Distance learning during Covid-19 pandemic and social anxiety in adolescents returning to school: A retrospective study

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BACKGROUND AND AIMS

- The **distance learning (DL)** imposed in Italian schools **during COVID-19 pandemic** endured **from March 2020 to June 2021,** with various timeframes defined by regional norms and local administrations
- **DL during pandemic** have had diverse **consequences for adolescent wellbeing,** impacting both *learning processes* and *general adjustment* (reviews by Panagouli et al., 2021; Schiera et al., 2024).
- Overall, the **prolonged deprivation of social contacts with peers and teachers at school** and the **new difficulties implied by DL** have provided a **loss of critical developmental experiences for Italian students,** which may have shown its effects on emotional and relational adjustment later during adolescence.
- **Social anxiety** is **very common** during adolescence (Khalid-Khan et al., 2007), presenting both **individual and environmental risk factors** (Spence and Rapee, 2016), and it may be **triggered by negative life events**, such as social isolation and difficulties with DL during pandemic (Kindred & Bates, 2023).
- To date, the possible **long-term effects of DL on adolescents' adjustment are still mostly understudied**.

We aim to retrospectively investigate the experiences of Italian adolescents with **Distance Learning (DL) during COVID-19 pandemic** (from March 2020 to June 2021) and their **long-term effects on social anxiety when returning to school** in person (September 2021).

HYPOTHESES:

H1: More numerous **days spent in DL** during the last years and a more **negative perceived impact of DL** on the overall school experience, may have had long-term effects on adolescents' social adjustment, leading to ***increased social anxiety when they came back to school in person***.

H2: These effects are expected also controlling for the variability due to the **effective usability of DL**, which also is supposed to have affected social anxiety.

H3: **Indirect effects** were expected in these relations via the ***increase in psychological distress*** and the ***reduction in adolescents' resilience.***

METHODS

Participants:

- Participants were **280 adolescents** aged 15 to 18 years (M_{age} = 16.96 SD_{age} = 0.90; 61.4 % girls)
- They attended Italian high schools, enrolled at the 11th (32.9%), the 12th (34.6%), and 13th grade (32.5%)
- ***Inclusion criterion***: having attended school in Italy in the past year

Procedures:

- Data were gathered **from November 2021 to April 2022**, when Italian adolescents had returned to school in-person after about one year of DL due to COVID-19 pandemic
- **Informed consents** were obtained by participants, parents and school authorities
- The **anonymous online survey** was administered at school
- Participants **retrospectively reported about their experiences with DL during the past year** and self-assessed **their current mental health status**
- Research was approved by the Ethical Committee of Sapienza University of Rome

Measures:

- ***Individual information:*** Gender (0 = Girls; 1 = Boys); Age
- ***Retrospective measures of DL during past year:***
  - *Distance Learning Days in the past year:* 1 item created *ad hoc,* "Looking back over the past year, how many days in total did you attend school lessons in distance learning (e.g. because in-person lessons were suspended, or because your class had online shifts, or because you were in isolation at home)?". Response options from 0 (*never*) to 4 (*more than 6 months*).
  - *Distance Learning Usability* (Commodari & La Rosa, 2021): 6 items evaluating the **schools' capability to manage the digital channels** (e.g., "…did your school conduct online learning using a specific platform and virtual classrooms?) and the **affordances available in the family during the home confinement** (e.g., "… did you have a computer, tablet, or notebook at home to use for online lessons?"; Mc Donald's ω = .62). Response scale from 0 (*not at all*) to 3 *(most of times*). **Higher scores indicated greater usability of DL.**
  - *Distance Learning Perceived Impact* (Ferraro et al., 2021): 11 items assessing the **perceived impact of DL on the overall school experience** (see Table in results section; Mc Donald's ω = .76). Response scale from 0 (*positive*) to 2 (*negative*). **Higher scores indicated more negative perceived impact.**
- ***Current mental health:***
  - *General Health Questionnaire* (GHQ-12; Goldberg, 1972; Italian version Piccinelli et al. 1993): measures subclinical symptoms of depression and anxiety in the past two weeks (Mc Donald's ω of .84). Response scale from 0 to 3. **Higher scores indicated more psychological distress.**
  - *Resiliency Scale* (RS-14; Wagnild & Young, 1993; Italian version Callegari et al., 2016), measures the resilience perceived in front of difficulties (Mc Donald's ω = .90). Response scale from 1 to 7. **Higher scores indicated more resilience.**
  - *Social Anxiety Scale* (SAS-A; La Greca & Lopez 1998; Italian version Bianchi et al., 2020), measures social anxiety on three dimensions: Fear of negative evaluations (8 items); Social avoidance in new situations (6 items); General social avoidance (4 items). McDonald's ω ranging from .83 to .94. Response scale from 1 to 5. **Higher scores indicated more social anxiety.**

Data Analyses

- Data analyses conducted with SPSS version 29 and MPLUS version 8.2
- Descriptive statistics and bivariate correlations are available on request (email contact above)
- Percentage frequencies of answers on DL variables are provided for descriptive purposes
- *A multiple mediation model* was tested including:
  - Two independent predictors: Number of DL days (X_1) and Perceived impact of DL (X_2);
  - Three social anxiety dimensions as main outcomes (latent variables): Fear of negative evaluations (Y_1), Social avoidance in new situations (Y_2), and General social avoidance (Y_3)
  - Two mediators: psychological distress (M_1) and resilience (M_2)
  - Control variable: the effect of DL usability was controlled on the three social anxiety dimensions
- *Multigroup comparison* was applied on the model to ascertain gender differences in direct and indirect effects
- *Alternative indirect effects* were tested to further confirm the directions of the hypothesized relationships

For study references, please scan this QR code:

RESULTS

PERCENTAGE FREQUENCIES

Number of DL days in the past year:

- *"less than one month or never"*: 22.1%
- *"one to two months":* 16.8%
- *"two to four months"*: **24.6%**
- *"four to six months"*: **25.4%**
- *"more than six months"*: 11.1%

Most adolescents have spent ***from two to six months*** attending school lessons online due to COVID-19

PERCEIVED IMPACT OF DISTANCE LEARNING ON SCHOOL EXPERIENCE

	Percentage frequencies for answer options		
	(0)	(1)	(2)
1. Relationship with classmates	Improved 25.7%	**Unchanged 46.8%**	Worsened 27.5%
2. Relationship with teachers	Improved 10.7%	**Unchanged 67.9%**	Worsened 21.4%
3. Attention during the lesson	Improved 2.0%	Unchanged 19.6%	**Worsened 78.2%**
4. Feeling tired at the end of the lesson	Less tired 18.6%	As usual 11.4%	**More tired 70.0%**
5. Feeling involved during the lesson	More involved 2.1%	As usual 13.6%	**Less involved 84.3%**
6. Feeling embarrassed when I had to intervene during a lesson	Less embarrassed 17.9%	As usual 38.6%	**More embarrassed 43.6%**
7. Feeling calm when I study	**More calm 41.4%**	As usual 21.4%	Less calm 37.1%
8. Homework anxiety	**Improved 67.5%**	Unchanged 14.6%	Worsened 17.9%
9. Feeling to have learned	More 4.3%	As usual 27.9%	**Less 67.9%**
10. My study method	Improved 12.9%	Unchanged 37.9%	**Worsened 49.3%**
11. Compared to in-person lessons, my overall experience with distance learning	Better 11.1%	Unvaried 22.9%	**Worse 66.1%**

Highest percentages of ***negative perceived impact*** reported for **attention**, **fatigue**, **involvement** during lessons, and **shame** at intervention

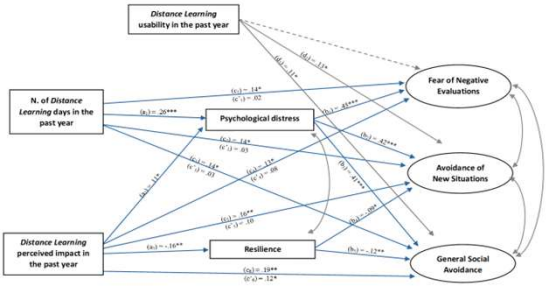
Most adolescents **learned less** during DL lessons and reported an **overall negative experience** with DL

Highest percentages of a ***positive perceived impact*** reported only for **homework anxiety**, which improved

Relationships with classmates and teachers were mostly unvaried

MULTIPLE MEDIATION MODEL

The hypothesized Model obtained a good fit to the data: $\chi^2(203) = 397.342$, $p < .001$, RMSEA = .058, CFI = .945, TLI = .932, SRMR = .048



Notes: Standardized regression coefficients reported. * $p < .05$; ** $p < .01$; *** $p < .001$. (c) = total effect; (c') = direct effects.

INDIRECT SIGNIFICANT EFFECTS IN THE MODEL:

The ***Fear of negative evaluations*** when returning to school was positively and significantly predicted by:

- the **Number of DL days** in the past year, ***via*** (1) ***the increase in psychological distress***, *beta* (a_1b_1) = .121, *SE* = .028, *95% CI* [.075, .168];
- the **Perceived negative impact of DL**, ***via*** (2) ***the increase in psychological distress***, *beta* (a_2b_1) = .051, *SE* = .026, *95% CI* [.008, .094].

The ***Avoidance of new situations*** was positively and significantly predicted by:

- the **Number of DL days** in the past year, ***via*** (3) ***the increase in psychological distress***, *beta* (a_1b_2) = .112, *SE* = .029, *95% CI* [.065, .160];
- the **Perceived negative impact of DL**, ***via both*** (4) ***the increase in psychological distress***, *beta* (a_2b_2) = .047, *SE* = .025, *95% CI* [.006, .089]; ***and*** (5) ***the reduction of resilience***, *beta* (a_3b_4) = .015, *SE* = .009, *95% CI* [.001, .029].

The ***General Social Avoidance*** was positively and significantly predicted by:

- the **Number of DL days** in the past year, ***via*** (6) ***the increase in psychological distress***, *beta* (a_1b_3) = .109, *SE* = .027, *95% CI* [.064, .153];
- the **Perceived negative impact of DL**, ***via both*** (7) ***the increase in psychological distress***, *beta* (a_2b_3) = .046, *SE* = .024, *95% CI* [.006, .086]; ***and*** (8) ***the reduction of resilience***, *beta* (a_3b_5) = .019, *SE* = .010, *95% CI* [.003, .035].

MULTIGROUP COMPARISON (gender as grouping variable):

- Comparison of the fully unconstrained (M_3) and the fully constrained (M_4) multigroup models, S-B $\Delta\chi^2_{M4\text{-}M3}(29)$ = 24.20, p = .72, suggested that all ***direct effects*** in the model were **not significantly different in girls and boys**;
- Also, the emerged ***indirect effects were not significantly different by gender***, Wald χ^2 difference tests, $p > .05$.

ALTERNATIVE MODEL: When the order of mediators and outcomes was inverted, $\chi^2(203) = 401.712$, $p < .001$; RMSEA = .059, CFI = .943, TLI = .930, SRMR = .048, the inverse indirect effects were nonsignificant (results available on request).

CONCLUSIONS

- A **predominantly negative impact** of DL was perceived, affecting **cognitive and emotional processes** involved in learning (attention, fatigue, involvement, shame) and the **overall school experience was worse**
- **Social anxiety was higher** in students who have had **more practical difficulties in DL** (poor usability; **H2** confirmed)
- A **chain-effect** was proven, in which the **more days spent in DL** due to COVID-19 pandemic and the **more negative perceived impact of DL** on school experience have **increased adolescents' psychological distress and reduced their resilience in the long term,** with effects detectable months later. In turn, ***high psychological distress*** and ***poor resilience*** **increased social anxiety** when adolescents returned to school in person (**H1** and **H3** confirmed)
- Despite the acknowledged advantages of DL during pandemic, our findings reveal the presence of **risk factors related to DL with long-lasting effects on adolescents' adjustment**
- These risk factors and their effects can be considered in ***programs of post-pandemic rehabilitation*** for vulnerable adolescents