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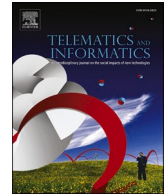
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Television, news media, social media and adolescents' and young adults' violations of the COVID-19 lockdown measures: A prototype willingness model

Ilse Vranken^{a,b,*}, Nausikaä Brimmel^a, Laura Vandenbosch^a, Jolien Trekels^a

^a School for Mass Communication Research, Faculty of Social Sciences, KU Leuven, Leuven, Belgium

^b Research Foundation Flanders (FWO-Vlaanderen), Belgium

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ABSTRACT

During the COVID-19 pandemic, television and social media informed and entertained people. This cross-sectional study among adolescents and young adults ($n = 859$, 71.94% female, $M_{age} = 20.55$, $SD_{age} = 4.59$) examined the associations between pro- and anti-governmental (social) media and youth's violations of the lockdown measures following the prototype willingness model (PWM). Data were collected during Belgium's first and strictest lockdown. The results largely confirmed the applicability of the PWM in a public health context. Posting of and exposure to anti-governmental social media messages positively related to violations of the regulations via higher descriptive norm perceptions of peers violating the measures and positive attitudes towards violations. Pro-governmental media interactions (i.e., exposure to news media and pro-governmental social media messages) negatively related to violations via negative attitudes towards violations. No support emerged for the role of (televised) series, prototype favorability, or subjective norms in the PWM. Differences in posting versus exposure of social media messages were found. Posting generally related stronger to risk cognitions and behaviors compared to exposure. Gender and age moderated some of the examined relations in the PWM. Implications for media research and health campaigns are discussed.

1. Introduction

In March 2020, the World Health Organization declared the coronavirus disease (COVID-19) as a pandemic. To slow down the spreading of COVID-19, several 'national lockdowns' were declared. As COVID-19 is less threatening for adolescents and young adults' health, their willingness to follow the COVID-19 regulations may depend on other factors (Teasdale et al., 2012). One important factor may be media use.

During the lockdown periods, social media contained virus-related messages (Kurten and Beullens, 2020). Televised media further provided viewers with documentaries and series on diseases (Clark, 2020). Additionally, (online) news media kept people informed (Cave, 2020). These media are at the heart of youth culture as no other age group spends so much time consuming media (European Commission, 2020). The role that media played in youth's compliance with the COVID-19 regulations during a severe lockdown is

* Corresponding author at: School for Mass Communication Research, KU Leuven, Parkstraat 45, B-3000 Leuven, Belgium.

E-mail addresses: ilse.vranken@kuleuven.be (I. Vranken), nausikaabrimmel@kuleuven.be (N. Brimmel), laura.vandenbosch@kuleuven.be (L. Vandenbosch), Jolien.trekels@kuleuven.be (J. Trekels).

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addressed in this cross-sectional study among adolescents and young adults.

Our study examined whether the prototype willingness model (PWM) was a valid theory to understand how different media uses related to youth's violations of the COVID-19 regulations (i.e., violating hygiene regulations, social distancing, gatherings with multiple friends or making non-essential displacements/travelling). The PWM explains how televised / social media behaviors are related to youth's risk behavior via various health risk cognitions (i.e., attitudes, norms, prototype favorability, intention, willingness) (Walrave et al., 2015). Studies applying the PWM focused on individual risk behaviors, such as risky selfie behaviors (Chen et al., 2019). Youth's violations of the COVID-19 regulations relate more to public health behavior as the violations had a greater impact on loved-ones and the society than on themselves. Thus, this study contributes to health literature by testing the PWM's applicability in a public health context instead of an individual health context.

Apart from the unique public health context, the study extends earlier literature (van Oosten et al., 2017) by theorizing and examining how exposure versus (vs.) self-posting media activities relate differently to the mechanisms that are proposed to precede risk behavior in the PWM. Theoretically, such insights may help us understand which media behaviors are more strongly associated with risk behaviors and may guide the design of future health campaigns. Attention will be given to a heterogeneous sample by exploring whether developmental status (i.e., adolescents vs. young adults) and gender moderate the examined relations as not everyone may react similarly to media. Research on the relations between media use and health risk behaviors suggest that these relations may be stronger depending on participants' age and gender (e.g., Boyle et al., 2016; Vannucci et al., 2020).

2. Literature review

2.1. Media interactions during the pandemic

Media use increased during the pandemic (GlobalWebIndex, 2020). Because individuals spent more time at home during the lockdown, youth had to rely more on media to maintain contact with other people and to stay informed about the regulations and course of the pandemic. Approximately 58%/58% and 48%/43% of adolescents and young adults had spent more time on respectively social media and streaming/TV than before the pandemic. Approximately 67% of youth consumed more news than before the pandemic (GlobalWorldIndex, 2020). Research suggests these media may have had pro- and anti-governmental roles in youth's responses to the crisis (Scopelliti et al., 2021).

Pro-governmental media messages can be described as messages that apply to the COVID-19 pandemic and that (indirectly) advocate the compliance with the safety measures taken by the government (i.e., governmental COVID-19 regulations). Such messages reduce the risk of spreading or contracting the virus oneself (Zhao and Dale, 2019). During the first wave of the pandemic, different pro-governmental media can be distinguished, i.e., (1) motivating and supportive social media messages, (2) traditional/online news media and (3) entertainment (fiction) programs. Different types of actors distributed these messages. More precisely, on social media, messages appeared from citizens stressing adhering the COVID-19 regulations (Kurten and Beullens, 2020) and presenting reasons to follow such regulations (Mustafa et al., 2020). Hashtags such as 'stayhome' (23 M posts) were used to encourage people (Instagram, data from April 22, 2020). Such messages were often accompanied with pictures about home entertainment such as home recorded TikTok videos in which families were dancing (Willingham, 2020).

News media messages (coming from news media outlets) informed youth about health threats through social media and traditional media platforms (e.g., television news, digital newspaper). Research suggested that these news media were the most pivotal sources regarding COVID-19 information (Mitchell et al., 2020). News messages were also shared by citizens on their own social media (YouGov, 2020). Studies revealed that news consumption had a positive influence on health behaviors (Allington et al., 2021; Lin and Lagoe, 2013). Additionally, movies, series, and documentaries produced by media companies knew a steep increase in popularity (Clark, 2020). Characters struggle to survive the disaster and show efficient and effective (collaborative) behavior in problem situations (Korstanje and Skoll, 2015). Such messages also occurred in support programs where well-known people (e.g., local actors) talked about their life and how they followed the COVID-19 regulations. Such programs have a positive influence on health outcomes (Shen and Han, 2014).

Anti-governmental media messages can be described as messages that apply to the COVID-19 pandemic and in which resistance toward the COVID-19 measures are included. Such messages indirectly promote health risk behavior (Branley and Covey, 2017). Examples of such messages are posts modelling an individual violating the health measures (Day, 2020), or posts that use hashtags that show resistance (e.g., #NotMyGovernment, #IDontParticipateAnymore). Some anti-governmental messages came from celebrities mocking the lockdown measures (Day, 2020). Such posts are not unusual as research has also shown youngsters enjoy posting risky behavior online, even when this behavior violates governmental rules (Chen et al., 2019). Other messages potentially came from users who were dissatisfied with the health measures and complained. Feelings such as frustration were expressed on social media during other pandemics (Chew et al., 2010).

2.2. Media and the prototype willingness model

A model to structure the interrelations between an individual's cognitions and risk behavior is the prototype willingness model (PWM). The model explains individual health risk behavior in adolescents (Gerrard et al., 2008), but has also proven its applicability among young adults (Rivis et al., 2011). This study will explore its validity in a public health context, as the examined risk behavior in youngsters (i.e., violating the COVID-19 regulations) is especially dangerous in view of public health.

The PWM uses a dual-process structure which implies that decision making is based on two processes (Gerrard et al., 2008). The

first **reasoned path**, based on the theory of reasoned action (Fishbein and Ajzen, 1975), assumes that an individual's risk behavior is planned. Within the reasoned path, an individual's risk behavior depends on (1) *positive attitudes*, (2) *subjective norms* and (3) *descriptive norms* via *behavioral intention*. With regard to positive attitudes, individuals can hold favorable or unfavorable thoughts about the consequences of the risk behavior which determine their attitude. *Subjective norms* refer to perceptions of the extent to which significant others approve of the behavior. *Descriptive norms* refer to perceptions of the number of peers who perform a particular behavior (Gerrard et al., 2008; Gibbons et al., 2020). Intentions are behavioral objectives "that are formulated after some deliberation or reasoning" (Gerrard et al., 2008, p.34).

The second path, the **social reaction path**, assumes that behavior is reactive rather than reasoned and explains "youths' unplanned decisions" (Gerrard et al., 2008, p. 35). Apart from attitudes and subjective/descriptive norms, the social reaction path adds two additional constructs, i.e., behavioral willingness and prototypes. Prototypes precede a risk behavior via the antecedent of behavioral willingness. *Prototypes* refer to one's mental images of an individual engaging in risk behavior. Images that are favorable and similar to the self will increase the willingness to engage in the risk behavior oneself (Gerrard et al., 2008). *Willingness* refers to one's openness to engage in risk behavior when an opportunity to perform the behavior presents itself (Gibbons et al., 2020).

The PWM posits that external factors such as media messages may affect an individual's cognitions and behaviors (Gerrard et al., 2008). Media theories help to understand how exposure to, and self-posting of pro- and anti-governmental messages relate to youth's cognitions and violations of the COVID-19 regulations.

With regard to *exposure to televised media, news media and social media content*, social learning theory (Bandura, 2001) states that observing role models performing a behavior will inspire individuals to perform a similar behavior. Media that show pro- or anti-governmental behavior in a rewarding context may therefore be influential in motivating individuals to perform such behavior. If pro-governmental behavior (i.e., complying with regulations) is seen as rewarding (e.g., TikTok videos with #TogetherAgainstCorona in which a family is enjoying themselves while following the COVID-19 regulations), it may positively relate to individuals' cognitions (i.e. prototypes, norms, and attitudes) and behavior with regard to compliance with these regulations. Likewise, when, for instance, influencers on social media mention having a 'fun time' while violating the regulations, the rewarding context of this anti-governmental behavior may pose a threat to one's compliance with the health regulations.

Regarding one's *posting of a message on social media*, self-effects literature (Valkenburg, 2017) posits that such self-posting may influence individual's cognitions and behaviors: the act of posting a message will induce an intensification of the individual's cognitions and behaviors so that they more strongly align with the created (anti- or pro-governmental) social media content. Youth who posted pro- vs. anti-governmental messages may thus have, respectively, (1) more positive vs. negative cognitions toward complying with the COVID-19 regulations, and (2) have followed vs. violated the regulations more frequently.

Together, the literature postulates a series of links between pro-/anti-governmental media interactions and youth's subjective norms (H1), descriptive norms (H2), attitudes (H3), prototypes (H4), intention (H5), willingness to violate the COVID-19 regulations (H6) and actual violations (H7). Pro-governmental media interactions (i.e., exposure to news media, exposure to televised series, posting/exposure pro-governmental social media messages) are expected to negatively relate to violations of the COVID-19 regulations via lower descriptive/subjective norm perception of peers violating the measures, lower positive attitudes towards violating the measures, lower prototype favorability perceptions towards a violator, lower intention and willingness to violate the regulations. Similar, but *positive* relations are expected for posting/exposure to anti-governmental social media messages. Fig. 1 provides a model of these relations applied in our study (H1–H7).

2.3. Differences according to type of social media interaction and audience

These relations may vary depending on the (1) type of media interaction and (2) media user. As for the examined *social media interactions*, the literature suggests *similar* cognitions are adopted following respectively media exposure and self-posting behavior, yet in a different *intensity*. Mere passive exposure is suggested to result in weaker links with the examined outcomes than self-posting behavior. During a passive media activity, viewers process messages in a heuristic manner (Slater and Rouner, 2002). Accordingly, exposure to social media content is described as 'social browsing', and even as an unconscious, heuristic scrolling activity (Lup et al., 2015). Content creation, on the other hand, is described as a more thoughtful activity in which users reflect upon ways in which they can express their identity (Gündüz, 2017). Literature examining whether exposure vs. self-posting activities relate differently to cognitions has suggested such differences can occur as the direct relations between self-posting and risk behaviors seem to be stronger than those for exposure to social media content (Geusens and Beullens, 2016a). Previous studies did not theorize or systematically test such differences. Thus, this study hypothesizes that exposure to pro- / anti-governmental social media messages will show weaker links to the examined cognitions and behaviors than the self-posting of pro- / anti-governmental social media messages respectively (H8).

As for the examined *audience*, not all individuals may react similarly to messages. Literature suggests that especially gender and developmental status may be relevant factors moderating the relations between (social) media use and risk behaviors (Boyle et al., 2016; Carmack and Rodriguez, 2020; van Oosten and Vandenbosch, 2017; Vannucci et al., 2020). As for gender, men perform more risk behavior than women (Gibbons and Gerrard, 1995). Risk behavior is perceived as more appropriate for men as it can help prove their 'masculinity' (Cohen and Prinstein, 2006) and men show greater tolerance for risks and evaluate risks more positively than women (Ronay and Kim, 2006). Applied to the pandemic, men were less likely to follow health-protective behaviors than women (Allington et al., 2021; Triberti et al., 2021). This may result in a predisposition of men to interact more frequently and attentively with messages promoting risk behavior compared to women (Geusens and Beullens, 2017a, 2017b). Following this reasoning, men may respond more strongly and positively to risk messages supporting violations of the COVID-regulations (i.e., anti-governmental messages).

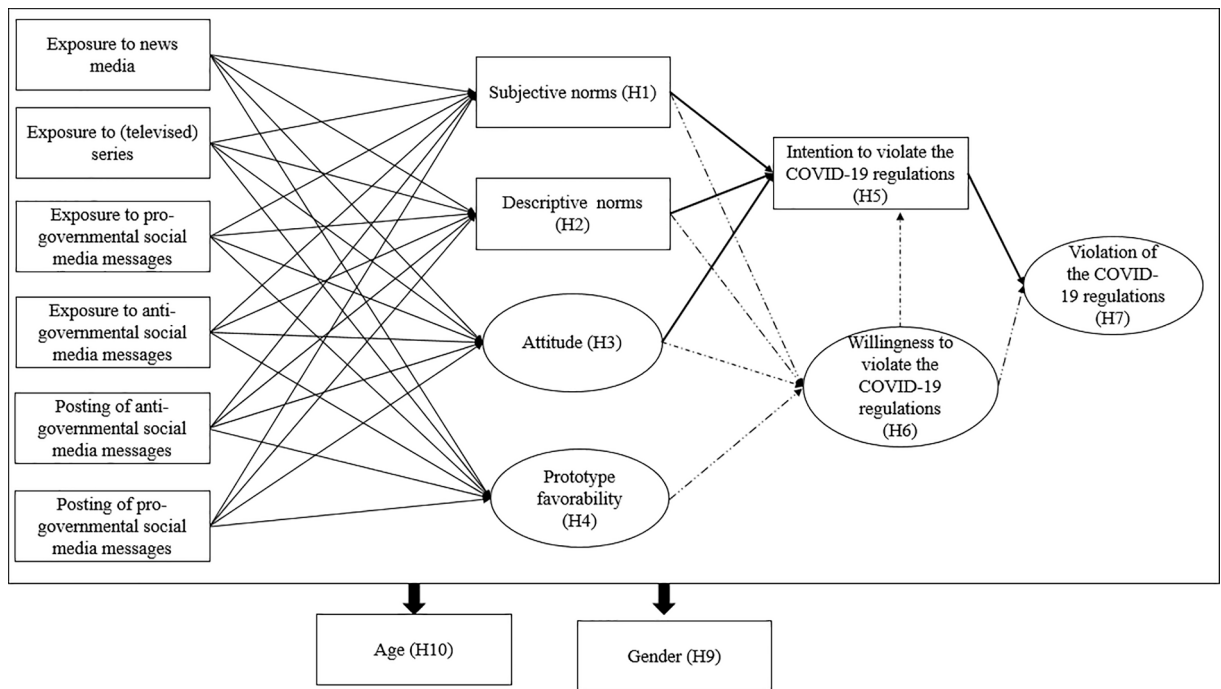


Fig. 1. Hypothesized Prototype Willingness Model. Dotted lines represent the social reaction pathway (i.e., subjective norms, descriptive norms, attitudes, prototype favorability, willingness, violation). Bold lines represent the reasoned action pathway (i.e., subjective norms, descriptive norms, intention, violations). Control variables are SES, ethnicity, sensation seeking and environmental motivation to follow the COVID-19 regulations.

As for developmental status, adolescents tend to make decisions more often based on spontaneity than young adults. Therefore, unplanned behavior is typical for the developmental period of adolescence, whereas young adults more often engage in reasoned behavior (Davies et al., 2017; Sherman et al., 2018). Adolescents' dependence on peers is one of the reasons for their increased risk behavior. Adolescents more often turn to peers (Brown, 2004) and peer group dynamics often support engaging in risk behavior (Gardner and Steinberg, 2005). Apart from peers, individuals' appreciation for sensational activities is higher in adolescence than in other developmental periods (Byck et al., 2015; Harden and Tucker-Drob, 2011). Consequently, adolescents may be more attracted to risk behavior (Zuckerman, 2014) than young adults. During the pandemic, older individuals followed COVID-regulations more than younger individuals (Allington et al., 2021). This may result in a predisposition of younger individuals to interact more attentively with messages promoting risk behaviors (i.e., during exposure/posting anti-governmental social media messages) and older individuals to interact more attentively with messages promoting health behaviors (i.e., during pro-governmental media interactions such as news media consumption). Numbers during the pandemic revealed that pro-governmental media interactions such as news consumption were higher among young adults than adolescents (Vandendriessche et al., 2021). Younger individuals may thus respond more strongly and positively to media content promoting risk behaviors (in this study: anti-governmental media). This reasoning aligns with prior studies (Vannucci et al., 2020) in which the relations between media use and risk behaviors were stronger for adolescents than young adults.

Following this literature, we hypothesize that the negative interrelations between exposure/posting of pro-governmental media messages, exposure to news media/televised series and violations of the COVID-19 regulations via the cognitions in the PWM (i.e., subjective/descriptive norms, attitude, prototype favorability, intention, willingness) are stronger for girls (H9) and young adults (H10). The positive relations between anti-governmental media interactions (i.e., posting/exposure anti-governmental social media messages) and violations of the regulations via the cognitions in the PWM are stronger for boys (H9) and adolescents (H10) (See Fig. 1).

The study will control for socio-economic status, sensation seeking, ethnicity, and environmental motivation as studies using the PWM revealed that these factors affected the relationships within the PWM (Gibbons et al., 2010; Schmidt et al., 2014; Vaughn and King, 2016).

3. Method

3.1. Sample and procedure

Data among adolescents (12–18 years) and young adults (19–30 years) were collected in the first (and strictest) COVID-19 lockdown period (April/May 2020) in Flanders (i.e., the Dutch-speaking part of Belgium). The following regulations were applicable during the data collection, i.e., (1) hyper attention to personal hygiene, (2) social distancing regulations, (3) having no offline contact

or gatherings with multiple people, (4) staying at home. Adolescents were recruited via (1) high schools and (2) youth organizations using an online survey. High schools in Belgium were (1) randomly selected from a list of all high schools ($n = 23$) and (2) via a convenience sample ($n = 9$). Seven schools agreed to participate. Parents provided passive consent and adolescents provided active consent. The data collection was part of two larger projects¹. Data and syntaxes are available on OSF (<https://osf.io/2ekft/>).

Young adults provided active consent and were recruited via (1) a research agency who recruited a representative sample of young adults and (2) a snowball sampling via the social media profiles of the researchers in April 2020.

Of the 980 participants, 859 were part of the analytical sample, i.e., 413 adolescents (48.08%) and 446 young adults (51.92%). Participants were deleted when they did not provide active consent ($n = 20$), answered the attention check wrong ($n = 2$), opened the survey without answering questions ($n = 63$), had more than 95% missing values on key variables ($n = 28$), or did not fit the age criteria ($n = 8$). In the overall sample, participants had a mean age of 20.55 ($SD = 4.59$), 71.94% were female. Adolescents had a mean age of 16.51 ($SD = 1.41$), 78.93% was female, 65.1%, 17.7%, 13.8% and 3.4% respectively followed the general, technical, professional and arts education track. Young adults had a mean age of 24.29 ($SD = 3.10$), 65.47% were female, 48.8% were employed, 3.1% unemployed, 2.7% employed students and 42.9% were students.

3.2. Measures

All measures are described in the appendix. Note that all COVID-19 measurements and the timing of their enforcement (i.e., March 2020) were repeated in the questions.

3.2.1. Descriptive norms

Participants estimated how many peers violated one or multiple of the Belgian COVID-19 regulations since they were enforced (March) on a scale from (1) *nobody* to (7) *all of them* (Ajzen, 2002).

3.2.2. Subjective norms

Participants rated the extent to which their peers would approve of violating the Belgian COVID-19 regulations on a scale from (1) *totally not okay* to (7) *totally okay* (Ajzen, 2002).

3.2.3. Attitude

Participants rated five items (e.g., funny) to measure their attitudes towards violating the COVID-19 regulations on a scale from (1) *totally disagree* to (7) *totally agree* (Ajzen, 2002). Principal component analyses (PCA) showed that all items loaded on one factor in the overall (eigenvalue = 2.40; explained variance = 47.92; $\alpha = 0.72$), among adolescents (eigenvalue = 2.31; explained variance = 46.23; $\alpha = 0.70$), and young adults sample (eigenvalue = 2.43; explained variance = 48.63; $\alpha = 0.73$). Items were averaged.

3.2.4. Prototype favorability

Participants imagined a person who sometimes violated the Belgian COVID-19 regulations and indicated to what extent five characteristics typify this violator (e.g., 'popular') on a scale from (1) *totally disagree* to (7) *totally agree* (Gibbons and Gerrard, 1995). PCA showed that all items loaded on one factor in the overall (eigenvalue = 3.45; explained variance = 68.99; $\alpha = 0.88$), adolescents (eigenvalue = 3.32; explained variance = 66.47; $\alpha = 0.87$), and young adults sample (eigenvalue = 3.62; explained variance = 72.43; $\alpha = 0.90$). Items were averaged.

3.2.5. Intention to violate the COVID-19 regulations

Participants indicated how frequently they planned to violate the COVID-19 regulations in the time left that they still apply on a scale from (1) *never* to (7) *multiple times in a day*.

3.2.6. Willingness to violate the COVID-19 regulations

Participants indicated in four scenarios how likely they would violate the regulation described in each scenario from (1) *totally unlikely* to (7) *totally likely* (Gibbons and Gerrard, 1995; Gerrard et al., 2005). PCA showed that all items loaded on one factor in the overall (eigenvalue = 1.93; explained variance = 48.37) and young adult sample (eigenvalue = 1.975; explained variance = 49.36), but not among the adolescent sample in which one violation (i.e., regarding personal hygiene) loaded on a second factor (eigenvalues = 1.81 and 1.01; explained variance = 45.22 and 25.27). Reliability analyses confirmed an increase in reliability if this item was omitted. Reliability for the three-item structure revealed an $\alpha = 0.65$ in the overall sample, $\alpha = 0.65$ among adolescents, and $\alpha = 0.66$ among young adults. The scale displayed mediocre but acceptable reliability given that only three items were part of the scale (Tavakol and Dennick, 2011). Items were averaged.

¹ Two schools participated in a larger project regarding media and professional beliefs among late adolescents. Four schools participated in a larger project regarding media and body image. None of the key variables of this study (i.e., media variables, mediators, outcome variables) were tested in other papers. Participants of one other school only received questions for this COVID-19 study. More information can be requested from the corresponding author.

3.2.7. Violation of the COVID-19 regulations

With four items, participants indicated how frequently they had violated the described COVID-19 regulation since they were enforced (March 2020) on a scale from (1) *never* to (7) *multiple times in a day*. PCA confirmed the one-factor structure in the overall (eigenvalue = 1.79; explained variance = 44.87; $\alpha = 0.58$), adolescents (eigenvalue = 1.84; explained variance = 45.98; $\alpha = 0.60$), and young adults sample (eigenvalue = 1.77; explained variance = 44.17; $\alpha = 0.54$). The scale displayed mediocre but acceptable reliability given the low number of items (Tavakol and Dennick, 2011). Items were averaged.

3.2.8. Exposure to news media

Participants indicated how frequently they had (1) watched the (televised) news and (2) read the newspaper digitally or in paper since the regulations were enforced on a scale from (1) *(almost) never* to (7) *multiple times a day*. The items correlated in the overall ($r = 0.28, p < .001$), adolescents ($r = 0.29, p < .001$) and young adults sample ($r = 0.25, p < .001$). Items were averaged.

3.2.9. Exposure to (Televised) series

Participants indicated how frequently they had (1) watched programs that support the COVID-19 regulations, (2) watched series about epidemics and pandemics since the COVID-regulations were enforced on a scale from (1) *(almost) never* to (7) *multiple times a day*. The items significantly correlated in the overall ($r = 0.42, p < .001$), adolescents ($r = 0.43, p < .001$) and young adults sample ($r = 0.42, p < .001$). Items were averaged.

3.2.10. Posting of pro-governmental social media messages

Participants indicated how frequently they had posted or shared three types of pro-governmental messages via social media since the regulations were enforced such as 'posting a support message about COVID-19 on social media' on a scale from (1) *I never use social media* to (8) *multiple times in a day*. PCA showed that all items loaded on one factor in the overall (eigenvalue = 1.97; explained variance = 65.51; $\alpha = 0.69$), adolescents (eigenvalue = 1.84; explained variance = 61.30; $\alpha = 0.59$) and young adults sample (eigenvalue = 2.06; explained variance = 68.73; $\alpha = 0.76$). Reliability analyses confirmed an increase in reliability if the item regarding sharing a news message was omitted in the overall ($\alpha = 0.80$), adolescent ($\alpha = 0.79$) and young adults sample ($\alpha = 0.80$). The remaining two items significantly correlated in the overall ($r = 0.67, p < .001$), adolescent ($r = 0.66, p < .001$) and young adult sample ($r = 0.67, p < .001$). Items were averaged.

3.2.11. Posting of anti-governmental social media messages

Participants indicated how frequently they had posted three types of anti-governmental posts on social media since the COVID-regulations were enforced such as 'a message to mock the COVID-19 regulations' on a scale from (1) *I never use social media* to (8) *multiple times in a day*. PCA showed that all items loaded on one factor in the overall (eigenvalue = 2.37; explained variance = 79.125; $\alpha = 0.87$), adolescents (explained variance = 2.19; explained variance = 72.91; $\alpha = 0.81$), and young adults sample (eigenvalue = 2.61; explained variance = 86.94; $\alpha = 0.92$). Items were averaged.

3.2.12. Exposure to pro-governmental social media messages

Participants indicated how frequently they had seen three types of pro-governmental posts on social media since the COVID-19 regulations were enforced on a scale from (1) *I never use social media* to (8) *multiple times in a day*. PCA confirmed that all items loaded on one factor in the overall (eigenvalue = 2.46; explained variance = 82.17; $\alpha = 0.89$), adolescents (eigenvalue = 2.44; explained variance = 81.25; $\alpha = 0.88$), and young adults sample (eigenvalue = 2.49; explained variance = 82.89; $\alpha = 0.89$). Items were averaged.

3.2.13. Exposure to anti-governmental social media messages

Participants indicated how frequently they had seen three types of anti-governmental posts since the COVID-19 regulations were enforced on a scale from (1) *I never use social media* to (8) *multiple times in a day*. PCA confirmed that all items loaded on one factor in the overall (eigenvalue = 2.21; explained variance = 73.67; $\alpha = 0.82$), adolescents (eigenvalue = 2.33; explained variance = 77.49; $\alpha = 0.86$), and young adults sample (eigenvalue = 2.09; explained variance = 69.72; $\alpha = 0.78$). Items were averaged.

3.3. Control variables and moderators

3.3.1. Socio-demographics

Participants indicated their age, gender, ethnicity (i.e., West-European or other) and socioeconomic status (SES) using the MacArthur scale (Adler et al., 2000; Goodman et al., 2001).

3.3.2. Sensation seeking

The four-item sensation seeking scale was used with a scale ranging from (1) *totally not agree* to (7) *totally agree* (Stephenson et al., 2003). All items loaded on one factor in the overall (eigenvalue = 2.36; explained variance = 59.03; $\alpha = 0.77$), adolescents (eigenvalue = 2.37; explained variance = 59.35; $\alpha = 0.77$), and young adults sample (eigenvalue = 2.32; explained variance = 58.11; $\alpha = 0.76$). Items were averaged.

3.3.3. Environmental motivation to follow the COVID-19 regulations

Participants indicated to what extent their environment (e.g., housemates) motivated them to follow the regulations on a scale from (1) *not at all* to (7) *extremely*.

3.4. Analytical strategy

First, descriptive statistics were examined. The hypothesized relations (H1-H10) were examined through SEM in AMOS, using the maximum likelihood method. Based on the modification indices (Byrne, 2010), the error terms of descriptive and subjective norms and the error terms of prototype favorability and positive attitude were allowed to co-vary; the latter is in line with Hennessy et al. (2017) who argue that a positive evaluation of the person coincides with a favorable appraisal of the behavior itself.

Skewness and kurtosis revealed that items of scales (i.e., attitude, posting pro- and anti-governmental social media messages) exceeded the acceptable range (Kline, 2011). Bootstrapping in AMOS was applied to deal with non-normal data (Nevitt and Hancock, 2001). As bootstrapping doesn't allow missing data, missing values were imputed via multiple imputation using five alternative datasets. Sixty-three participants (7.3%) had missing data. All variables had less than 10% missing data.

To test for differences in the strength of the paths between exposure to vs. self-posting of social media messages and the cognitions (H8), a model in which the parameters varied freely was compared with a model in which the structural paths were constrained to be equal.

Next, multiple group analysis examined gender differences (H9). After, measurement invariance was confirmed, $\Delta\chi^2 = 12.66$, $\Delta df = 14$, $p = .55$, a multiple group analysis was performed. The fit indices of the constrained model (in which the relations were constrained to be equal among men/boys and women/girls) and unconstrained model were compared.

A multiple group analysis compared adolescents to young adults (H10). Measurement invariance was not confirmed ($\Delta\chi^2 = 74.25$, $\Delta df = 14$, $p < .001$) – indicating that groups differed on the conceptualization of several measurements (i.e., prototype favorability, willingness, and violations). To examine the structural paths, the restrictions of equality were freed². Measurement invariance was obtained for a model in which the four measurement weights were freed, $\Delta\chi^2 = 15.18$, $\Delta df = 10$, $p = .126$.

4. Results

4.1. Descriptive statistics

Zero-order correlations and descriptive statistics can be found in Table 1. Tables 2 and 3 report the correlations split by age and gender.

4.2. Testing the hypothesized model

The model showed an acceptable fit of the data; $\chi^2 = 1077.32$, $df = 322$, $p < .001$, RMSEA = 0.05 (95% CI [0.049; 0.056]), CFI = 0.90; TLI = 0.86; SRMR = 0.04; $\chi^2/df = 3.35$ (Fig. 2) and indicated that 92.1% of the variance of violations could be explained by the model. Below, the examined relations per cognition/behavior and indirect paths to violations of the regulations are discussed in relation to each type of media behavior.

4.2.1. Subjective norms

H1 was partially confirmed: exposure to pro-governmental social media messages negatively related to subjective norms ($\beta = -0.11$, $B = -0.10$, $SE = 0.04$, $CI\ 95\%[-0.182, -0.039]$, $p = .013$) whereas anti-governmental exposure positively related to subjective norms ($\beta = 0.22$, $B = 0.22$, $SE = 0.04$, $CI\ 95\%[0.127, 0.282]$, $p = .018$). No other significant links occurred.

4.2.2. Descriptive norms

H2 was partially confirmed as only anti-governmental media interactions: i.e., posting anti-governmental social media messages ($\beta = 0.12$, $B = 0.25$, $SE = 0.83$, $CI\ 95\%[0.017, 0.224]$, $p = .009$) and exposure to anti-governmental social media messages ($\beta = 0.16$, $B = 0.22$, $SE = 0.03$, $CI\ 95\%[0.077; 0.262]$, $p = .007$) positively related to descriptive norms.

4.2.3. Attitudes

H3 was partially confirmed as both pro- and anti-governmental media interactions related to attitudes. For pro-governmental media interactions, exposure to news media ($\beta = -0.15$, $B = -0.07$, $SE = 0.02$, $CI\ 95\%[-0.219, -0.081]$, $p = .010$) and exposure to pro-governmental social media messages ($\beta = -0.27$, $B = -0.12$, $SE = 0.02$, $CI\ 95\%[-0.374, -0.210]$, $p = .004$) negatively related to holding a positive attitude towards violations. Posting anti-governmental ($\beta = 0.33$, $B = 0.37$, $SE = 0.05$, $CI\ 95\%[0.192, 0.461]$, $p = .013$) and exposure to anti-governmental social media messages ($\beta = 0.21$, $B = 0.10$, $SE = 0.02$, $CI\ 95\%[0.135, 0.284]$, $p = .009$) positively related to positive attitude towards violations.

² For the prototype favorability measure, the item "funny" was significantly different between the adolescent and young adult group. For the willingness measurement, the items "lockdown party" and "sneezing in public" differed significantly. Lastly, for the violations measurement, the item "meeting offline" significantly differed."

Table 1
Zero-order Correlations.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	M (SD)
1 Environmental motivation	0.18***	0.06	-0.01	-0.17***	0.03	0.03	-0.03	-0.03	-0.09*	-0.00	-0.02	-0.08*	-0.07*	-0.25***	-0.12***	-0.30***	-0.09*	-0.29***	5.79(1.44)	
2 SES		0.00	0.07*	-0.15***	0.03	0.07*	0.01	-0.01	0.01	0.04	0.01	-0.04	-0.04	-0.05	-0.05	0.02	0.07*	0.01	6.97(1.23)	
3 Ethnicity			0.04	-0.09**	0.03	-0.04	-0.05	0.09*	0.08*	-0.01	0.08*	0.04	0.02	0.03	-0.04	0.03	0.03	-0.01	1.08(0.28)	
4 Sensation seeking				-0.15***	-0.07*	-0.06	-0.03	-0.03	0.13***	0.04	0.22***	0.09*	0.09*	0.18***	0.07*	0.17***	0.30***	0.21***	4.25(1.20)	
5 Age					-0.23***	0.26***	-0.01	0.15***	0.03	0.09*	-0.05	-0.11***	-0.06	-0.16***	-0.07*	0.01	-0.49***	-0.10**	20.55 (4.59)	
6 Gender						-0.06	0.07	-0.03	-0.06	0.05	-0.07*	0.02	-0.04	-0.10**	-0.08*	-0.08*	0.00	-0.05	1.72 (0.45)	
7 ENM							0.28***	0.13***	-0.05	0.21***	0.06	-0.02	-0.01	-0.20***	-0.05	-0.09*	-0.21***	-0.13***	4.25 (1.52)	
8 ES								0.30***	0.17***	0.14***	0.09*	0.07*	0.04	-0.00	0.03	-0.04	0.01	0.04	2.28 (1.30)	
9 Posting PGSM									0.53***	0.19***	0.13***	0.05	0.03	0.12***	0.12***	0.03	0.01	0.17***	2.23 (0.75)	
10 Posting AGSM										0.10**	0.26***	0.16***	0.11**	0.32***	0.23***	0.23***	0.29***	0.38***	2.09 (0.64)	
11 Exposure PGSM											0.44***	0.02	-0.00	-0.14***	-0.02	-0.01	-0.07	0.02	5.09 (1.68)	
12 Exposure AGSM												0.17***	0.19***	0.16***	0.09**	0.14***	0.19***	0.19***	3.90 (1.58)	
13 Descriptive norms													0.31***	0.20***	0.14***	0.20***	0.19***	0.22***	2.99 (1.28)	
14 Subjective norms														0.22***	0.14***	0.17***	0.14***	0.17***	3.19 (1.57)	
15 Attitude															0.43***	0.40***	0.42***	0.47***	2.04 (0.90)	
16 Prototype favorability																0.19***	0.22***	0.25***	1.77 (1.03)	
17 Intention																	0.34***	0.55***	1.92 (1.21)	
18 Willingness																		0.46***	2.29 (1.32)	
19 Violations																			1.90 (0.83)	

Note. SES = socio-economic status, ENM = exposure to news media, ES = exposure to (televised) series, PGSM = pro-governmental social media messages, AGSM = anti-governmental social media messages. *p <.05, **p <.01, ***p <.001.

Table 2
Zero-order Correlations divided by Age Group.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 ENM		0.31***	0.11*	-0.04	0.22***	0.10*	0.03	-0.01	-0.13**	0.06	-0.06	-0.06	-0.07
2 ES	0.27***		0.19***	0.06	0.19***	0.07	0.09	0.05	-0.07	0.05	-0.06	-0.06	0.01
3 Posting PGSM	0.09	0.39***		0.47***	0.19***	0.16***	0.12*	0.05	0.04	0.09	0.02	0.02	0.15**
4 Posting AGSM	-0.05	0.28***	0.60***		0.13**	0.32***	0.18***	0.15**	0.24***	0.17**	0.30***	0.35***	0.35***
5 Exposure PGSM	0.14**	0.08	0.17***	0.07		0.46***	0.09	-0.02	-0.14**	0.04	0.05	0.06	0.10*
6 Exposure AGSM	-0.05	0.11*	0.12*	0.19***	0.45***		0.26***	0.24***	0.17**	0.12*	0.21***	0.25***	0.21***
7 Descriptive norms	0.01	0.06	0.04	0.13**	-0.03	0.06		0.34***	0.19***	0.11*	0.12*	0.12***	0.23***
8 Subjective norms	0.02	0.03	0.03	0.08	0.03	0.15**	0.27***		0.22***	0.13**	0.23***	0.18***	0.23***
9 Attitude	-0.19***	0.08	0.25***	0.42***	-0.11*	0.12*	0.18***	0.21***		0.33***	0.44***	0.38***	0.39***
10 Prototype favorability	-0.14**	0.01	0.17**	0.30***	-0.08	0.04	0.16**	0.14**	0.54***		0.13**	0.19***	0.14**
11 Intention	-0.11*	-0.01	0.04	0.17**	-0.06	0.06	0.27***	0.12*	0.36***	0.24***		0.51***	0.59***
12 Willingness	-0.10	0.16**	0.22***	0.38***	-0.11*	0.12*	0.10*	0.08	0.44***	0.27***	0.26***		0.52***
13 Violations	-0.13*	0.09	0.24***	0.43***	-0.06	0.15**	0.17**	0.11*	0.54***	0.37***	0.52***	0.41***	

Note. Correlation coefficients above the diagonal represent the adolescent sample, correlation coefficients below the diagonal represent the young adult sample. ENM = exposure to news media, ES = exposure to (televised) series, PGSM = pro-governmental social media messages, AGSM = anti-governmental social media messages. *p <.05, **p <.01, ***p <.001.

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Table 3
Zero-order Correlations divided by Gender.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 ENM		0.27***	0.15*	-0.02	0.19**	0.07	-0.03	-0.10	-0.11	-0.04	-0.09	-0.14*	-0.12
2 ES	0.30***		0.40***	0.34***	0.20**	0.14*	-0.00	0.08	0.02	-0.01	-0.05	0.07	0.12
3 Posting PGSM	0.12**	0.25***		0.65***	0.22**	0.19**	0.05	0.08	0.26***	0.18**	0.09	0.06	0.31***
4 Posting AGSM	-0.07	0.08	0.43***		0.13*	0.25**	0.10	0.20**	0.31***	0.22**	0.19**	0.24***	0.38***
5 Exposure PGSM	0.22***	0.11**	0.18**	0.09*		0.46***	0.01	-0.04	-0.13*	-0.09	-0.07	-0.05	-0.05
6 Exposure AGSM	0.06	0.07	0.45***	0.27***	0.45***		0.07	0.23***	0.16*	0.05	0.11	0.20**	0.21**
7 Descriptive norms	-0.01	0.10*	0.05	0.19***	0.02	0.22***		0.31***	0.16*	0.13*	0.26***	0.13*	0.26***
8 Subjective norms	0.03	0.03	-0.00	0.06	0.02	0.18***	0.31***		0.30***	0.16*	0.17**	0.15*	0.18**
9 Attitude	-0.25***	-0.00	0.04	0.32***	-0.14**	0.14**	0.22***	0.18***		0.51***	0.40***	0.44***	0.56***
10 Prototype favorability	-0.07	0.05	0.07	0.24***	0.02	0.10*	0.15***	0.12**	0.39***		0.19**	0.23***	0.31***
11 Intention	-0.10*	-0.02	-0.02	0.26***	0.03	0.15***	0.17***	0.16***	0.39***	0.18***		0.28***	0.57***
12 Willingness	-0.24***	-0.01	-0.02	0.33***	-0.07	0.18***	0.22***	0.14**	0.41***	0.22***	0.38***		0.49***
13 Violations	-0.13**	0.02	0.09*	0.38**	0.05	0.18***	0.20***	0.16***	0.42***	0.22***	0.55***	0.45***	

Note. Correlation coefficients above the diagonal represent boys/men, correlation coefficients below the diagonal represent girls/women. ENM = exposure to news media, ES = exposure to (televised) series, PGSM = pro-governmental social media messages, AGSM = anti-governmental social media messages. *p <.05, **p <.01, ***p <.001.

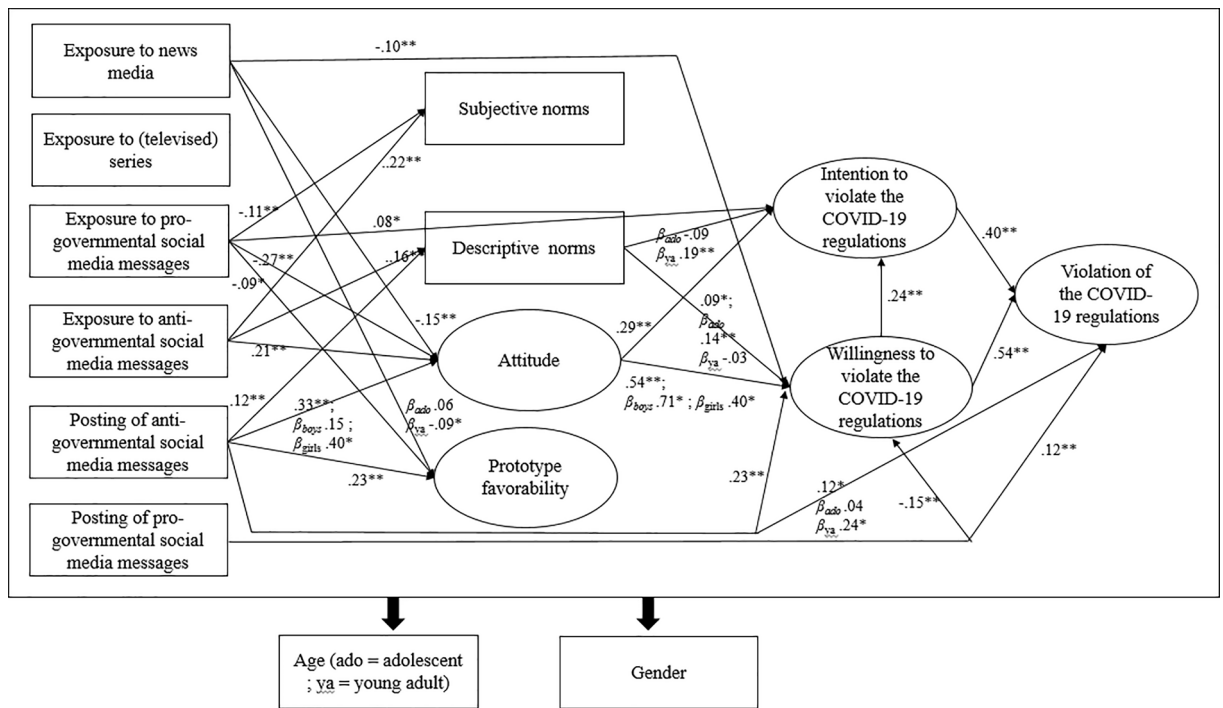


Fig. 2. Observed Model. Control variables are SES, ethnicity, sensation seeking and environmental motivation to follow the COVID-19 regulations. Control variables and error terms are not shown for clarity. *p <.05, **p <.01, ***p <.00.

Table 4
Effect Sizes for Indirect Paths.

Indirect path	β	SE	CI95%	p
Posting anti-governmental social media messages → descriptive norm → willingness → violation	0.005	0.004	0.001, 0.019	0.018
Posting anti-governmental social media messages → descriptive norm → willingness → intention → violation	0.001	0.001	0.000, 0.004	0.028
Posting anti-governmental social media messages → positive attitude → willingness → violation	0.083	0.030	0.034, 0.151	0.011
Posting anti-governmental social media messages → positive attitude → willingness → intention → violation	0.015	0.007	0.006, 0.035	0.007
Posting anti-governmental social media messages → positive attitude → intention → violation	0.034	0.016	0.014, 0.085	0.003
Exposure to anti-governmental social media messages → descriptive norm → willingness → violation	0.003	0.002	0.000, 0.006	0.044
Exposure to anti-governmental social media messages → descriptive norm → willingness → intention → violation	0.001	0.000	0.000, 0.001	0.024
Exposure to anti-governmental social media messages → positive attitude → willingness → violation	0.022	0.008	0.012, 0.046	0.003
Exposure to anti-governmental social media messages → positive attitude → willingness → intention → violation	0.004	0.002	0.002, 0.008	0.005
Exposure to anti-governmental social media messages → positive attitude → intention → violation	0.009	0.004	0.003, 0.019	0.004
Exposure pro-governmental social media messages → positive attitude → willingness → violation	-0.027	0.009	-0.053; -0.015	0.005
Exposure to pro-governmental social media messages → positive attitude → willingness → intention → violation	-0.005	0.002	-0.010; -0.002	0.007
Exposure to pro-governmental social media messages → positive attitude → intention → violation	-0.011	0.005	-0.024; -0.004	0.006
Exposure to news media → positive attitude → willingness → violation	-0.016	0.007	-0.034; -0.007	0.011
Exposure to news media → positive attitude → willingness → intention → violation	-0.003	0.001	-0.006; -0.001	0.007
Exposure to news media → positive attitude → intention → violation	-0.007	0.004	-0.019; -0.002	0.004

4.2.4. Prototype favorability

H4 was partially confirmed as only posting anti-governmental social media messages positively related to prototype favorability towards a violator ($\beta = 0.23, B = 0.39, SE = 0.07, CI\ 95\%[0.134, 0.333], p = .007$) whereas exposure to pro-governmental social media messages was negatively associated with prototype favorability ($\beta = -0.09, B = -0.06, SE = 0.03, CI\ 95\%[-0.184, -0.011], p = .036$).

4.2.5. Intention

H5 was partially confirmed as two cognitions, i.e., holding a positive attitude towards violating the regulations ($\beta = 0.29, B = 0.49, SE = 0.14, CI\ 95\%[0.127, 0.499], p = .007$) and willingness ($\beta = 0.24, B = 0.28, SE = 0.07, CI\ 95\%[0.086, 0.387], p = .016$) were positively related to intention. Exposure to pro-governmental ($\beta = 0.08, B = 0.06, SE = 0.03, CI\ 95\%[0.003, 0.154], p = .040$) and posting pro-governmental social media messages ($\beta = -0.06, B = -0.10, SE = 0.06, CI\ 95\%[-0.132, -0.001], p = .048$) were also respectively positively and negatively related to intention to violate.

4.2.6. Willingness

H6 was partially confirmed as two cognitions: i.e., descriptive norms ($\beta = 0.09$, $B = 0.08$, $SE = 0.03$, $CI\ 95\%[0.007, 0.165]$, $p = .044$) and positive attitude ($\beta = 0.54$, $B = 0.81$, $SE = 0.12$, $CI\ 95\%[0.374, 0.733]$, $p = .012$) related to willingness to violate the regulations. No support emerged for the associations between subjective norms/prototype favorability and willingness. Exposure to news media ($\beta = -0.10$, $B = -0.07$, $SE = 0.03$, $CI\ 95\%[-0.194, -0.029]$, $p = .012$), posting pro-governmental social media messages ($\beta = -0.15$, $B = -0.21$, $SE = 0.06$, $CI\ 95\%[-0.231, -0.059]$, $p = .012$) and posting anti-governmental social media messages ($\beta = 0.23$, $B = 0.40$, $SE = 0.08$, $CI\ 95\%[0.118, 0.353]$, $p = .007$) related to willingness.

4.2.7. Behavior

H7 was partially confirmed as willingness ($\beta = 0.54$, $B = 0.28$, $SE = 0.04$, $CI\ 95\%[0.383, 0.718]$, $p = .014$) and intention ($\beta = 0.40$, $B = 0.18$, $SE = 0.02$, $CI\ 95\%[0.285, 0.533]$, $p = .010$) were positively related to violations. Posting pro-governmental ($\beta = 0.12$, $B = 0.09$, $SE = 0.03$, $CI\ 95\%[0.027, 0.221]$, $p = .006$) and anti-governmental social media messages ($\beta = 0.12$, $B = 0.10$, $SE = 0.04$, $CI\ 95\%[0.004, 0.253]$, $p = .044$) were positively related to violations.

The results indicated several indirect links of media interactions to violations of the COVID-regulations via (1) attitudes and (2) descriptive norms. The effect sizes for significant indirect paths were obtained through user-defined estimands (see Table 4).

Indirect paths revealed that *attitudes* played a role in the social reaction and reasoned pathway of the PWM. For the *social reaction pathway*, posting anti-governmental social media messages ($\beta = 0.08$, $p = .011$), exposure to anti-governmental social media messages ($\beta = 0.02$, $p = .003$), exposure to pro-governmental social media messages ($\beta = -0.03$, $p = .005$) and exposure to news media ($\beta = -0.02$, $p = .011$) related to violations via attitudes and willingness. For the *reasoned action pathway*, posting anti-governmental social media messages ($\beta = 0.03$, $p = .003$), exposure to anti-governmental social media messages ($\beta = 0.01$, $p = .004$), exposure to pro-governmental social media messages ($\beta = -0.01$, $p = .006$), exposure to news media ($\beta = -0.01$, $p = .004$) related to violations via attitudes and intention.

Support was found for *descriptive norms* in the *social reaction pathway* of the PWM, i.e., posting anti-governmental social media messages ($\beta = 0.01$, $p = .018$) and exposure to anti-governmental social media messages ($\beta = 0.00$, $p = .044$) related to violations via descriptive norms and willingness.

4.3. Exposure vs self-posting differences

Model comparison tests were performed whereby the relations between exposure vs. posting behavior of one social media type (anti-/ pro-governmental) were compared for each cognition to examine if significant differences emerged in the PWM between exposure vs. self-posting behaviors (H8). For *subjective norms*, no significant differences emerged between the posting of and exposure to anti-governmental social media messages ($\Delta\chi^2 = 0.07$, $p = .796$) and the posting of and exposure to pro-governmental social media messages ($\Delta\chi^2 = 0.19$, $p = .665$), contradicting H8.

For *descriptive norms*, no significant differences emerged between the posting of and exposure to anti-governmental social media messages ($\Delta\chi^2 = 1.58$, $p = .208$) and the posting of and exposure to pro-governmental social media messages ($\Delta\chi^2 = 0.08$, $p = .773$), contradicting H8.

For *attitudes*, the strength of the association between posting pro-governmental social media messages and attitudes ($\beta = 0.07$, $p = .157$) was significantly weaker ($\Delta\chi^2 = 17.43$, $p < .001$) than the strength of the association with exposure to pro-governmental social media messages ($\beta = -0.27$, $p = .004$) (contradicting H8). In line with H8, the association between posting anti-governmental social media messages and attitudes ($\beta = 0.33$, $p = .013$) was significantly stronger ($\Delta\chi^2 = 25.67$, $p < .001$) than the relations between exposure to anti-governmental social media messages and attitudes ($\beta = 0.21$, $p = .009$).

For *prototype favorability*, in line with H8, the association between posting anti-governmental social media messages and prototype favorability ($\beta = 0.23$, $p = .007$) was significantly stronger than the association between exposure to anti-governmental social media messages and prototype favorability ($\beta = 0.06$, $p = .161$; $\Delta\chi^2 = 17.36$, $p < .001$). No significant difference emerged for the association between exposure to and posting of pro-governmental social media messages and prototype favorability ($\Delta\chi^2 = 1.97$, $p = .161$) (contradicting H8).

For *intention*, in contrast with H8, posting pro-governmental social media messages was marginally related to intention ($\beta = -0.06$, $p = .048$) and the direction of this association was significantly different than ($\Delta\chi^2 = 5.04$, $p = .025$) the association between exposure to pro-governmental social media messages and intention ($\beta = 0.08$, $p = .040$). No significant differences emerged between posting of and exposure to anti-governmental social media messages and their association with intention ($\Delta\chi^2 = 0.76$, $p = .382$, contradicting H8).

For *willingness*, the association between posting pro-governmental social media messages and willingness ($\beta = -0.15$, $p = .012$) was significantly stronger than the association of exposure to pro-governmental social media messages ($\beta = -0.04$, $p = .683$; $\Delta\chi^2 = 7.365$, $p = .007$) and willingness. The association between posting anti-governmental social media messages and willingness ($\beta = 0.23$, $p = .007$) was significantly stronger than the association with exposure to anti-governmental social media messages and willingness ($\beta = 0.03$, $p = .441$; $\Delta\chi^2 = 20.01$, $p < .001$) (supporting H8).

For *violating* the regulations, posting pro-governmental social media messages related significantly to violations ($\beta = 0.12$, $p = .006$) and this association differed significantly from the association with exposure to pro-governmental social media messages ($\beta = 0.06$, $p = .277$; $\Delta\chi^2 = 4.62$, $p = .032$). Although this finding aligns with the tie strength expected in H8 in which posting behavior is expected to more strongly relate to violations compared to exposure behavior, reverse directions of associations were found. In support of H8, posting anti-governmental social media messages was significantly stronger related to violations ($\beta = 0.12$, $p = .044$; $\Delta\chi^2 = 6.75$, $p = .009$).

=.009) than exposure to anti-governmental social media messages ($\beta = -0.01$, $B = -0.00$, $p = .836$).

4.4. Gender differences

The unconstrained model (i.e., model where the parameters vary across groups) significantly differed from the constrained model, indicating that the processes differed for boys and girls, $\Delta\chi^2 = 87.69$, $\Delta df = 54$, $p = .003$. A path-by-path analysis indicated that posting anti-governmental social media messages related to a positive attitude among girls/women ($\beta = 0.40$, $B = 0.54$, $SE = 0.07$, $CI\ 95\% [0.281, 0.536]$, $p = .005$), but not among boys/men ($\beta = 0.15$, $B = 0.12$, $SE = 0.07$, $CI\ 95\% [-0.062, 0.463]$, $p = .194$), contradicting H9. No gender differences emerged between the pro-governmental media interactions/exposure to anti-governmental social media messages and the different cognitions of the PWM (i.e., descriptive/subjective norms, attitude, prototype favorability; contradicting H9). The effect size of the association between attitude and willingness was larger for boys/men ($\beta = 0.71$, $B = 1.20$, $SE = 0.33$, $CI\ 95\% [0.333, 1.274]$, $p = .026$) than for girls/women ($\beta = 0.40$, $B = 0.51$, $SE = 0.10$, $CI\ 95\% [0.195, 0.540]$, $p = .023$) (in line with H9). The association between prototype favorability and willingness was not significant among boys/men ($\beta = -0.22$, $B = -0.21$, $SE = 0.10$, $CI\ 95\% [-0.670, 0.023]$, $p = .066$) and girls/women ($\beta = 0.00$, $B = 0.00$, $SE = 0.04$, $CI\ 95\% [-0.095, 0.164]$, $p = .874$) (contradicting H9).

4.5. Age differences

The unconstrained model differed from the constrained model, indicating that the processes differed for adolescents and young adults, $\Delta\chi^2 = 100.12$, $\Delta df = 54$, $p < .001$. A path-by-path analysis revealed that exposure to news media related to prototype favorability among young adults ($\beta = -0.09$, $B = -0.07$, $SE = 0.04$, $CI\ 95\% [-0.178, -0.007]$, $p = .038$), but not among adolescents ($\beta = 0.06$, $B = 0.04$, $SE = 0.04$, $CI\ 95\% [-0.054, 0.169]$, $p = .356$), which aligns with H10. Posting anti-governmental social media messages related to violations among young adults ($\beta = 0.24$, $B = 0.24$, $SE = 0.06$, $CI\ 95\% [0.049, 0.462]$, $p = .020$), but not among adolescents ($\beta = 0.04$, $B = 0.03$, $SE = 0.05$, $CI\ 95\% [-0.159, 0.266]$, $p = .525$), which contradicts H10. H10 could not be fully supported as no other age differences occurred between the media interactions and other cognitions in the PWM (e.g., attitudes, norms). The association between descriptive norms and willingness was only significant among adolescents ($\beta = 0.14$, $B = 0.12$, $SE = 0.04$, $CI\ 95\% [0.039, 0.265]$, $p = .010$), not among young adults ($\beta = -0.03$, $B = -0.02$, $SE = 0.03$, $CI\ 95\% [-0.105, 0.073]$, $p = .563$). Descriptive norms related to intention, only among young adults ($\beta = 0.19$, $B = 0.20$, $SE = 0.05$, $CI\ 95\% [0.098, 0.312]$, $p = .003$), not among adolescents ($\beta = -0.09$, $B = -0.08$, $SE = 0.04$, $CI\ 95\% [-0.187, 0.012]$, $p = .107$).

5. Discussion

This study provided insights in the relations between media interactions, cognitions and violations of the COVID-19 regulations. First, the findings largely confirmed the role of various media interactions within the PWM; some related positively to the different cognitions; others linked negatively to them (H1-H7). As for the *pro-governmental media interactions*, (1) news exposure negatively related to attitudes and willingness, (2) exposure to social media messages negatively related to subjective norms, attitudes, prototype favorability and, (3) posting of social media messages negatively related to intention and willingness to violate the regulations. Interestingly, exposure to (televised) series did not relate to any of the cognitions or behaviors in the PWM, contradicting our hypotheses and research which found that entertainment media relate to health risk cognitions/behaviors (Shen and Han, 2014). One explanation may be that the content of these series was entertainment-related. The other included media interactions referred more explicitly to pro- or anti-governmental COVID-19 health norms. Additionally, although series appeared during the first lockdown, they were not as popular as other pro-governmental media (e.g., news exposure, exposure to pro-governmental social media messages) as participants watched such programs, on average, once a month.

As for the *anti-governmental media interactions*, posting of and exposure to such social media messages related positively to descriptive norms and attitudes. Posting also positively related to prototype favorability and willingness. These findings align with research indicating that exposure to pro- and anti-health safety messages are related to, respectively, individual's adaption of health and risk behavior (Allington et al., 2021; Boyle et al., 2016). Our findings extend such patterns to the unique COVID-19 context of public health behavior.

One puzzling finding occurred for posting pro-governmental social media messages as this variable related to a *lower* willingness to violate the regulations and simultaneously related to *higher* actual violations. A discrepancy emerged between what was posted online and youths' offline behavior. As our results revealed that actual violations occurred quite seldom, this discrepancy may have occurred in a subset of the sample. One explanation may be the group who posted pro-governmental messages. This group was limited as most of the sample (88%) never posted such content and for those who posted, they only did so a few times per month. The specific characteristics of this group may explain our results. More research is needed on the characteristics and motivations of these individuals that post such content.

Additionally, the worries of scholars that anti-governmental content relates to anti-governmental cognitions or behaviors, is supported by our data (Ahmed et al., 2020). Simultaneously, our data contextualizes such concerns. Descriptive statistics showed that

actual violations of the regulations rarely occurred, and the cognitions showed unfavorable beliefs towards the violations. Additionally, participants rarely posted or encountered this type of content. Such content was even less frequently encountered/posted than pro-governmental content. Posting pro-governmental content on social media ($M = 2.23$) occurred more frequently than posting anti-governmental social media content ($M = 2.09$). Exposure to pro-governmental content ($M = 5.09$) also occurred more frequently than exposure to anti-governmental content ($M = 3.90$)³.

Yet, the direction of the association remains unclear due to our cross-sectional design. We hypothesized that individuals who consumed or posted anti-governmental media messages more frequently, had more positive cognitions or violated the COVID-19 regulations more frequently. The reverse pattern is also likely and would be in line with theories such as the reinforcing spiral model (Slater, 2015) and literature documenting media selection and media production activities in the context of risk behavior (Geusens and Beullens, 2017b).

5.1. Social reaction and reasoned action pathways

The mediation analyses provided partial support for the PWM. We found support for the role of some media interactions (i.e., exposure to news media/ pro- and anti-governmental social media messages, posting of anti-governmental social media messages) in youths' violations/compliance with the regulations via the pathway of attitudes with behavioral willingness (i.e., social reaction path) and intentions (i.e., reasoned path) in the PWM.

The findings align with studies supporting correlations between media use and risk behaviors via positive attitudes and descriptive norms (Schreurs et al., 2020). Yet, none of the links between media and risk behavior occurred via subjective norms or prototype favorability; these variables did not relate to intention or willingness. These findings somewhat contradict prior studies supporting the mediating role of prototype favorability or social norms (e.g., Schreurs et al., 2020). It is unclear why these findings emerged. Potentially, some cognitions are more impactful in individual risk behavior than for public health behavior.

The mediating role of attitudes between exposure to pro-governmental social media messages and youths' adherence to the regulations may have implications for health campaigns. Actions that motivate others to post about positively coping with the measures seem warranted. Yet, such posts distributed by youth themselves are rare and thus especially influencers, celebrities, or even governmental campaigns can help to distribute them.

5.2. Exposure vs self-posting differences

Differences emerged between exposure vs. self-posting activities on social media, which largely supported H8. For *anti-governmental social media*, posting related more strongly to attitudes, prototype favorability, willingness, violations of the COVID-19 regulations compared to exposure. For *pro-governmental social media*, posting stronger related to willingness compared to exposure. As certain media behaviors relate more strongly to risk behaviors/cognitions (e.g., posting of anti-governmental messages) than others (e.g., exposure to anti-governmental messages), future studies may explore which individual characteristics predict such posting vs. exposure behaviors such as gender and sensation seeking.

Yet, exposure to pro-governmental social media messages related more strongly to attitudes and intention compared to posting behavior (contradicting H8). Except for the latter findings, the results align with studies suggesting that more active – posting – social media activities are stronger related to users' cognitions and behaviors than exposure (Geusens and Beullens, 2016a, 2016b). It is puzzling why the pattern of exposure to pro-governmental social media messages vs. the posting of such content showed some unexpected findings. The prevalence rates of exposure to pro-governmental social media messages ($M = 5.09$) were much higher than for self-posting of such content ($M = 2.23$); which aligns with studies that revealed higher mean exposure levels to social media content compared to posting behavior on social media (e.g., Geusens and Beullens, 2016a). However, such large differences were not observed between exposure to ($M = 3.90$) and posting of anti-governmental social media content ($M = 2.09$). Potentially, some level of engagement with the content is needed to correlate with individuals' attitudes and intentions. It remains unclear in this reasoning why we did find stronger associations for willingness and violations; self-posting of pro-governmental social media messages did show stronger correlations than exposure to such messages. Future research is advised to first replicate such patterns and, next, theorize a potential explanation.

5.3. The moderating role of age and gender

Several gender and age differences were found, which implicates that health actions can target gender and age groups differently. In regard to *gender*, in contrast to H9 and literature suggesting that boys/men are more likely to positively and strongly respond to anti-governmental media messages (Ronay and Kim, 2006), we found that posting anti-governmental social media messages positively related to positive attitudes towards COVID-19 violations among girls/women but not boys/men. As explained above, the group that posted anti-governmental content was small and may not match with typical gender traits observed in male and female samples. Another study that also observed the surprising finding that girls, but not boys, were more susceptible to adopt risk cognitions from

³ Note that we also tested if these differences were significant. Specifically, posting of pro-governmental content on social media occurred significantly more frequently than posting of anti-governmental social media content, $t(8\ 0\ 8) = 5.67, p < .001$. Similarly, exposure to pro-governmental content occurred significantly more frequently than exposure to anti-governmental content, $t(8\ 0\ 8) = 19.63, p < .001$.

media activities suggested that it may be that girls, generally, have lower risk cognitions than boys. Girls' risk perceptions may, as such, be more susceptible to influence. In our study, it could be that users have a ceiling level up to which risk cognitions can be increased. With boys having higher risk cognitions, girls' perceptions may have more variance left to be changed after media activities (Vandenbosch and Beyens, 2014).

As for *age differences*, although posting anti-governmental social media messages indirectly related to violating regulations via attitudes among adolescents and young adults, posting anti-governmental messages also directly related to violations of the regulations among young adults. The latter finding contradicts H10 and literature expecting that adolescents are more attracted to risk behavior (Sherman et al., 2018). Potentially, adolescents were still living with their parents and were thus more strictly monitored to follow the regulations.

5.4. Limitations

Several limitations existed. Some scales that were adapted from prior studies (e.g., willingness) had a low reliability. We measured descriptive norms with one item instead of multiple items. Other studies focusing on different regulations should examine norms for each regulation separately as individuals may be stricter about following certain regulations (e.g., attending gatherings with many people) compared to other regulations. Youth may have also responded in a socially desirable manner regarding their violations, and thus underreporting may have occurred. Future research may use face-saving questions that decrease the social norms of following the COVID-regulations by rationalizing why non-compliance can occur (Daoust et al., 2021). We used self-report measures of participants' media use which may have implications for the accuracy and validity (Verbeij et al., 2021). Future studies measuring individuals' content-specific media use may reflect about digital trace methods- yet until now such methods are not available to measure content-specific exposure (rather general app uses). This study did not measure anti-governmental messages in news media and entertainment TV. Possibly, such messages may have especially appeared in subsequent lockdown periods as news agencies for instance reported about demonstrations against the lockdown measures or invited virologists who disagreed with the measures. Future studies may examine the role of such messages in youth's cognitions towards the regulations. We followed the PWM (Gerrard et al., 2008) and prior studies (Walrave et al., 2015), which suggest that intention and willingness are two separate constructs. It remains questionable if these measures measure a different construct because additional PCA's⁴ suggested only one construct and significant correlations existed between intention and willingness. Research may further explore the differentiation between intention and willingness. Additionally, the time frame of the data collection may have influenced the results of the study. For instance, compliance with the COVID-19 measures decreased when the measures were applied for a longer period (Laszewska et al., 2021). It seems possible that individuals' cognitions and violations were higher in the subsequent lockdowns. Causal inferences could not be drawn from this cross-sectional study (Levin, 2006). Lastly, although the sample had a good distribution in terms of educational level, females were over-represented in the sample which may limit the generalizability of the findings. The generalizability of the findings to other cultures is also limited as the current study was conducted in a Western culture. Western cultures are more individualistic and use more social media (Jackson and Wang, 2013) and may therefore be more likely to violate regulations which would benefit a society compared to collectivistic cultures (Oh, 2013).

6. Conclusion

Different media interactions related differently to risk behaviors in a public health context (i.e., violating COVID-19 regulations) via attitudes and descriptive norms. Additionally, the results reveal differences between (1) media audiences and (2) media interactions. Active media behavior (i.e., posting social media messages) are especially strongly related to health cognitions and behavior compared to exposure to messages.

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Data availability statement

All data and syntaxes related to this study can be found on OSF: <https://osf.io/2ekft/> https://osf.io/2ekft/?view_only=480035916ecce47ad8076a4cedb52437e.

⁴ Additional PCA's indicated that willingness (four items) and intention (one item) load on the same factor in the whole- (eigenvalue= 2.17, explained variance= 43.30%), young adult-(eigenvalue= 2.12, explained variance= 42.42) but not the adolescent sample in which one item (i.e., the item regarding personal hygiene in the willingness scale) loaded on a second factor (eigenvalues= 2.20/1.01, explained variances= 44.08%/ 20.29%). Reliability increased if this item was omitted. Good reliability occurred on the scale with the three items of willingness and one item of intention ($\alpha_{\text{fullsample}} = 0.66$; $\alpha_{\text{youngadultssample}} = 0.62$; $\alpha_{\text{adolescentssample}} = 0.71$).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

The questions below were developed to test the prototype willingness model regarding violations of the COVID-19 regulations in Belgium. All questions (Q) and corresponding items are provided.

Note that these regulations were officially declared by the government in Belgium at the end of March 2020 in order to contain the spread of the COVID-19 virus and that violations of these regulations could result in a penalty. The same regulations were applicable during the full data collection period in the whole country, i.e., (1) hyper attention to a good personal hygiene (e.g., washing your hands, ...), (2) social distancing regulations, (3) having no offline contact or gatherings with multiple people (e.g., in a park, meeting with multiple friends at someone's home, lockdown parties, ...), (4) staying at home and avoiding non-essential displacements (e.g., going to another city, ...). One regulation differed among adolescents and young adults. While young adults were not allowed to meet with multiple friends, adolescents were not allowed to meet multiple friends and their girlfriend/boyfriend. This wording was adjusted for adolescents in each question.

Note that these regulations and the moment since these regulations were applied were repeated in the question about the COVID-19 regulations. It was for instance clearly explained that the regulations were enforced since March 2020 and were still applicable in April 2020.

Descriptive norms

Q: How many peers violate one or more of the Belgian COVID-19 regulations since they were applied? [question displayed for adolescents and young adults].

Subjective norms

Q: According to you, what do your peers think about violating the Belgian COVID-19 regulations? [question displayed for adolescents and young adults].

Attitude

Q: The next sentences are about violating the COVID-19 regulations that were proclaimed. Indicate to what extent you agree with the following sentences. [question displayed for adolescents and young adults].

Not following one or multiple of the COVID-19 regulations is ... (1) dangerous*, (2) normal, (3) funny, (4) stupid*, (5) fun.

Note that items with * were reverse-coded.

Prototype favorability

Q: Imagine a man or woman of your age who violates the COVID-19 regulations now and then. We would like to know if you think that the following characteristics typify this person. To what extent do you agree with the following statements.

Q: A person who violates the COVID-19 regulations is ... (1) cool, (2) smart, (3) interesting, (4) funny, (5) popular. [question displayed for young adults].

Q: A boy or girl who violates the COVID-19 regulations is... (1) cool, (2) smart, (3) interesting, (4) funny, (5) popular. [question displayed for adolescents].

Willingness to violate the COVID-19 regulations

Q: Imagine that two friends call you and ask you to hang out at one of your friends' place, how likely is it that you will meet them while the COVID-19 regulations are still enforced? [question displayed for adolescents and young adults].

Q: Imagine that your friends organize a lockdown party and you are certain that no one will catch you at a secluded place, how likely is it that you will go to this party while the COVID-19 regulations are still enforced? [question displayed for adolescents and young adults].

Q: Imagine that you are using the public transport in your own city. You are sitting on the bus and feel that you have to sneeze or cough, how likely is it that you will sneeze or cough in your elbow while the COVID-19 regulations are still enforced? [question displayed for adolescents and young adults].

Q: Imagine that you see your best friends again after a long time, how likely is it that you will give them a kiss/hand while the COVID-19 regulations are still enforced? [question displayed for young adults].

Q: Imagine that you see your girlfriend/boyfriend at a time when no one would see you. How likely is it that you will hug/kiss him/her while the COVID-19 regulations are still enforced? [question displayed for adolescents].

Intention to violate the COVID-19 regulations

Q: How many times do you plan to violate one or multiple of the COVID-19 regulations when they still apply? [question displayed for adolescents and young adults].

Violation of the COVID-19 regulations

Q: The next COVID-19 regulations apply since March. These regulations also apply currently. How frequently have you violated one or multiple of the following COVID-19 regulations since they were enforced? (1) Violating hygiene regulations (e.g., not washing hands) (2) violating the social distancing rules, (3) meeting offline with multiple friends / meeting offline with multiple friends, your boyfriend or your girlfriend [question displayed for adolescents].

(e.g., having a lockdown party), (4) making a non-essential displacement and not staying at home (e.g., going to another city, visiting your grandparents).

Exposure to news media

Q: How frequently have you (1) watched the (televised) news, (2) read the (digital) newspaper since the enforcement of the COVID-19 regulations? [question displayed for adolescents and young adults].

Exposure to (televised) series

Q: How frequently have you (1) watched television programs who support following the COVID-19 regulations (e.g., BlijftnUwKot on VTm), (2) watched series on epidemics and pandemics (e.g., Pandemic on Netflix, Telefacts about corona, Topdokters Corona) since the enforcement of the COVID-19 regulations? [question displayed for adolescents and young adults].

Exposure to pro-governmental social media messages

Q: How often have you seen the following messages on social media since the enforcement of the COVID-19 regulations (1) read a news item about COVID-19 via a shared message on social media (e.g., a newspaper article on Facebook), (2) read a support message about COVID-19 on social media (e.g., pictures, stories or statuses with #WeCanDoThis, #TogetherAgainstCorona), (3) read a message on social media to motivate others to follow the COVID-19 regulations (e.g., pictures, stories or statuses with #StayHome). [question displayed for adolescents and young adults].

Exposure to anti-governmental social media messages

Q: How often have you seen the following messages on social media since the enforcement of the COVID-19 regulations (1) read a message on social media to mock the COVID-19 regulations (e.g., a meme about how stupid it is not seeing any friends), (2) read a message on social media to complain about the COVID-19 regulations (e.g., a status in which you complain how stupid it is to not see any friends), (3) read a message on social media in which you violate the COVID-19 regulations (e.g., a picture or status about a get-together with multiple friends). [question displayed for adolescents and young adults].

Posting of pro-governmental social media messages

Q: How frequently have you posted the following messages on social media since the enforcement of the COVID-19 regulations (1) shared a corona-related news item via social media (e.g., news articles on Facebook), (2) posted a support message about COVID-19 on social media (e.g., pictures, stories or status updates with #TogetherWeCanDoThis #TogetherAgainstCorona), (3) posted a message on social media to motivate others to follow the COVID-19 regulations (e.g., pictures, stories or status updates with #StayHome). [question displayed for adolescents and young adults].

Posting of anti-governmental social media messages

Q: How frequently have you posted the following messages on social media since the enforcement of the COVID-19 regulations (1) posted a message on social media to mock the COVID-19 regulations (e.g., a meme to laugh about the prohibition of seeing friends), (2) posted a message on social media to complain about the COVID-19 regulations (e.g., a status on Twitter to complain about how stupid it is that you can't go to a bar), (3) posted a message on social media in which you violate the COVID-19 regulations (e.g., a picture of how you met with friends when this was not allowed). [question displayed for adolescents and young adults].

Environmental motivation to follow the COVID-19 regulations

Q: To what extent do your housemates follow the COVID-19 regulations? [question displayed for young adults living with housemates such as parents, partner, friend, brother or sister].

Q: To what extent does your environment follow the COVID-19 regulations? [question displayed for young adults living alone without housemates].

Q: To what extent do your parents and any brothers or sisters follow the COVID-19 regulations? [question displayed for adolescents living with housemates such as parents, brother or sister].

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Ilse Vranken (MA, KU Leuven) is a PhD fellow at the School for Mass Communication Research (KU Leuven, Belgium) funded by the Research Foundation Flanders (FWO). She studies the role of televised series and social media (e.g., TikTok, Instagram) in late adolescents' vocational aspirations and beliefs. Her research also focuses on the effects of TV portrayals and social media portrayals of women in atypical careers (e.g., STEM-professions) on late adolescents.



Nausikaä Brimmel (MA, KU Leuven) is a doctoral student at the Leuven School of Mass Communication Research, Faculty of Social Sciences at KU Leuven, Leuven, Belgium. Her research focuses the role of (social) media use in emotional well-being in adolescents and adolescent (media) response styles to affect.



Laura Vandenbosch is a professor at the Leuven School for Mass Communication Research, KU Leuven, Belgium (BOF-ZAP research professorship grant). The relationship between media and well-being is the core subject of her research, leading to international publications in several fields including developmental psychology, sexology, body image, social relationships and communication theory.



Jolien Trekels (PhD, KU Leuven) is a postdoctoral researcher at the KU Leuven and studies the role of traditional and social media in the lives of youth with a specific focus on body image development.