

Changes in Alcohol Consumption, Eating Behaviors, and Body Weight during Quarantine Measures: Analysis of the CoCo-Fakt Study

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Keywords

COVID-19 measures · Quarantine · Alcohol consumption · Eating behaviors · Body weight

Abstract

Introduction: Public health measures enacted to reduce COVID-19 transmission have affected individuals' lifestyles, mental health, and psychological well-being. To date, little is known how stay-at-home orders have influenced the eating behaviors, weight development, and alcohol consumption of quarantined persons. The CoCo-Fakt cohort study analyzed these parameters and their association with psychological distress and coping strategies. **Methods:** An online survey was conducted of all persons who tested positive for SARS-CoV-2 (infected persons [IP]) between December 12, 2020, and January 6, 2021, as well as their close contacts (contact persons [CP]) registered by the public health department of Cologne. 8,075 of 33,699 individuals were included in the analysis. In addition to demographic data, psychological distress, and coping strategies, information on changes in body weight, eating, and drinking behaviors was collected. **Results:** IP lost 1.2 ± 4.4 kg during the quarantine

period, and CP gained 1.6 ± 4.1 kg. The reasons given by IP for weight change were mainly loss of taste and feeling sick, whereas CP were more likely than IP to eat out of boredom. Higher psychological burden and lower coping strategies were associated with both weight gain and loss. Of the 30.8% of participants who changed their alcohol consumption during the quarantine period, CP in particular drank more alcohol (IP 15.2%; CP 47.7%). Significantly less alcohol was consumed by individuals with higher coping scores. **Conclusion:** In this short but psychologically stressful period of stay-at-home orders, changes in eating and drinking behavior as well as weight development are evident, mainly in high-risk contacts. To avoid possible long-term sequelae, health authorities should take these findings into account during the quarantine period; in particular, general practitioners should consider these findings during follow-up.

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Introduction

In response to the COVID-19 pandemic, various lockdown and public health measures have been and will continue to be used regionally until herd immunity is achieved. These measures are accompanied by significant restrictions on people's lives [1]. This affects all areas of professional life (e.g., working from home) and personal life (e.g., closure of cultural and sports recreational facilities and restaurants, contact restrictions in public and private spaces). Numerous studies have examined the pandemic's effects on psychosocial conditions [2] and lifestyle, especially weight development and eating and drinking behavior. Chew et al. [3] scoping review found that up to 50% of (mostly digital) respondents self-reported weight gain, and up to one-fifth reported weight loss. Subjects with a higher baseline BMI at the beginning of each study or interview had a higher risk of weight gain, which was mostly attributed to stress and emotional eating. Ammar et al. [4] surveyed 1,047 individuals worldwide on their eating, drinking, and exercise behaviors before the outbreak of the pandemic and while public health measures were in effect. Individuals mainly from Europe, Asia, Africa were included. Sitting time increased by about 3 h per day, and diets and meal patterns became less healthy (e.g., binge eating, snacking between meals, eating a greater number of main meals). Only binge drinking was significantly reduced. In a review, Zeigler et al. [5] examined the weight changes of individuals during COVID-19 self-quarantine. Among those who reported gaining weight, body weight increased between 0.5 and 1.8 kg (± 2.8 kg) after only 2 months of quarantine. Risk factors for weight gain during COVID-19 self-quarantine were identified as increased sedentary behavior, decreased physical activity, increased snacking (especially after dinner), increased alcohol consumption, decreased water intake, emotional eating, decreased sleep quality, and overweight/obesity.

Barr-Anderson et al. [6] also examined the impact of a general mandatory stay-at-home policy by the US state of Minnesota on the physical activity and dietary behavior of young adults compared to data from 2018. On average, physical activity levels decreased, and recreational screen time use increased. However, there was variation with almost a third of the sample reporting being more physically active and engaging in less recreational screen time during the COVID-19 mandatory stay-at-home order compared to pre-pandemic. Lacking neighborhood safety, a low socioeconomic

status (SES) background, and being part of an ethnic/racial minoritized group were the strongest predictors of decreasing physical activity and an increase in screen time during the pandemic. The extent to which these behaviors further promote increased rates of noncommunicable diseases, especially cardiometabolic diseases, and their associated mortality as well as psychiatric manifestations, even after the pandemic, cannot yet be determined. Drawing on analyses of previous disasters and pandemics, De Rubeis et al. [7] and Muehlschlegel et al. [8] have suggested that they may lead to behavioral changes, such as negative changes in physical activity, sleep, and diet, as well as increased alcohol consumption and intoxication as a consequence of stress exposure and lack of access to health services (among other factors), thus contributing to an increased incidence of noncommunicable diseases over the life course. So far, research focused on the consequences of voluntary self-quarantine or stay-at-home policies, not on infected persons (IP) or their close contact persons (CP), who were legally enforced into quarantine by local public health departments. Based on the German Infection Protection Act, identified IP or CP were obliged by means of an administrative order not to leave their households for a period of 10 to 14 days; the length of isolation varied depending on the respective data situation and findings regarding the infectious process. In this case, leaving the household was classified as a misdemeanor, unless one of the following special cases existed: evacuations by the city, mandatory medical visits, catastrophic events such as fire, death care of close relatives, birth care as a close confidant, or the performance of a SARS-CoV-2 test in the absence of symptoms.

This period of legally enforced quarantine is considered to be particularly stressful as studies from earlier pandemics like SARS, Ebola, or influenza pointed out [9]. So far, there is a lack of knowledge, how a legally enforced quarantine affected drinking and eating behavior of quarantined IP and CP. Therefore, we analyzed lifestyle-relevant parameters such as eating behavior, weight development, and alcohol consumption during mostly 10 up to 14 days of legally enforced quarantine within the framework of the CoCo-Fakt cohort study (Cologne-Corona-Beratung und Unterstützung Für Index-und Kontaktpersonen während der Quarantäne-Zeit; Cologne Corona counseling and support for index and contacts during the quarantine period – author's translation), in order to formulate recommendations to combat a possible COVID-19-aggravated obesity pandemic.

Methods

Study Design

Since the outbreak of the first COVID-19 infection in Cologne at the end of February 2020, IP have been reported to Cologne's public health department. These individuals were contacted; registered in the city's digital contact management system (DiKoMa [10]); questioned in a standardized manner about possible routes of infection, chronic diseases, risk factors, and so on; and instructed to quarantine. Contact tracing was also carried out to isolate CP. Additionally during this period, all persons were also registered in DiKoMa who had been quarantined as travel returners, due to a positive Corona-Warn-App or as complete school classes and kindergarten groups due to a positive case dependent on each current requirement of the German Infection Protection Act (date December 9, 2020, $n = 91,818$).

The CoCo-Fakt survey is a cohort study that focuses on IP and their close CP who had been quarantined since the beginning of the local SARS-CoV-2 outbreak up to December 2020. The questionnaire was developed and modified based on the COVID-19 Snapshot Monitoring (COSMO) study; the study design has been published elsewhere [11]. This survey was carried out using the online survey software Unipark and sent to registered persons in the DiKoMa system. Answering the survey took approximately 30 min [11].

Sampling and Study Population

All IP and CP registered in DiKoMa from February 2020 to December 9, 2020, meeting the inclusion criteria ($n = 36,498$) were extracted from the dataset [11]. People under 16 years of age, people with missing informed consent forms, noncompliant people, deceased patients, and those who were in medical or nursing facilities or quarantined for other reasons (e.g., travel returnees) were not integrated and excluded (see Fig. 1). Pregnant women received a modified online questionnaire. The details of the study design have already been published [12]. Between December 12, 2020, and January 6, 2021, the link to the online survey was emailed to 33,699 people, 13,057 of whom responded by clicking (response 38.7%). However, only people about whom information on dietary and drinking habits was available were integrated into this evaluation ($n = 8,075$ (response: 24.0%), Figure 1).

Survey Items

The following demographic data were assessed and included in this analysis: age, sex, presence or absence of chronic diseases (e.g., diabetes, cardiovascular diseases, orthopedic disorders), living situation (i.e., availability of balcony or garden), family structure (e.g., partnership, children), and household size. We calculated respondents' SES based on their categorization in the German Health Update 2009 (GEDA) as high, middle, or low [13]. Migration background was classified as German or not German based on language spoken at home.

Eating Behavior

Eating behavior was assessed and scored in points (P) using the following questions:

- Which meal would you consider your main meal? Response categories: breakfast, lunch, dinner, other.

- Did anything change regarding your meals during the quarantine period? Response categories: yes/no.
 - Eating healthier (yes: 3 P, partly: 2 P, no: 1 P).
 - Eating less healthily (yes: 1 P, partly: 2 P, no: 3 P).
 - Eating more snacks between meals (yes: 1 P, partly: 2 P, no: 3 P).
 - Engaging in more snacking (e.g., while watching TV, while working) (yes: 1 P, partly: 2 P, no: 3 P).
 - Other.
 - Sweet food (e.g., chocolate, gummy bears).
 - Salty food (e.g., chip, nuts).
 - Fresh vegetables.
 - Fresh fruit.
- Did anything change regarding the food you eat during the quarantine period? (Response categories: yes/no).
 - I eat more (yes: 1 P, no: 2 P).
 - I eat less (yes: 2 P, no: 1 P).
 - I eat more sweets (yes: 1 P, no: 2 P).
 - I eat fewer sweets (yes: 2 P, no: 1 P).
 - I eat more salty snacks (yes: 1 P, no: 2 P).
 - I eat fewer salty snacks (yes: 2 P, no: 1 P).
 - I eat more fruits (yes: 2 P, no: 1 P).
 - I eat less fruits (yes: 1 P, no: 2 P).
 - I eat more vegetables (yes: 2 P, no: 1 P).
 - I eat fewer vegetables (yes: 1 P, no: 2 P).
 - I eat more consciously (yes: 2 P, no: 1 P).
 - I eat less consciously (yes: 1 P, no: 2 P).
 - I eat healthier (yes: 2 P, no: 1 P).
 - I eat less healthily (yes: 1 P, no: 2 P).
 - Other.
- Did your body weight change during the quarantine period? Response categories: yes/no.
- If yes, how did your body weight change during the quarantine period? Answer in kg.

The healthy eating index was calculated by summing the positive and negative responses from the following three categories: change in meal time (4 items), change in frequency (4 items), and change in food (14 items). The score for change in meal time could take a value between 1 and 3; the score for change in frequency, a value between 1 and 5; and the score for change in food, a value between 1 and 2. These individual scores were then summed, Cronbach's alpha coefficient was 0.83, and the subscale reliabilities ranged from 0.808 to 0.835. Tertiles were formed (>0.75 corresponded to eating healthier; 0.65–0.75 to no change; and <0.65 to eating less healthily).

Physical Activity Behavior (Modified according to [14])

Based on the reported type of sport and intensity, average baseline metabolic units (MET) were derived using Ainsworth et al. [15] compendium. An average MET value for each sporting activity was then determined based on the frequency and duration data using the following formula for the indicated activities summed during the quarantine period: MET minutes per week = MET baseline value \times frequency per week \times duration per unit [16]. Sedentary activities were queried in minutes per week.

Alcohol Consumption

The alcohol use disorder identification test-consumption (AUDIT-C) [17], which consists of the following three questions, was used to assess alcohol consumption:

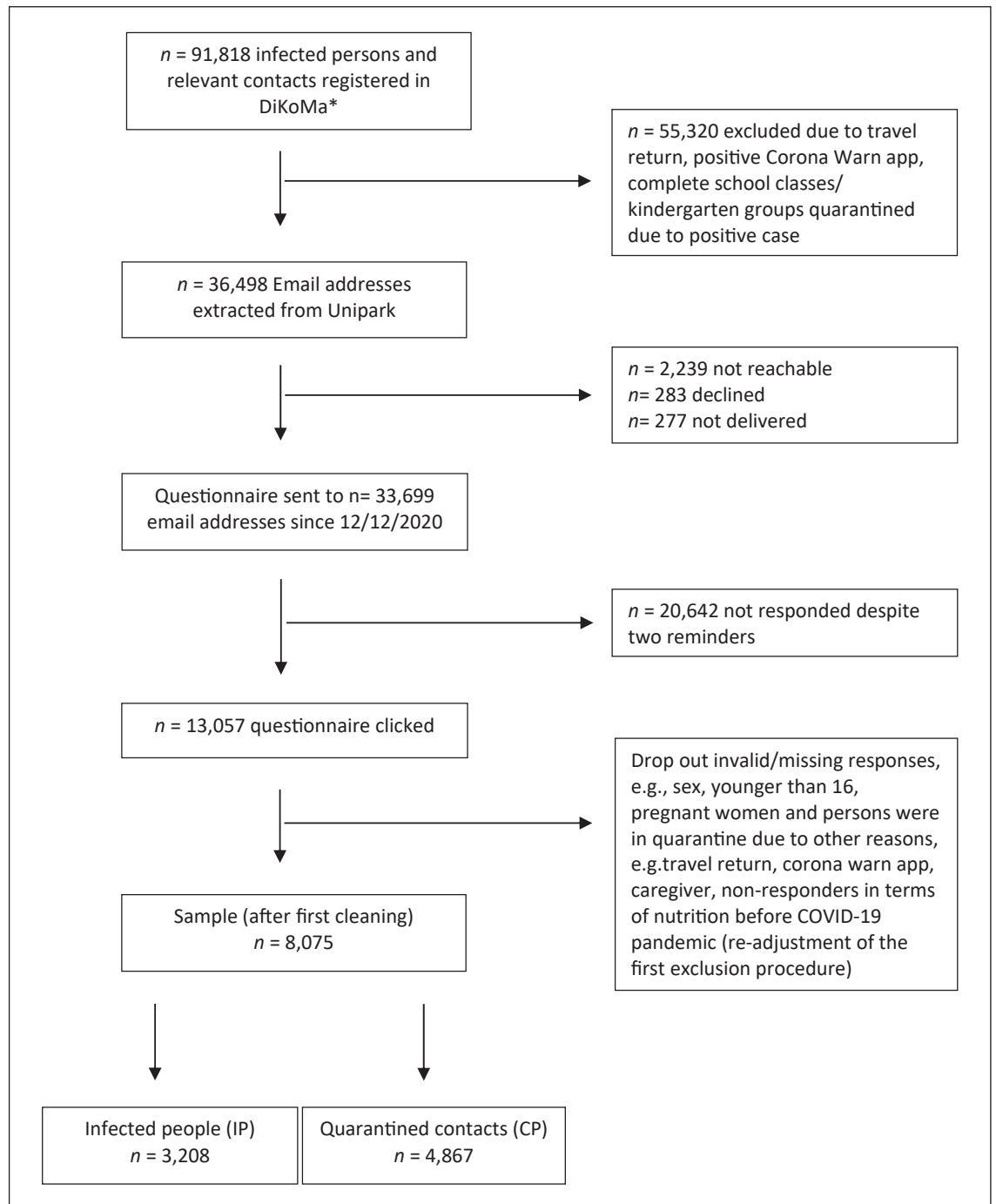


Fig. 1. Study population/flowchart. IP, infected persons; CP, quarantined contact persons. *Date December 9, 2020.

- How often do you consume an alcoholic beverage, e.g., a glass of wine, beer, mixed drinks, liquor, or liqueur? Response categories: never; once a month or less often; 2–4 times a month; 2–3 times a week; 4 times a week or more.
- If you drink alcohol, how many alcoholic drinks do you usually have in a day? By one alcoholic drink, we mean a small bottle of 0.33 L beer, a small glass of 0.125 L wine, a glass of sparkling wine, a double shot of schnapps, or a bottle of alcopops. Response categories: 1–2; 3–4; 5–6; 7–9; 10 or more alcoholic drinks.
- How often do you drink 6 or more alcoholic drinks on one occasion, such as at dinner or at a party? Note: One alcoholic

drink is again equivalent to a small bottle of 0.33 L beer, a small glass of 0.125 L wine, a glass of sparkling wine, a double shot of schnapps, or a bottle of alcopops. Response categories: never (0); less often than once a month (1); every month (2); every week (3); every day or almost every day (4).

AUDIT-C questionnaire is considered an economical and valid screening tool, and scores range from 0 to 12 [17]. A score 4 or greater in women and 5 or greater in men after forming the sum score from the individual items of the AUDIT-C was considered risky use. A sum score of 1–3 in women and 1–4 in men was classified as moderate alcohol use, and a score of 0 as never drinking. Changes during the quarantine period were also recorded and categorized (additional information in online suppl. Table S1; see www.karger.com/doi/10.1159/000524352 for all online suppl. material).

Psychological Situation

Five items from the COSMO study [12] were integrated to assess psychological distress during domestic quarantine:

- “I felt nervous, anxious, or tense” ([18]; item 1, Generalized Anxiety Disorder Scale-7 [GAD-7]).
- “I felt down/depressed” ([19, 20]; item 6, GDS).
- “I felt lonely” ([19, 20]; item 14, GDS).
- “I thought of the future with hope” ([19, 20]; item 8, GDS).
- “Thoughts of my experience in the Corona pandemic triggered physical reactions in me such as sweating, shortness of breath, dizziness, or palpitations” ([21]; item 19, Impact of Event Scale – Revised [IES-R]).

Responses were provided on a 6-point Likert scale ranging from “not at all/less than 1 day” to “always/daily.” These were summarized into “not at all,” “1–2 days,” “3–4 days,” and “5–7 days,” from which a sum score was formed related to the number of questions. A higher relative score was associated with higher psychological distress. The Cronbach’s alpha coefficient was 0.693 for the psychological distress score, and the subscale reliabilities ranged from 0.529 to 0.778. A Cronbach’s alpha value higher than 0.70 would be ideal, but values higher than 0.6 for 5 items are statistically acceptable for a screening questionnaire [22].

Coping Strategies

Six items assessed the use of possible coping strategies and support systems, following the COSMO study (see also [23]):

- “I have received offers of support from family, friends or neighbors” ([12]; item 2, Bundeszentrale für gesundheitliche Aufklärung (BZgA, resp. Federal Centre for Health Education – coping).
- “I had a plan for my daily life in terms of sleep, work or physical activities” ([12]; item 4, BZgA – coping).
- “I discovered activities for myself that made staying at home easier” ([12]; item 6, BZgA – coping).
- “I have used digital media to communicate with family, friends and acquaintances” ([12]; item 1, BZgA – coping, modified).
- “I was bored” ([12]; item 1, BZgA – coping, modified).
- “I couldn’t do anything myself to influence the situation positively” ([12]; item 2, solidarity).

A 6-point Likert scale was also used to answer these questions, and a sum score was formed after recoding related to the number of questions. A higher relative score was associated with stronger coping strategies. The open-ended question “What helped you the most?” was added and categorized according to Klee et al. [23]. The

Cronbach’s alpha coefficient was 0.686 for the psychological distress score, and the subscale reliabilities ranged from 0.601 to 0.685. A Cronbach’s alpha value higher than 0.70 would be ideal, but values higher than 0.6 for 5 items are statistically acceptable for a screening questionnaire [22].

Descriptive Statistics

Regarding descriptive statistics, absolute and relative frequencies were calculated for categorical variables and means with standard deviations (SDs) for continuous variables. Associations between participant characteristics (e.g., age, sex) and outcomes were examined using χ^2 tests or independent *t* tests; normal distribution was assumed due to the sample size [24].

Multiple logistic regressions were used to analyze predictors on weight trends; therefore, 95% confidence intervals (CIs) and odds ratios (ORs) were calculated. Analysis included quarantine situation (IP or CP), influence of exercise and dietary pattern, age, sex, migration background, SES, and psychological distress or coping score. Family structure, housing situation, chronic diseases, and duration of quarantine were excluded from the models, as they were found to be irrelevant to the research question after initial calculations. Changes in alcohol consumption during the duration of quarantine were analyzed using binary logistic regression, calculating 95% CI and OR. Quarantine situation (IP or CP), age, sex, migration background, SES, partnership status, psychological distress or coping score, and alcohol consumption before quarantine were considered.

Model fits were tested using pseudo R^2 (Nagelkerke’s R^2). The significance level was set to 0.05. Analyses were performed using SPSS version 27.0 (IBM, Armonk, NY, USA).

Results

Subjects

A total of 3,208 IP and 4,867 CP were included in this analysis. The population had a mean age of 41.6 years (SD = 14.2) and was composed of 61.5% women. On average, the duration of quarantine ordered by the authorities after a case became known was 11.8 days (SD = 4.6 days). Data for the group as a whole are shown in Table 1 as well as subdivided by IP and CP.

Eating Behavior and Weight Development

About 29% of participants reported eating more healthily or less healthily during the quarantine period. A total of three 132 subjects (39.5%) described a weight change of 0.2 kg on average (Table 2A). IP lost an average of 1.2 kg, whereas CP gained an average of 1.6 kg. Dinner was mostly the main meal, but significantly more often for CP (52.6% vs. 47.7%; $p < 0.001$). Meal changes were reported significantly more often by IP (37.5 vs. 26.7%, $p < 0.001$). Meal changes were associated with a more significant weight reduction in IP (-1.5 ± 4.5 vs. -0.8 ± 4.2 kg, $p < 0.001$) and with a higher weight gain in CP (1.8 ± 4.4 vs. 1.5 ± 3.9 kg, $p = 0.045$).

Table 1. Population characteristics

	Total	IP	CP	Differences between IP and CP; <i>p</i> value
Sample, <i>n</i> (%)	8,075	3,208 (39.7)	4,867 (60.3)	
Sex, <i>n</i> (%)				
Male	3,110 (38.5)	1,362 (42.5)	1,748 (35.9)	<0.001*
Female	4,965 (61.5)	1,846 (57.5)	3,119 (64.1)	
Age, mean (SD), years	41.6 (14.2)	42.7 (14.3)	40.9 (14.1)	<0.001**
Migration background, <i>n</i> (%)				
No	7,551 (95.0)	2,934 (93.4)	4,617 (96.0)	<0.001*
Yes	398 (5.0)	207 (6.6)	191 (4.0)	
Education, <i>n</i> (%)				
High	6,491 (80.9)	2,533 (79.5)	3,958 (81.8)	0.020*
Middle	1,467 (18.3)	618 (19.4)	849 (17.5)	
Low	68 (0.8)	34 (1.1)	34 (0.7)	
Household structure, <i>n</i> (%)				
Live alone	2,260 (28.6)	858 (27.4)	1,405 (29.4)	0.059*
Couple	5,640 (71.4)	2,271 (72.6)	3,379 (70.6)	0.003*
Children yes	3,511 (43.6)	1,457 (45.6)	2,054 (42.3)	
Living situation, <i>n</i> (%)				
No garden and/or no balcony	1,238 (15.4)	462 (14.5)	776 (16.0)	0.063*
With garden and/or with balcony	6,813 (84.6)	2,734 (85.5)	4,079 (84.0)	
Chronic diseases yes, <i>n</i> (%)	1,769 (22.7)	747 (24.1)	1,022 (21.7)	0.012*
Quarantine duration days, mean (SD)	11.8 (4.6)	12.0 (4.9)	11.6 (4.3)	<0.001**

* χ^2 test. ** Unpaired *t* test.

In the free-response questions, 26.8% of IP reported having changed their eating behavior because of their psychological condition and 18.2% because of their physical condition (127 and 86 of 473, respectively). CP primarily cited adjustment to the quarantine period as a reason for change (30.1%, or 34 of 375).

According to the healthy eating index, 28.8% of participants reported eating more healthily and 28.9% less healthily during the quarantine period, while 42.4% reported no changes (Table 2B). Group comparisons between IP and CP showed that CP had more changes to unhealthier eating habits than IP (30.7% vs. 26.1%); inversely, IP had greater changes regarding eating healthier than CP (30.7% vs. 27.5%, $p < 0.001$). Individuals who self-reported a completely unhealthy or at least partially unhealthy eating behavior increased body weight during quarantine (Fig. 2). The risk of weight gain was 3.7 times higher for the group that reported eating more unhealthily compared with those who reported eating healthier (OR 3.37; CI: 3.11–4.47). The group that lost weight was significantly less likely to report unhealthy eating behaviors during quarantine (OR 0.52; CI: 0.43–0.64). Higher psychological burden and lower coping score were asso-

ciated with both weight gain and weight loss (Fig. 3; for additional information, see online suppl. Table S2).

Alcohol Consumption and Coping Strategies

Before the onset of the pandemic, 39.2% of all participants had high-risk alcohol consumption; CP scored significantly higher than IP for high-risk consumption (40.2% vs. 37.7%, $p = 0.015$) (Table 2C). Alcohol consumption was influenced by the reason for quarantine: CP were more likely to increase alcohol consumption than IP (OR 0.20; CI: 0.16–0.25; calculated for IP as reference group), as were those who had exhibited risky drinking behavior before the pandemic (OR 1.28; CI: 1.02–1.60) and people in a partnership (OR 1.36; CI: 1.12–1.74). Significantly less alcohol was consumed by individuals with higher coping scores (OR 0.73; CI: 0.65–0.84). Age, sex, education, and psychological burden had no influence on changes in alcohol consumption during the quarantine period (Fig. 4; for additional information, see online suppl. Table S3). Differences between persons who consumed more alcohol compared with those who consumed less or no alcohol were mainly found in social environment (69.9% vs. 74.4%), hobbies (21.4% vs.

Table 2. Lifestyle variables: healthy eating index, weight change, and alcohol consumption during quarantine

	Total	IP	CP	Differences between IP and CP; <i>p</i> value
A: Weight change/mean (SD), <i>n</i> (%)				
Weight gain	1,700 (21.6)	575 (18.4)	1,125 (23.8)	
Weight loss	1,399 (17.8)	993 (31.7)	406 (8.6)	<0.001*
No change	4,768 (60.6)	1,564 (49.9)	3,204 (67.6)	
Weight change, mean (SD), kg	0.2 (4.5), <i>n</i> = 2,933	-1.2 (4.4), <i>n</i> = 1,497	1.6 (4.1), <i>n</i> = 1,436	<0.001*
B: Healthy eating index, <i>n</i> (%)				
Eating healthier	2,279 (28.8)	967 (30.7)	1,312 (27.5)	
No change	3,357 (42.4)	1,359 (43.2)	1,998 (41.8)	<0.001*
Eating unhealthier	2,290 (28.9)	823 (26.1)	1,467 (30.7)	
C: Alcohol consumption				
Pre-pandemic alcohol consumption (AUDIT-C), <i>n</i> (%)#				
No alcohol	213 (3.8)	102 (4.5)	111 (3.3)	
Moderate alcohol consumption	3,218 (57.0)	1,294 (57.7)	1,940 (56.5)	0.015*
At-risk drinkers	2,216 (39.2)	846 (37.7)	1,336 (40.2)	
Alcohol consumption – changes during quarantine, <i>n</i> (%)#				
No	4,758 (69.2)	1,716 (61.4)	3,042 (74.7)	<0.001*
Yes	2,113 (30.8)	1,080 (38.6)	1,033 (25.3)	
If yes				
Increased alcohol consumption	570 (30.5)	148 (15.2)	422 (47.4)	
Less/no alcohol	1,289 (69.1)	825 (84.5)	464 (52.1)	<0.001*
No change	7 (0.4)	3 (0.3)	4 (0.4)	
Total	1,866 (100)	976 (100)	890 (100)	

* χ^2 test. # Rounding errors.

18.6%), and attitude (16.6% vs. 21.2%), although the frequency of these statements was very low (for additional information on coping strategies, see free-text clusters in online suppl. Table S4).

Discussion

To our knowledge, this is one of the first studies to analyze alcohol consumption, eating behavior, and weight development in IP and CP during officially ordered quarantine. On average, legally quarantine periods were 11 and 12 days for IP and CP, respectively, after a case became known, and the mean weight change was +0.2 kg. IP lost an average of 1.2 kg, mostly as a result of loss of taste and smell, weakness due to illness, and loss of appetite. CP, on the other hand, gained an average of 1.6 kg during the quarantine period. They more frequently reported eating out of boredom and unhealthier eating behavior. Looking at the composition of the healthy eating index, unhealthier eating behavior was characterized among both IP and CP by higher consumption of sweets, more salty snacks, less fruit, fewer veg-

etables, less conscious eating, and more alcohol. Alcohol consumption especially increased among individuals who were already at-risk drinkers before the pandemic. These findings are consistent with those of previous studies conducted in the context of general lockdown measures [25, 26]. Those studies showed, in particular, an increase in media time, reduction in physical activity, and unhealthy diets. In a study by Ammar et al. [27], a reduction in mental well-being and a 10% increase in depressive symptoms were shown simultaneously with lifestyle changes. The authors therefore recommended implementing crisis-oriented interdisciplinary interventions to mitigate the negative effects of restrictions and promote an active and healthy lifestyle in the quarantine setting. In this regard, CP in particular appear to have higher need of care than IP, whose care is mainly focused on the course of the disease. This requirement is underlined by our data, which show that both weight change and higher alcohol consumption are influenced by better coping scores. The most important positive measures were contact with the social environment, followed by hobbies and attitude. However, the duration of quarantine also seemed to have a negative effect on alcohol consumption, at

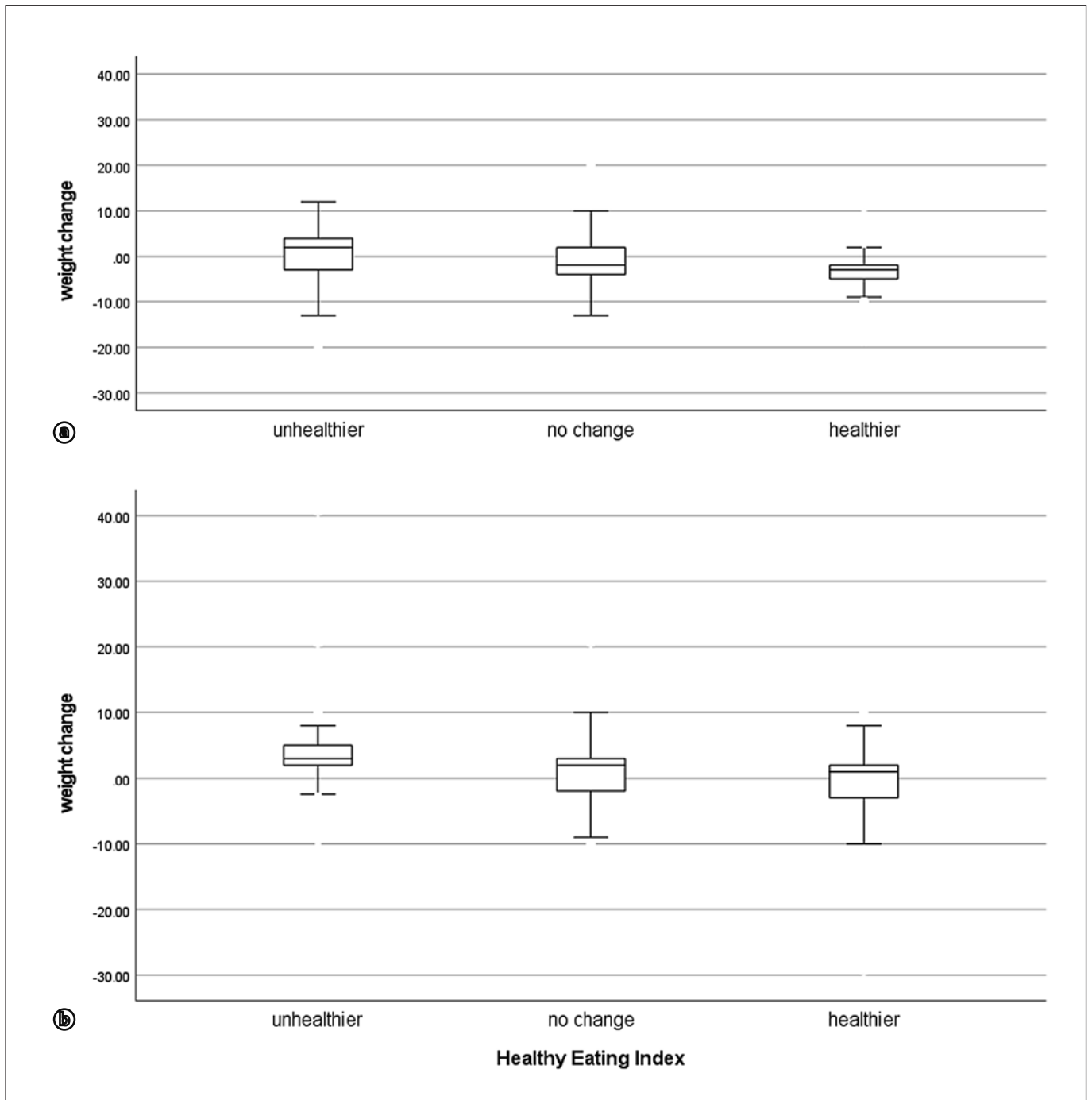


Fig. 2. Weight change in kg of IP (a) and CP (b) in relation to the healthy eating index.

least according to the free-text data. In their review article, Xu et al. [28] pointed out the risks of excessive alcohol, but also mentioned online gaming consumption in the context of the pandemic and called for promoting physical activity, social interaction, and cooperation.

Strengths and Limitations

The major strength of this study is the size of the sample and the systematic data collection from the largest health department in Germany (i.e., Cologne). This was exclusively a regional cohort whose quarantine was pre-

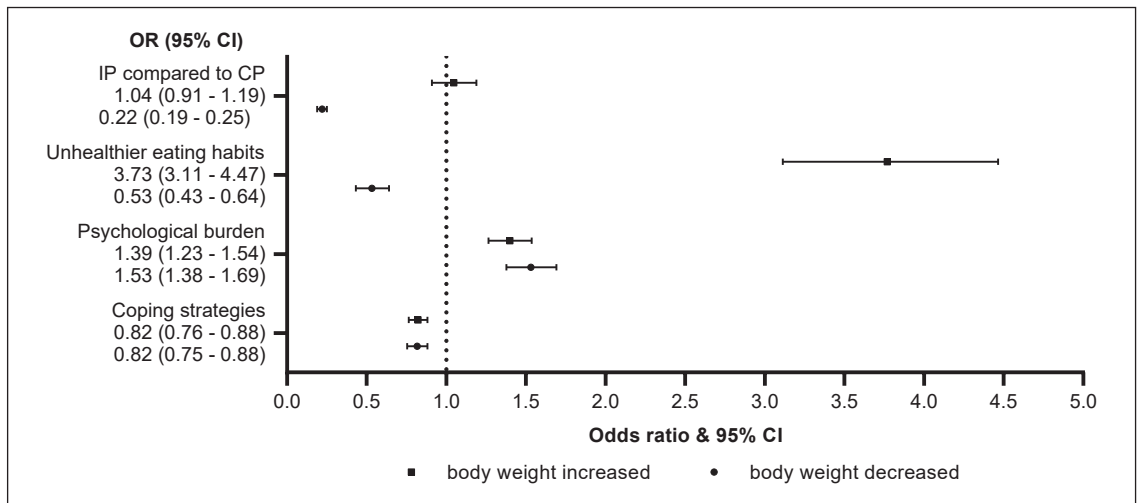


Fig. 3. Influence of quarantine group IP compared to CP, unhealthy eating habits, psychological burden, and coping strategies on self-reported body weight gain and loss during quarantine; adjusted for age, sex, education, and exercise during quarantine (for additional information, see online suppl. Table S2).

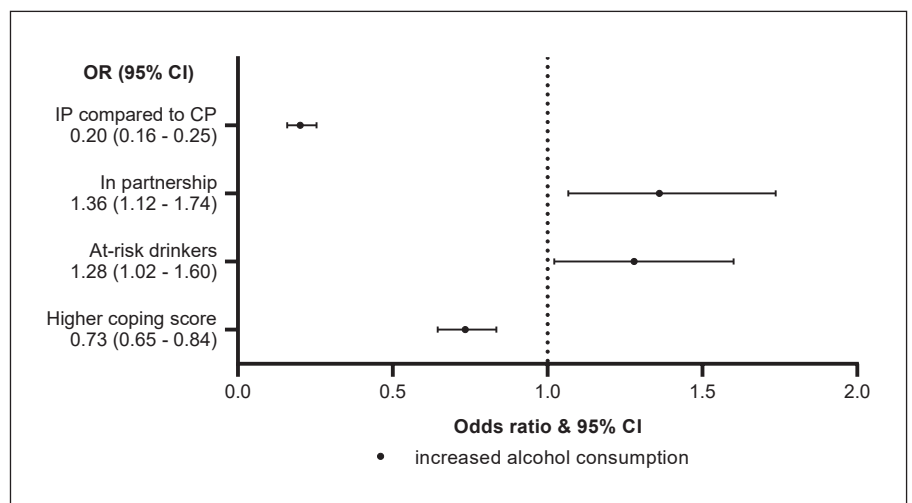


Fig. 4. Predictors of an increased alcohol consumption; adjusted for age, sex, education, and psychological burden (for additional information, see online suppl. Table S3).

scribed by law due to COVID-19 infection or close contact. Overall, a total response rate of 38.7% was achieved. However, the lifestyle-related questions were only answered by 24.0% and mainly by individuals of higher SES. This may have led to a bias in the responses. Additionally, average quarantine period was 11 days. Therefore, we can only speculate about possible long-term consequences. Moreover, objective data on dietary and drinking behavior, meal size, and measured weight status were not available, and responses collected by questionnaire are generally less likely to be truthful compared to collected via

other methods. The initial weight or BMI was not asked either, so that this important influencing factor could not be taken into account in this analysis. Finally, statements can only be made here about the corresponding phase of the pandemic. In the meantime, the rules for IP and CP have been adjusted and the quarantine has been shortened considerably. Above all, vaccinated CP no longer have to be isolated. Nevertheless, the results provide important indications for the short- and long-term management of those affected.

Conclusion

These data show that health-relevant changes in lifestyle are already detectable during this short period of mandatory stay-at-home order due to the associated temporary lifestyle restrictions. Even though we can only speculate about possible long-term consequences, this study helps optimize counseling during legally enforced quarantine, especially for people at risk. Therefore, in order to prevent possible long-term physical and psychological disorders, caregivers should be qualified to detect at-risk patients and, if necessary, refer them to support systems. In addition, topics such as nutrition, alcohol, and healthy lifestyles should be addressed by caregivers in health offices, and possibly also by family doctors, in order to provide close and competent support to those affected during and after this exceptional period.

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Statement of Ethics

The study was conducted according to the Declaration of Helsinki and the principles of Good Clinical Practice. Participation in the survey was on voluntary basis and required a written consent.

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Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

C.J. was responsible for researching the background literature for the manuscript and drafted the first version of the manuscript together with S.W. and M.T., assisted by B.G. All authors were involved in revising the manuscript. N.E. and N.S. were responsible for programming the online CoCo-Fakt questionnaire, and N.S., C.J., and S.W. calculated and presented the quantitative data. Analysis, presentation, and interpretation of the qualitative data were performed by M.T.

Data Availability Statement

The data that support the findings of this study are not publicly available due to data protection reasons, as the consent states that the data will not be transmitted to third parties.

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