

Students' experience and adherence to containment measures during COVID-19 in Switzerland

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Summary

Background Young adults are not considered a risk group, but the public health response to COVID-19 impacts all citizens. We investigated the impact on young adults' and their adherence to containment measures addressing potential gender differences. **Methods** In April 2020 12 341 students of the Zurich University of Applied Sciences were invited to a longitudinal health survey. Survey topics spanned socio-demographic data, students' health status and behavior, COVID-19 specific impact, concerns, information sources, adherence to containment measures, and trust in government bodies. Group comparisons by gender and multivariate ordinal regression models assessing adherence to restrictions of mobility and social contacts were conducted ($n = 2373$). **Results** Mean age was 26.4 (SD = 5.6), 70% were female. 43.5% reported some concern about their own health, 2.7% stated major worries. Women experienced more conflicts ($p < 0.000$) and, enjoyed time with the family more ($p < 0.000$). Men felt less locked up ($p = 0.001$). The most frequented COVID-19 information source was public media (48%) and confidence in government bodies was high (82%) for both genders. Men yielded lower adjusted odds (OR; 95%-CI) of adherence regarding the following measures: social distancing (0.68; 0.53–0.87), non-utilization of public transport (0.74; 0.56–0.97), 5-person limit for social gatherings (0.47; 0.35–0.64) and the stay at home rule (0.64; 0.51–0.82). **Conclusion** Early in the pandemic a high degree of adherence was observed in this young academic population. Containment measures restricting movement and social contact yielded considerable differences by gender, information source and perceived susceptibility to the virus. More targeted communication may increase adherence regarding mobility restrictions.

Key words: adherence, gender, COVID-19, students

BACKGROUND

On 11 March 2020, the World Health Organization (WHO) declared the coronavirus disease (COVID-19) outbreak a world-wide pandemic (WHO, 2020). As countries quickly developed responses to curb local outbreaks, one of many challenges was the communication of risks and public health measures to gain public cooperation (Ratzan *et al.*, 2020). First data from Europe indicate a generally high acceptance of the public health measures implemented in the respective countries. However, while most people approved fines for 14-day quarantine violations, ban of public gatherings and border closures, curfews and suspension of travel were less accepted, and the under-25 year-olds were significantly opposed to stay-at-home orders (Sabat *et al.*, 2020). An Israeli study points to differing associations between risk perceptions, evaluation of crisis management and compliance by age (Gesser-Edelsburg *et al.*, 2020). Furthermore, perception of norms and social pressure, as well as personal susceptibility and consequences are major predictors of compliance (Eastwood *et al.*, 2009; Emanuel *et al.*, 2012). A key factor in reaching the public is their utilization of information sources. Sabat *et al.* observed that during the current pandemic 86% of European respondents mentioned receiving updates from TV and 50% additionally searched for information online. As younger generations are more likely to seek health information on the internet in general, they may especially resort to this medium now, thus using a medium known to transport excessive non-validated information (Ratzan *et al.*, 2020). Apart from age, gender is a relevant determinant of social health and health behavior. However, gender is often neglected when developing health promotion and prevention strategies (Östlin *et al.*, 2006) based on the assumption that communication will be just as effective for men as for women. Experience from previous epidemics, however, indicates that women are more likely than men to be compliant, as are older people compared to younger generations (Brown *et al.*, 2010).

For successful health promotion and disease prevention strategies and communication, local knowledge of socio-demographic factors and factors of compliance seem of utmost importance (Betsch *et al.*, 2020).

In the initial phase of the pandemic, younger age cohorts (< 29 years) were not considered a high-risk group for COVID-19 infections (CDC, 2020). However, public health measures implemented in Switzerland and other countries in response to COVID-19 had an enormous impact on all citizens. In Switzerland, young people were publicly criticized for non-compliance (20 min,

2020). Containment measures impacting mobility and social contacts may indeed have been more difficult to follow for this age group, for whom high mobility, an active social life and various contacts are typical, especially as risk perception was low. Early on in the epidemic, shortly after universities implemented online-teaching, we developed a longitudinal study at Zurich University of Applied Sciences (ZHAW). The main aim of the HHealth Study during the Corona pandemic (HES - C) is to (1) investigate the impact of COVID-19 on the students' lives, (2) explore the impact on students' health and health behavior, and (3) to study students' perception of the pandemic and the corresponding measures. This paper presents the impact that containment measures had on student's lives, focusing on their adherence to various containment measures by gender and investigating potential influencing factors, such as concern for one's own health, confidence in the measures, social trust and information behavior.

METHODS

Procedure

We employed a prospective open cohort study design with four survey time points between April and September 2020. The first survey (T0) took place from 3 to 14 April 2020 and covered seven working days. The present study uses cross-sectional data from the first survey (T0). Students from all faculties of the ZHAW ($N = 12\,431$) received a non-personalized email with information about the study and an online-link inviting them to fill in the online-survey. Participants had to actively provide their consent to participate in the study before filling in the online questionnaire. Anonymity was guaranteed at all times. The study is in accordance with the Declaration of Helsinki and was approved by both the local cantonal ethics committee (BASEC-Nr. Req-2020-00326) and the ZHAW data protection officer.

Study population and data

The net participation rate was 20% ($n = 2429$). For the present study, a sample of 2373 students with valid information was included, 'other' gender ($n = 10$) were excluded for analysis of gender differences.

Questionnaire outcomes and measures

The survey questions covered both COVID-19 and health-related topics (www.zhaw.ch/gesundheit/studierendengesundheit). In this paper we analyze the following items:

Adherence to the COVID-19 public health containment measures and hygiene recommendations was assessed with the following question 'Do you follow the recommendation on ...?' with students responding with either 'never', 'rarely', 'often' or 'always', or 'not relevant'. The following nine adherence indicators were assessed: (1) Washing your hands regularly and thoroughly; (2) Avoiding shaking hands; (3) Maintaining distance to other persons; (4) Sneezing and coughing into a tissue or the crook of your arm; (5) Avoiding unnecessary journeys by public transport; (6) Avoiding gatherings of more than five people; (7) Staying at home with fever and a cough; (8) Only going to the doctor's office or emergency stationward after making an appointment by telephone; (9) Not leaving the house if possible. In this manuscript we focus on measures restricting social activities and mobility, (3), (5), (6), and (7), because these measures affect young people the most. Responses were coded as (1) never/rarely, (2) often or (3) always.

The impact of COVID-19 pandemic and the public health measures on students' and their social life was measured with statements, shown in Figure 1 (Sotomo, 2020).

Concern about their own health or about the health status of their family (parents, siblings, grand-parents, own child/child of partner, other relative) was collected. The answer categories were 'no concerns', 'some concerns' or 'great concerns', and 'not relevant' (for family members) (Sotomo, 2020).

COVID-19 information behavior was assessed with a list of information sources, with students indicating the first, second, and third most frequently used source: 'Public health institutions, Homepage of the Federal Office of Public Health, Cantons, WHO', 'Internet (non-specific)', 'Public media (live ticker, daily news, radio)', 'Scientific articles/internet pages', 'Social media (Facebook, YouTube, Twitter, etc.)', 'Friends/Family', 'Others, namely: Free text'.

Students' confidence in the Federal Council, Federal Office of Public Health and the university in terms of their competence, openness of communication and trust in the measures implemented was assessed with the following answer categories (1) 'no confidence at all', (2) 'little confidence', (3) 'high confidence', (4) 'very high confidence' or (5) 'don't know' (Scheibler et al., 2011).

Social trust was measured with the Social Trust Scale (SST; Breyer, 2015). The statement 'Do you usually assume that most people can be trusted, or do you rather think that you cannot be careful enough?' was rated on an 11-point Likert scale, with lower scores indicating a less social confidence.

Socio-demographic variables collected were gender, age, nationality, university faculty affiliation, pursued degree (BSc, MSc.), part-time vs. full-time degree and perceived parental social status at student age 16 (MacArthur scale; Hoebel et al., 2015).

Statistical analyses

Descriptive statistics include means and standard deviations for continuous variables and percentages for categorical variables. Bivariate gender differences were assessed using Chi²-tests and Bonferroni corrected p-values were calculated where appropriate. For multivariate analyses, we focused on four of the nine containment and public health measures: 3) social distancing, 5) avoiding public transport, 6) avoiding gatherings 7) staying home, and used ordered logistic regressions models, i.e. cumulative odds models, with robust standard errors to estimate adjusted models for all four containment measures. The main investigated predictors were gender and age (emerging adulthood (18–24 years) vs. older students), adjusted for nationality, parental social status, and university faculty affiliation. In addition, factors that might influence adherence, namely concerns for one's own health, the primary source of information regarding COVID-19, trust in the Swiss Federal Council's measures to contain the COVID-19 epidemic, and trust in other people, were included into the model. We report Odds Ratios (OR) with corresponding 95% confidence intervals (95% CI) and P-values from the full model. Sensitivity analyses yielded no significant interactions between gender and age in any of the models. Consequently, only main effects for these parameters are reported. We calculated adjusted predictive margins and average marginal effects with 95% CI for gender. Statistical significance level alpha was set at $P < 0.05$. We used Stata Version 15.1 (StataCorp, College Station, TX, USA) for all statistical analyses.

RESULTS

Descriptive statistics of the study sample are shown in Supplementary Table 1. Students from all fields of studies participated. Women (70%) and students from the School of Health Professions (25%) were overrepresented. The mean age of the total sample was 26.4 years (SD = 5.6), 47% were defined as 'emerging adults' (18–24-years-old).

With respect to the impact of the containment measures on the students' lives, the vast majority (76%) reported that their timetable and their daily routine had changed considerably, while the workload had increased

for 48% of the students. Many appreciated the freedom that increased self-study brings (57%), but most students missed social contact with their fellow students (81%). Just over a third worried about their semester completion (39%), and felt that they were not well informed about the consequences regarding semester exams and the continuation of their studies (32%) (Figure 1). With respect to their every-day life, around 10% of students experienced little or no negative effects (Figure 1). A good third reported ‘experiencing more tension and conflict’ (33%) and ‘feeling lonely’ (31%). In total, 42% stated that they felt locked up. On the positive side, over half of the students said they enjoyed their increased time with their family and/or partner (65.8%).

Gender differences were found regarding the impact of all four containment measures. Significantly more women agreed that the timetable had changed considerably ($p = 0.003$), men felt less well informed about university decisions ($p = 0.000$). Women experienced more tension and conflict ($p = 0.000$), but also reported

enjoying time with their family more ($p = 0.000$) compared to men. While men were more frequently bored ($p = 0.001$), they felt less locked up. Men stated more often that they felt no specific impact ($p = 0.000$) compared to women.

Generally, adherence to containment measures and hygiene recommendations was high, with at least 95% of the students reporting following most of these measures often or always (Table 1). A little lower, but still high (81.5%) was the adherence to the containment measure ‘Not leaving the house if possible’. Approximately 18.5% reported not to follow this specific measure, the most frequently stated reasons for this were ‘shopping’, ‘going for walks’ and ‘sports’. Bivariate analyses for each containment measure and hygiene recommendation showed significant associations between gender and non-adherence for seven out of nine measures (see Table 1). Adjusted predictive margins of adherence to containment measures and marginal effects, showing the absolute probabilities and differences regarding adherence by gender, are presented in the last

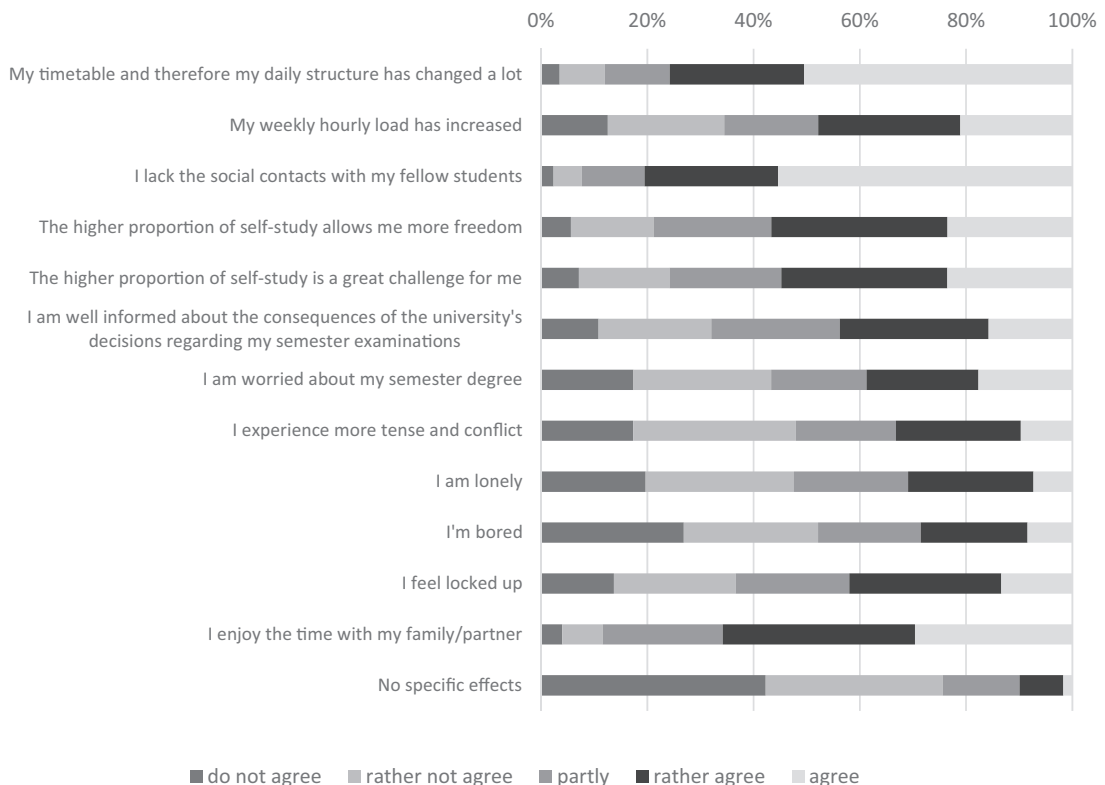


Fig. 1: Impact of COVID-19 on study and social life.

Table 1: Adherence with containment measures and hygiene recommendations in the context of COVID-19

	Total Never/rarely	Female % Never/rarely	Male % Never/rarely	Pearson Chi2 ^a
Wash your hands regularly and thoroughly	3.3	2.2	6.2	20.58, $p < 0.001$
Avoid shaking hands	1.4	0.5	3.7	30.52, $p < 0.001$
Maintain distance to other persons	4.7	3.5	7.8	16.74, $p < 0.001$
Sneezing and coughing into a tissue or the crook of your arm	2.5	1.4	5.3	25.49, $p < 0.001$
Avoiding unnecessary journeys by public transport	2.8	2.4	4.1	4.47, $p = 0.035$
Avoid accumulations of more than five people	1.4	0.8	2.8	11.51, $p = 0.001$
Stay at home with fever and cough ^b	2.5	2.3	3.1	0.58, $p = 0.445$
Only go to the doctor's office or emergency ward after making an appointment by telephone ^b	2.3	2.2	2.8	0.31, $p = 0.581$
Do not leave the house if possible	18.5	16.1	24.6	19.28, $p < 0.001$

^adf (1).

^bSmaller sample size due to many 'not relevant' answers, which were excluded for bivariate analysis.

section. Overall, women showed lower non-adherence compared to male students.

More than half of the students reported being worried about their own health (43.5%), among them 2.7% reported major worries, 56.5% had no worries. While not relevant to all students, most reported to be worried about grandparents and parents (Supplementary Figure 1). There was a significant difference between gender and health concerns for grandparents ($p = 0.000$), parents ($p = 0.004$), siblings ($p = 0.000$) and other family members ($p = 0.000$), but not for partners and students' own health. Overall, women were more often worried and men voiced major concerns less often.

Students' first and second choice of information source in relation to COVID-19 were public media, 47.9% and 29.4%, respectively, and public health institutions, 34.5% and 26.7%. Participants who chose a third information source, reported friends/family (28.1%) and the internet (21.4%) as their most frequent source of information, followed by scientific journals (13.1%) and social media (13.9%). We observed significant differences by gender for all three sources (1st ($p < 0.001$), 2nd ($p < 0.05$) and 3rd ($p < 0.05$)). As their primary source of information, women were more likely to choose public health institution compared to men (37% vs. 29.5%), while men were more likely to choose the internet (13.1% vs. 6.7%) or scientific articles (4.2% vs. 1.3%) (Supplementary Table 2). Trust in the Federal Council, the Federal Office of Public Health and their university was generally high on all three dimensions: confidence in the competence to cope with the COVID-19 epidemic (72.9–92.5%), openness of communication regarding the COVID-19 epidemic (78.1–84%) and confidence in measures taken (79.6–82%). Trust was highest for the Federal Council and lowest for the

university (Supplementary Figure 2). Bivariate analysis for confidence in institutions by gender revealed women had more confidence in the university, for all three aspects (competence [$p = 0.015$], communication [$p = 0.000$], actions [$p = 0.000$]).

Multivariate analyses

Gender was associated with all four containment measures. Male students had lower odds compared to females regarding maintaining distance to other persons (OR=0.7; $p = 0.003$), avoiding unnecessary journeys by public transport (OR=0.7; $p = 0.030$), avoiding gatherings of more than five people (OR=0.5; $p = 0.000$) and not leaving the house (OR=0.6; $p = 0.000$) (Table 2). Age was associated with one containment measure. Students in the age group emerging adulthood (18-24 years) had lower odds of maintaining distance compared to older students (OR=0.7; $p = 0.002$). Moreover, the association of age and staying at home was borderline significant (OR=1.2; $p = 0.084$).

Concern, information resources, trust and confidence in measures implemented by the Federal Council and social trust proved to be independent factors associated with one or more of the containment measures. Participants who used public media or public health institutions as information sources had higher odds regarding maintaining distance (OR=1.5; $p = 0.003$) and higher odds regarding avoiding unnecessary journeys by public transport (OR=1.6; $p = 0.001$), but no association with the other two containment measures was found. Concerns about their own health were significantly associated with three containment measures. Students with little or major concerns about their own

Table 2: Adherence to containment measures and its correlates: Ordered logistic regression model

Variable	Maintain distance		Use public transport		5 persons rule		Stay at home	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<i>Gender (ref=female)</i>								
Male	0.68**	0.53–0.87	0.74*	0.56–0.97	0.47***	0.35–0.64	0.64***	0.51–0.82
<i>e_adulthood (ref=students >24years)</i>								
Emerging adulthood	0.73**	0.60–0.89	0.92	0.73–1.16	0.81	0.62–1.05	1.18	0.98–1.42
<i>Nationality (ref=Swiss)</i>								
Swiss dual nationality	0.96	0.75–1.23	1.18	0.88–1.59	0.85	0.61–1.19	0.99	0.79–1.25
Foreign nationality	1.64**	1.17–2.29	1.19	0.76–1.85	1.01	0.62–1.63	1.08	0.77–1.54
<i>sh_status</i>								
	0.99	0.93–1.05	1.02	0.96–1.09	1.06	0.98–1.15	0.99	0.93–1.04
<i>Faculty (ref=health professions)</i>								
AL	1.32	0.92–1.90	0.83	0.55–1.25	1.35	0.80–2.27	1.94***	1.36–2.76
AP	1.37	0.95–1.95	1.19	0.74–1.91	2.61**	1.33–5.14	1.06	0.74–1.51
ADC	1.59	0.84–3.00	1.27	0.60–2.67	2.40	0.90–6.38	1.26	0.69–2.28
LS	1.30	0.94–1.80	0.83	0.57–1.20	1.53	0.97–2.42	1.52*	1.11–2.08
E	1.61*	1.12–2.33	1.32	0.87–2.01	1.70*	1.08–2.69	1.93***	1.38–2.70
ML	1.04	0.78–1.39	0.96	0.68–1.34	1.29	0.89–1.88	1.27	0.97–1.66
SW	1.20	0.85–1.71	1.14	0.74–1.78	1.16	0.71–1.87	1.64**	1.19–2.25
<i>primary source of information (ref=all other sources)</i>								
<i>health/public services concerns about own health (ref=no concerns)</i>								
a little concerns	1.36**	1.13–1.65	1.45**	1.15–1.82	1.30	1.00–1.69	1.69***	1.41–2.03
big concerns	2.88***	1.59–5.23	3.77*	1.32–10.81	1.87	0.71–4.95	4.67***	2.58–8.45
<i>Trust in measures (ref=trust much)</i>								
no trust at all	0.49	0.14–1.66	0.54	0.20–1.47	0.28*	0.10–0.77	0.53	0.21–1.34
littl trust	0.93	0.68–1.27	0.95	0.66–1.36	0.77	0.52–1.13	0.89	0.67–1.18
very much trust	1.54***	1.25–1.88	1.25	0.98–1.60	1.19	0.89–1.59	1.21	1.00–1.46
I don't know	0.89	0.53–1.49	0.86	0.50–1.47	1.14	0.55–2.37	0.67	0.36–1.23
Social trust ^a	0.96	0.92–1.01	0.92**	0.87–0.97	0.95	0.89–1.01	0.97	0.93–1.02
Cutpoint 1	-2.83	-3.43–(-2.22)	-3.49	-4.20–(-2.77)	-4.08	-4.87–(-3.29)	-1.25	-1.77–(-0.72)
Cutpoint 2	0.86	0.29–1.44	-1.1	-1.74–(-0.45)	-1.43	-2.11–(-0.74)	1.20	0.67–1.72

*** $p < 0.001$.** $p < 0.01$.* $p < 0.05$.

Note. AL=Applied Linguistics, AP=Applied Psychology, ADC=Architecture, Design and Civil Engineering, HP=School of Health Professions, LS=Life Sciences and Facility Management, E=School of Engineering, ML=School of Management and Law, SW=Social Work.

^aSocial Trust Scale (SST; Breyer, 2015).

health, compared to those with no concerns, had higher odds to maintain distance (few: OR = 1.4; $p = 0.001$, major: OR = 2.9; $p < 0.000$), to avoid unnecessary journeys by public transport (few: OR = 1.5; $p = 0.001$, major: OR = 3.8; $p = 0.013$), and to not leave the house (few: OR = 1.7; $p < 0.000$, major: OR = 4.7; $p < 0.000$). Confidence in measures by the Federal Council was positively associated with all four containment measures. Students with very high confidence in

measures had significantly higher odds of maintaining distance to other persons compared to students with high confidence (OR = 1.5, $p < 0.000$). Weak evidence with $P < 0.1$ (Bland, 2015) was found for avoiding unnecessary journeys by public transport (OR = 1.3; $p = 0.073$) and not leaving the house if possible (OR = 1.2; $p = 0.052$) in students with very high confidence compared to high confidence. Students with no confidence in measures had significantly lower odds of avoiding

gatherings of more than 5 persons compared to students with high confidence in measures (OR = 0.3; $p = 0.014$). Lastly, social trust was positively associated with avoidance of unnecessary journeys by public transport (OR = 0.9; $p = 0.004$).

Additionally, we calculated adjusted predictive margins of adherence to containment measures by gender, as well as average marginal effects. The adjusted probabilities of *never/rarely*, corresponding to non-adherence to the four containment measures, were consistently higher for men than for women (see [Supplementary Figure 3](#)). Differences in the adjusted absolute probabilities of adhering to measures between genders are presented in [Figure 2](#). The reference category being women. An example of interpretation by means of 'maintaining distance': the adjusted predicted probability of *never/rarely* complying with maintaining distance is 0.042 (95%-CI: 0.033–0.051) for women and 0.061 (95%-CI: 0.044–0.077) for men ([Supplementary Figure 3A](#)). The absolute difference of the probability between gender is 0.018 (95% CI: 0.005–0.032, $p = 0.009$) [Figure 2A](#). Absolute differences in *never/rarely*, *often* and *always* complying differed significantly, but were small. The largest absolute difference between genders is consistently found in the category 'always' (approx. 10%; i.e.

delta $p = 0.1$). Thus, the probability that men always comply is lower compared to women.

DISCUSSION

Overall, adherence to containment measures and hygiene recommendations was very high among Swiss university students. Avoiding leaving the house and social distancing were the two containment measures with the highest non-compliance of 18% and 5%, respectively. Containment measures restricting movement and social contact yielded differences by gender and perceived susceptibility. Further, gender differences were present in the COVID-19 information behavior. Confidence in institutions to cope with the pandemic was high irrespective of gender. Adjusted odds of adherence in men were 30–50% lower than in women, and students who were highly concerned about their own health showed a 30–70% higher odds of adherence to one or the other containment measure. On a population prevalence level, the odds correlate with an absolute difference of roughly 2% in non-compliance by gender.

Daily routines and lives abruptly changed for all students with the closing of universities and the national implementation of containment measures. However, the

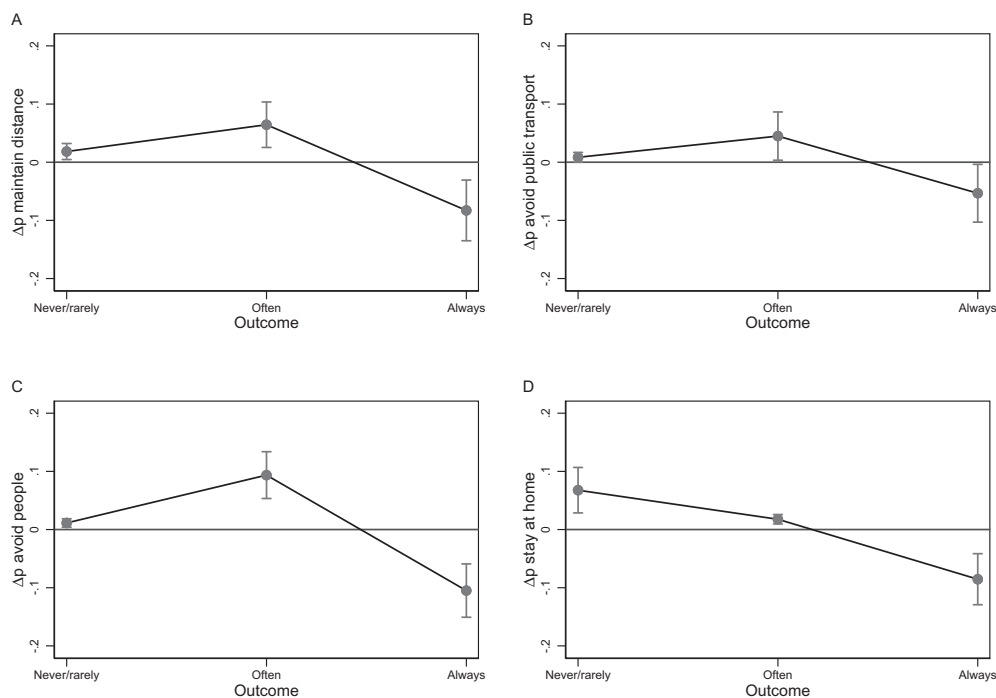


Fig. 2: Differences in adjusted absolute probabilities of adherence between genders.

Note: The reference category are women.

lockdown was perceived very differently. While more than half of the students appreciated the freedom of self-study, just as many struggled with it. The majority of students missed having social contact with other students. In-person social contact could obviously not be replaced by online contact, and in line with this hypothesis, one third of our sample reported that they felt lonely and 42% felt locked up. In a comparable age group (18–29 year olds) in Italy, only 9% reported feeling lonely and 15% reported lack of freedom during the lock-down (Barari *et al.*, 2020). As containment measures in Italy were even more restrictive, this is rather surprising. Maybe fewer Italians felt lonely because a majority spent the social distancing period with their family, according to Mazza *et al.* (2020) 75% lived at home and only 9% spent the time alone.

While only few students perceived themselves to be at risk, many voiced major concerns for family members, especially for grandparents and parents, in accordance with media reportings and scientific literature at the time. However, students had very concrete concerns related to the COVID-lockdown. A little over a third were worried about their semester completion, and just as many felt insufficiently informed about the consequences of the university's decisions for their semester exams. This lack of confidence could also be seen in their confidence rating of the universities.

The primary sources of information in our sample were public media and official public health institutions. The internet ranked third. Considering data on general and health specific information behavior of younger and higher educated persons (Cotten and Gupta, 2004; Bonfadelli and Signer, 2008), this was an unexpected result. A major reason for the use of digital information resources is the accessibility and availability of information outweighing the lack of trust in internet sources (Cotten and Gupta, 2004; Jaks *et al.*, 2019). In the case of COVID-19, however, there was abundant information in all types of media and accessibility was not an issue. Furthermore, literature on risk and catastrophe communication indicates that in critical situations people resort to public media. Bonfadelli and Signer (2008) point out that traditional media may have continued to be the most used information resource in the initial phase of a public crisis, followed by communication with family and friends, for the emotional processing of the event. Overall, the internet increasingly comes into play (Bonfadelli and Signer, 2008). The use of public media and public institutions as primary information sources was significantly associated with adherence to social distancing and avoidance of public transport, regardless of the confidence in the measures, indicating

that these information sources are considered trustful. Social media use as the primary source of information for COVID-19 has been found to be associated with conspiracy beliefs and with lower adherence to health protective behavior (Allington *et al.*, 2020).

Confidence in the Federal Council, the Federal Office of Public Health and the university to cope, openly communicate, and confidence in the measures taken was very high, although confidence was lowest for the university. Switzerland's pandemic response was, in fact, decided and communicated by the Federal Council, with thematic support by the Federal Office of Public Health, whereas the universities only re-communicated aspects relevant to the university. Understandably, the universities were cautious in their communication concerning the academic year, possibly underestimating the need for information of many students. Even during non-pandemic times, abrupt changes to university life lead to high insecurities (Zhai and Du, 2020). Not all countries report equally high confidence in government bodies (Sabat *et al.*, 2020). For example, Italians were more skeptical (Barari *et al.*, 2020), only about half had confidence in the openness of communication (58%) or had confidence in the competence of the government to cope with the COVID-19 pandemic (51%). Certainly, the German-speaking part of Switzerland was at no time equally affected (ECDC, 2020; FOPH, 2020), nor is Italy known for high trust in their government with 26% of young Italians rusting the government, compared to, 88% of young Swiss people (15–29 years) (OECD, 2019). A comparison across different EU countries with respect to measures and trust in government support during the pandemic indicates a general north-south gradient, with higher trust in the north and higher acceptance of measures in the more affected south (Sabat *et al.*, 2020).

Adherence to containment measures was very high in our student sample. That is rather surprising since the media frequently depicted young people not complying with containment measures (20 min, 2020) and since the age-group is more risk-prone (Schwartz and Petrova, 2019) and less easily reached by health promoting messages in general. In line with other studies (Rubin *et al.*, 2009; Prati *et al.*, 2011; Allington *et al.*, 2020; Barari *et al.*, 2020; Brouard *et al.*, 2020; Mazza *et al.*, 2020), we found that female gender was positively associated with higher adherence to all containment measures. Male gender had a significantly higher probability to never or rarely follow the containment measures investigated in this study. Compared with the relative effect of gender, expressed by the OR, the absolute differences of the probability between genders were rather small, but

nevertheless noteworthy. Although gender has been repeatedly found to be associated with adherence, explanations of this effect are rarely given (Allington *et al.*, 2020; Barari *et al.*, 2020; Brouard *et al.*, 2020). A possible explanation for gender differences with respect to adherence was thought to be higher concern voiced by women. However, adjusting the model for concern and further covariates still yielded a significant gender effect. Another potential explanation is the generally higher compliance to health promoting and prevention behavior repeatedly observed in women compared to men (Turrell, 1997; Emanuel *et al.*, 2012). Olcaysoy Okten *et al.* (2020) argue that higher female adherence can be related to higher attention to one's own and other people's health-related needs as well as greater empathic response to others' pain in women compared to men. How best to reach men in health promotion is a constant narrative that may seem less a concern regarding this global health topic and overall high adherence. However, we see in our data that despite the medial presence of the topic and tremendous communication efforts by government bodies, the current communication does not reach genders equally. A more targeted communication directed to young men would probably increase adherence.

Among the investigated factors, the information source, confidence in federal council, and social trust, were all significantly associated with one containment measure or another. Concern was the most consistent across the various measures, with higher concern associated with higher odds of a higher adherence. Interestingly, concern for others showed no association, possibly due to the fact, that the measures we investigated were not perceived to directly put grandparents or parents at risk, especially if students and relatives didn't share a household.

In this unprecedented situation, data indicates that trust in government bodies is not a prerequisite for adherence to containment measures (Barari *et al.*, 2020; Sabat *et al.*, 2020). However, high adherence is most consistently associated with high trust (Rubin *et al.*, 2009; Prati *et al.*, 2011). Prati *et al.* (2011) conclude that it is important to build trust and commitment in advance of a pandemic outbreak. In our young, academic population, the low variability of trust limits the assessment of its relevance for adherence. Therefore, it is noteworthy that a lack of confidence in COVID-19 measures was associated with low adherence to the measure restricting group gatherings to no more than five people, while social distancing was associated with high confidence in measures. Social trust was negatively associated with avoiding public transport but with no other

measures. Apparently, the non-socio-demographic predictors are associated very specifically with certain measures, whereas socio-demographic traits show a more general pattern of associations.

Other socio-demographic factors included in the model were rarely associated with outcomes. Regarding age, younger students had significantly lower odds to maintain distance, but other containment measures showed no difference across the two defined age groups. Nationality and social status yielded little or no association with adherence. Some differences could be observed across the various students' affiliations, mostly related to the 'stay at home' measure. Interestingly, compared to the reference group of students of the School of Health Professions (HP) other students had higher odds of adherence.

Our study results are not generalizable to Swiss young adults from other language regions. The Italian-speaking region of Switzerland for example had far more COVID-19 cases than the German-speaking region, and the geographic closeness to Italy may have also impacted health behavior. It is also possible that young working adults or adults in other educational settings perceived the pandemic and adhered to measures differently. On the other hand, a third of our sample are part-time students, and a university of applied sciences typically draws from a wider educational background compared to a classic university. Moreover, in a current study from France using a large community based sample, education was not associated with adherence (Brouard *et al.*, 2020). With respect to potential biases, we cannot exclude selection bias. Students taking the pandemic more seriously might have been more likely to participate in the current study. While the sample is representative with respect to age and gender compared to the overall student body, no additional data on non-participants is available. Furthermore, self-reported data on adherence could be biased by social desirability, even if data collection was completely anonymous. A clear strength of the study is the inclusion of a large number of students from different fields of study, coming from different geographical areas in the German-speaking region of Switzerland, as well as the early collection of data during the first wave and during the lock-down.

CONCLUSION

Our data provides early insight into students' experience of the pandemic, and the successful communication of the Swiss public health institutions with respect to containment and hygiene measure. The seriousness of the COVID-19 pandemic was obviously recognized, leading

to a very high level of adherence in containment and hygiene measures in both genders. Although gender differences in non-adherence were significant, they are small in absolute terms. In addition, although students reported little personal susceptibility, the subjective risk perception was associated with higher adherence, as did utilization of public media and public institutions as information sources. These insights may lead the way for future improvements of public health communication strategies to increase adherence to public health measures in young men and women.

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ETHICS INFORMATION

The study is in accordance with the Declaration of Helsinki and was approved by both the local cantonal ethics committee (BASEC-Nr. Req-2020-00326) and the ZHAW data protection officer.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Health Promotion International* online.

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