherence was reported in close contacts who did not develop the disease. Low-risk perception among friends was the perceived barrier.

Introduction

COVID-19 epidemiological reports in Spain show that about 20% of COVID-19 cases reported in Spain as of May 2020 occur in the population between aged 15 and 29 years [1].

Non-pharmacological interventions (NPIs) are public health measures aimed at preventing and/or controlling the transmission of SARS-CoV-2 in the community. When there was no effective vaccine for COVID-19, NPIs constituted the most effective public health interventions [2].

In Spain, in a scenario of control of the COVID-19 pandemic, the Ministry of Health's Early Response Plan established NPIs that can be performed individually to prevent the risk of infection [3]. These NPIs match those described by the European Center for Disease Control (ECDC): physical distancing, hand hygiene, masks, and ventilation (avoiding enclosed, crowded, and poorly ventilated spaces) [2]. NPIs play a key role in reducing the risk of virus transmission but their promotion requires intense, sustained, and contextualized communication within socio-cultural and economic environments [4].

For the present study, we selected the NPIs described by the ECDC and also included sharing objects that are put in the mouth, such as cigarettes, drinks, and food. There is evidence of the transmission of SARS-CoV-2 through sharing alcoholic beverages [5], as well as the transmission of other microorganisms, such as pneumococcus, through shared glasses and bottles [6].

The necessary compliance with NPIs is related to people's belief system about COVID-19. The health belief model has been proposed for application to the COVID-19 pandemic [7]. This model suggests that a person's beliefs about disease threats (susceptibility and perceived severity) and the effectiveness of the measures can predict changes in health-related behaviors [8]. Personal characteristics such as age or gender influence this subjective perception [9].

In Spain, the COSMO-Spain study analyzes the knowledge, behaviors, and risk-perception of the Spanish population over 18 years of age in the face of the COVID-19 pandemic. Their results show high adherence to NPIs, but a low perception of risk [10].

Although the older population is more susceptible to COVID-19, young people are not without risk. There have been 1.2% of cases of young people between 15 and 29 years of age hospitalized for COVID-19, 0.1% of admissions to the Intensive Care Unit, and 0.01% of deceased [11].

Public health messages for the promotion of NPIs may be neglecting populations at risk, such as youth leisure [12]. Restrictive measures need to be accompanied by educational measures that take into account specific difficulties in adherence.

Young people are often associated with increased risk-taking and a greater need for group acceptance, factors that can hinder adherence to NPIs [13]. Socialization is a fundamental need at this stage, linking confinement and social isolation with negative psychological effects and higher risk behaviors, such as alcohol consumption after confinement. Situations such as the current one, with the cancellation or decrease of study, work, and leisure activities, have been associated with higher risk behaviors in young people [14].

Customs and social interactions are key factors to explain the evolving trends of the pandemic [15]. Therefore, studies are needed that can guide prevention and risk reduction measures in specific populations and contexts.

The general objective of this study was to describe the perceived adherence to the NPIs for the prevention of transmission of SARS COV 2 in the young population of the Canary Islands in leisure situations related to social outbreaks and to associate these situations with the risk of being diagnosed with COVID-19. We also wished to describe the barriers to NPIs compliance in the context of a social outbreak and determine the change in adherence after being involved in a COVID-19 outbreak.

Methods

Participants and procedure

A cross-sectional and retrospective study of COVID-19 cases and controls was conducted.

The population under study is made up of young people aged 18 to 29 and related to COVID19 outbreaks occurring at social events in the Canary Islands. An "outbreak associated with social events" is considered any outbreak of COVID-19 where, according to the epidemiological research developed by the General Directorate of Public Health, the environment of acquisition of the infection took place in a social environment (leisure, friends' homes, bars or restaurants, meetings at sporting events...). Outbreaks exclusively in the family, at work or school are excluded.

The cases were young people diagnosed with COVID-19 in the context of a social outbreak, and the young controls were those who, having been in close contact with the cases, did not contract the disease.

The sample was obtained through the "Red de Vigilancia Epidemiológica de Canarias" (REVECA; in English, the Epidemiological Surveillance Network of the Canary Islands) database of the General Directorate of Public Health. We selected the 6 social outbreaks of young people that occurred between November and December 2020, as they are the most recent dates concerning the time of the investigation (December 2020). All cases of these outbreaks were initially selected and a control individual of the same sex and similar age (± 5 years) was selected for each case.

The inclusion criteria were age (over 18 years and under 30), having been diagnosed by PCR, or classified as a close contact in the context of the selected outbreaks. The exclusion criteria were age, cases, or controls in contexts of outbreaks that were not social or cohabiting, and not being able to contact them by telephone.

Data collection was carried out by telephone interview with a questionnaire created for this study on the perception of Adherence to Non-pharmacological Measures in the context of the COVID-19 outbreak and the barriers to their compliance.

All methods were carried out in accordance with relevant guidelines and regulations. Concerning ethical aspects, prior authorization was requested from the Research Committee of the Insular Maternal and Child University Hospital Complex. Participants were also informed of the voluntary and anonymous nature of their participation, requesting prior informed consent.

Variables

The questionnaire items were selected based on variables highlighted in the literature and previous reports.

The personal variables included were age, sex, and outcome in the CRP diagnosis. Exposure variables were described and related to outcome variables based on the possible diagnosis of COVID-19. The variables analyzed in the context of the outbreaks were:

- Self perception in the compliance with different non-pharmacological behaviors: wearing face masks, performing hand hygiene, maintaining a safe physical distance, avoid sharing objects that are put in the mouth (cigarettes, food, and drinks), avoid closed, poorly ventilated spaces, and avoid going to crowded spaces.
- Perceived barriers to compliance with non-pharmacological measures: perceived effectiveness, perceived susceptibility, perceived severity, and other perceived difficulties in complying with the measures.
- Change in adherence after diagnosis or being classified as a close contact.

To prepare the survey, previous exploratory interviews were conducted with young people, requesting their opinion of the questionnaire to improve any unclear items.

Data analysis

Descriptive analyses and Chi-square tests were performed to contrast the hypotheses of the qualitative variables, comparing the frequency of non-pharmacological measures between cases and controls. Subsequently, through the Odds Ratio (OR), we calculated the association of each of the variables with the classification as a "case", assessing whether the cases had higher exposure to risk factors than the controls. The difference in the chi-square test was considered significant at a p -value of $<.05$; for the measures of association (OR) a 95% confidence interval (CI) that did not include the unit was considered significant.

Results

Sample description

A total of 6 outbreaks were selected on the islands of Gran Canaria, Tenerife, and La Palma. We attempted to contact a total of 128 young people involved in these outbreaks by telephone but 31 could not be contacted after multiple attempts at different times. We were finally able to contact 97 young people (75.8% of the initial sample). After applying the established exclusion criteria, the final sample included 80 young people (40 cases and 40 controls) aged between 18 and 29 years. Of them, 60% ($n = 48$) were males and 40% ($n = 32$) were females, with a mean age of 21.8 years (± 2.5). With regard to the islands of residence, 56.25% ($n = 45$) were from Gran Canaria, 36.25% from Tenerife ($n = 29$), and 7.5% ($n = 6$) from La Palma.

Perceived non-compliance with NPIs

The individual perception of adherence to NPIs in social situations associated with the outbreak was low. Of the interviewees, 77.5% ($n = 62$) said they had not used a mask in the social situations in which they were exposed to COVID-19, 71.3% ($n = 57$) had not maintained a safe distance, 68.8% ($n = 55$) had remained in poorly ventilated and/or closed spaces, 53.8% ($n = 43$) had not performed hand hygiene, 40% ($n = 32$) had shared objects that were put in the mouth (cigarettes, food, cutlery, glasses, and/or bottles), and 33.8% ($n = 27$) had shared mobile phones.

Association between perceived non-compliance with NPIs and risk of COVID-19

The association between perceived non-compliance with each NPI and "being a COVID-19 case" was analyzed. Of the nine NPIs analyzed (Table 1), six were shown to be significantly associated with the risk of being a COVID-19 case. The NPIs whose non-adherence constitutes a risk factor for being a COVID-19 case in this study are: wearing a face mask, avoiding closed spaces, keeping a safe distance, performing hand hygiene, not sharing glasses or bottles, not sharing cigarettes, not sharing food and avoiding going to places with many people.

Table 1
Association between Non-adherence to NPIs (self-perception) and being a COVID-19 case.

		Case (n = 40)	Control (n = 40)	χ^2	<i>p</i>	OR [95% CI]
		% (f)	% (f)			
Wearing a face mask	Yes	2.5% (1)	42.5% (17)	18.35	< .001	28.8 [3.59, 231]
	No	97.5% (39)	57.5% (23)			
Physical distance	Yes	12.5% (5)	45% (18)	10.31	< .001	5.72 [1.86, 17.7]
	No	87.5% (35)	55% (22)			
Hand hygiene	Yes	32.5% (13)	60% (24)	6.08	< .01	3.11 [1.28, 2.09]
	No	67.5% (27)	40% (23)			
Sharing glasses and/or bottles	No	67.5% (27)	80% (32)	1.61	NS	
	Yes	32.5% (13)	20% (8)			
Sharing cigarettes	No	80% (32)	85% (34)	0.346	NS	
	Yes	20% (8)	15% (6)			
Sharing food	No	72.5% (29)	80% (32)	0.621	NS	
	Yes	27.5% (11)	20% (8)			
Remaining in closed spaces	No	10% (4)	52.5% (21)	16.81	< .001	9.94 [2.98, 33.2]
	Yes	90% (36)	47.5% (19)			
Going to crowded places	No	67.5% (27)	92.5% (38)	7.81	< .01	5.93 [1.54, 22.9]
	Yes	32.5% (13)	7.5% (2)			

(f): Frequency. Odds ratios are not shown if there is no statistically significant association (*p*-value > .05). NS: Non significant

Barriers to compliance

To describe the personal barriers to compliance with the NPIs in social environments, we analyzed the perception of the effectiveness of the measures, the severity of and the susceptibility to the disease, and the perceived difficulties in complying with the NPIs.

Belief un the effectiveness of the preventive measures

The results revealed the belief that non-compliance with NPIs increased the risk of contracting COVID-19. In this regard, 96.3% (*n* = 77) considered that risk increased by not wearing a mask and not maintaining a safe distance, 93.7% (*n* = 73) by not performing hand hygiene, 91.3% (*n* = 73) by going to crowded places, 82.5% (*n* = 66) by staying in closed spaces, and 72.5% (*n* = 58) by sharing objects that are put in the mouth.

When considering the belief of the non-effectiveness of the measures and its association with "being a COVID-19 case," no significant differences were found (Table 2).

Table 2
Association between the belief in the effectiveness of NPIs and being a COVID-19 case.

		Case (n = 40)	Control (n = 40)	χ^2
		% (f)	% (f)	
Wearing a face mask protects one from COVID-19	Yes	92.5% (37)	100% (40)	3.1
	No	17.5% (3)	0% (0)	
Keeping a safe distance protects one from COVID-19	Yes	90% (36)	97.5% (39)	1.92
	No	10% (4)	2.5% (1)	
Performing hand hygiene protects one from COVID-19	Yes	95% (38)	97.5% (39)	0.35
	No	5% (2)	2.5% (1)	
Sharing glasses and/or bottles increases the risk of COVID-19	No	27.5% (11)	27.5% (11)	0.00
	Yes	72.5% (29)	72.5% (29)	
Sharing cigarettes increases the risk of COVID-19	No	30% (12)	30% (12)	0.06
	Yes	70% (28)	70% (28)	
Sharing food increases the risk of COVID-19	No	55% (22)	45% (18)	0.8
	Yes	45% (18)	55% (22)	
Staying in closed spaces increases the risk of COVID-19	No	20% (8)	15% (6)	0.35
	Yes	80% (32)	85% (34)	
Going to crowded places increases the risk of COVID-19	No	7.5% (3)	10% (4)	0.16
	Yes	92.5% (37)	90% (36)	

(f): Frequency. Odds Ratios are not shown because there is no statistically significant association (p -value > .05).

Perceived severity and susceptibility

Of the sample of young people, 71.3% ($n = 67$) believed that they would not contract COVID-19, and 81.3% ($n = 65$) believed that, if they did contract it, it would not be serious.

Perceived severity and susceptibility were lower in cases than in controls, with statistically significant differences. Considering that one is not susceptible to contracting the virus was significantly associated with an increased risk of being diagnosed with COVID-19 (OR = 5.73, CI [1.85, 6.3], $p < .001$). Believing that, even if contracted, the disease would not be severe was also significantly associated with an increased risk of being diagnosed as having COVID-19 (OR = 5.29, CI [1.36, 20.5], $p < .01$). The data can be seen in Table 3.

Table 3
Association between perceived susceptibility and severity and being a COVID-19 case.

		Case (n = 40)	Control (n = 40)	χ^2	p	OR (95% CI)
		% (f)	% (f)			
Perceived susceptibility	Yes	12.5% (5)	55% (22)	10.31	< .001	5.73
	No	87.5% (35)	45% (18)			
Perceived severity	Yes	7.5% (3)	30% (12)	5.29	< .01	[1.36, 20.5]
	No	92.5% (37)	70% (28)			

(f): Frequency. Odds ratios are not shown if there is no statistically significant association (p -value > .05). NS: Nonsignificant

Perceived difficulties

Among the perceived difficulties in complying with non-pharmacological measures (open question), being with one's usual and trusted group was noteworthy, reported by 51% ($n = 41$) of the participants. Other prominent reasons were being in a recreational environment, the group's social pressure, the existence of habits and customs that are hard to change, and the lack of information or contradictions in the information received (Table 4).

Table 4
Perceived difficulties (open question).

Perceived difficulties in complying with prevention measures	% (f)
Low perception of risk due to being with the habitual and trusted group	51% (41)
Recreational atmosphere and desire for leisure and fun	16% (20)
Social group pressure for non-compliance	8.75% (7)
Habits and customs that are hard to change	8.75% (7)
Lack of awareness and information during the outbreak	8.75% (7)
Perception of low risk due to the published data of low incidence in the environment	6.25% (5)
Conflicting and changing information on prevention measures	6.25% (5)
Access to information against prevention measures on social networks	6.25% (5)
Performing an activity incompatible with the measurement (e.g., eating and drinking)	5% (4)
Discomfort with the use of measures	5% (4)

Diagnosis and change in adherence

Concerning changes in compliance with the measures after diagnosis or being considered a close contact, statistically significant differences were found between cases and controls. Only 50% (20) of the cases reported increased adherence to the measures after the outbreak, compared to 73.7% (28) of the controls.

Discussion

The results reveal the perception of poor compliance with NPIs for the prevention of COVID-19 in social situations in the young population of the Canary Islands, and the association of non-compliance with some NPIs with an increased risk of being diagnosed with COVID-19.

The risk of non-compliance with these non-pharmacological measures has been analyzed in different studies and previous reports [2, 3, 9]. The low compliance in the studied population may be related to the data of high incidence in the population between 15 and 29 years in Spain [1].

The NPIs with the young people's lowest compliance in social contexts were the use of face masks, safety distance, avoiding closed or poorly ventilated spaces, and hand hygiene, which were those established as individual protection measures by the Ministry of Health and the ECDC, and on which the most preventive interventions were carried out [2, 3].

This low compliance contrasts with the results obtained in the COSMO-Spain study considering the entire Spanish population over 18 years of age, where these NPIs showed higher adherence [10].

These results coincide with the need for public health actions to be based on local socio-cultural and epidemiological situations, as proposed by different authors. There is a risk that the messages from Public Health do not focus on the characteristics of specific populations such as young people in leisure situations [4, 12]. Therefore, the study and previous analysis of their characteristics and the application of behavioral models, such as the model of health beliefs, would allow interventions to promote adherence to hygienic practices in young people in social contexts [20].

Regarding the barriers to compliance with the measures, the perception of the effectiveness of NPIs for the prevention of COVID-19 is high, and this result can be interpreted as a positive effect of the interventions and communication carried out by the institutions to prevent COVID-19 [2, 3]. However, no significant associations were found between the individual belief of the non-effectiveness of the measures and "being a COVID-19 case," with the results contradicting the principles of the health belief model, which establishes the belief in the effectiveness of the measures as one of the variables related to their compliance [7].

The specific characteristics of the young population and the current situation can influence non-compliance with NPIs in these social contexts, despite beliefs in their effectiveness. The developmental characteristics of young people, the effects of isolation and the consequences of the pandemic, and the greater need for social connection and group acceptance at these ages have been described as possible causes [13].

In the present study, the belief that COVID-19 could be contracted was low in most of the participants, with a high percentage also considering that even if they contracted it, it would not be severe. This perception of low severity coincides with the results of the COSMO-Spain study [10], although, in the case of our study population, it is much lower. The perception of risk in the young people surveyed coincides with the data provided about the few but existing hospitalizations, ICU admissions, and deaths in the population aged 15 to 29 years [11].

On the other hand, the perceived susceptibility and severity in the population of this study were significantly associated with an increased risk of being diagnosed with COVID-19, coinciding with the principles established by the health belief model [7]. Not being afraid of contagion or of the severity of the disease are risk factors, so it is an aspect to consider for the review and planning of COVID-19 prevention strategies.

Concerning the results of changes in compliance with the measures following diagnosis or being considered a close contact, only half of the cases considered that their compliance increased after the outbreak. The confinement and social isolation following contact with SARS have been associated with higher-risk behaviors after confinement [13, 14]. It is necessary to analyze factors that may be associated with changes in adherence to NPIs to adopt preventive measures.

The interpretation of these results should be carried out taking into account their main limitations, such as the retrospective and cross-sectional nature of the study, and the possible data biases. To minimize these biases, the sample was selected from outbreaks that occurred in the most recent period, establishing a maximum of two months between the outbreak and the telephone interview of the study. It is, therefore, an exploratory study but it can guide future research and interventions in the prevention of COVID-19 in young people and in social contexts.

Conclusions

There is a perception of low adherence to NPIs for the prevention of COVID-19 in the young population of the Canary Islands in social situations related to outbreaks, and this perception of low adherence is related to an increased risk of being diagnosed with COVID-19. The belief in the effectiveness of NPIs for the prevention of COVID-19 is high, whereas the susceptibility and perceived severity of COVID-19 is low. These beliefs about low susceptibility to the disease have been associated with an increased risk of being diagnosed with COVID-19.

Barriers to adherence are related to social factors such as trust in the group or being in leisure situations. In addition, there is little change in adherence to NPIs after being involved in a COVID-19 outbreak.

These conclusions could serve as a guide for the promotion of effective adherence to NPIs in the young population of the Canary Islands in leisure contexts.

Declarations

Competing interests. The authors declare no competing interests.

Consent to participate. Participation in this survey was anonymous, consensual and voluntary with informed consent given by all respondents.

Availability of data and material. All data and analysis performed are available and meet statistical analysis standards. The deidentified data underlying the results presented in this study may be made available upon request from the corresponding author Dr. Morata, L., at leticia.morata@ulpgc.es. The data are not publicly available in accordance with participant privacy.

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