# Improving Communication with Young Adults regarding COVID-19 Regulations by Combining Self-affirmation and Constructive Learning

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## Abstract

The COVID-19 pandemic has highlighted the need to improve public health communications, in particular with young adults. This study explored new ways to improve such communication, with the goal of increasing young adults' adherence to COVID-19 related health regulations.

Using an online randomized experiment, we tested two interventions designed to increase young adults' adherence. A self-affirmation task applied Social Cognition Theory to increase young adults' self-efficacy, while a constructive learning task drew from the ICAP framework to engage young adults in a creative process designed to increase their knowledge of COVID-19 related health regulations.

Participants (n=118) were mostly university students between the ages of 18 and 23. A 2x2 crossed design was used in which the participants were randomly assigned to each of the tasks. The hypotheses were tested using multivariate linear mixed-effects models, linear regressions, and an independent t-test.

Self-affirmation did not have a significant effect on participants' self-efficacy or intentions to adhere. The constructive learning task did not increase participants' knowledge or intentions to adhere significantly. Higher self-efficacy was associated with significantly higher intentions to adhere. The self-affirmation task did not significantly improve participants mood.

While none of the intervention changed the expected outcome significantly, this study has indicated that using unstructured constructive learning tasks in a social media setting are not a good way to increase knowledge and change behaviours in young adults when it comes to public health communication.

**Contents**

# Improving Communication with Young Adults Regarding COVID-19 Regulations by Combining Self-affirmation and Constructive Learning

In December 2019, a new virus emerged in Wuhan, China, and quickly spread around the world (Keni et al., 2020). Little was known about the transmission, death rates, or symptoms of what would be called Corona Virus Disease 2019, or COVID-19 (WHO, 2020). While treatment and vaccines were still in development, keeping physical distance (also called social distancing) and a strict hygiene protocol was considered the best way of curbing the spread of the pandemic (Anderson et al., 2020). Public communication was complicated by rapidly evolving knowledge about the virus and the best interventions for preventing its spread. Different governments and public health organisations advocated for different – often contradictory – interventions at different times, both on the national and international stage.

Given these circumstances, effective public health communication was both crucially important, and exceedingly difficult. That was even more true for communicating with young adults, identified by the World Health Organization (WHO) as a group with possible low compliance (Nebehay, 2020), while also being more likely to have active social lives and large social networks, and often show only mild or no symptoms while being contagious (Nivette et al., 2020).

The goal of this study is to explore effective means of public health communication with young adults. The following paragraphs will first provide a broad theoretical overview using the narrative of COVID-19 related health interventions used by the Dutch national government. We will then explain why trust, knowledge and self-efficacy are necessary elements of effective public health campaigns and introduce two interventions tailored to increase knowledge and self-efficacy in young adults.

In the current crisis, regulations were adopted in short time frames because of rapidly evolving knowledge about the virus and the communication of the government about the

regulations was not always as successful as they had hoped. At times quite a lot of uncertainty existed in the population about the implementation of the regulations. This uncertainty can result in a lack of adherence to the regulations, even if the person was willing to comply with them (Kavanagh et al., 2011). This increased the importance of a coherent communication campaign by the government to decrease the uncertainty and spread the correct information as communication failures can undermine the public trust which is needed to respond to the pandemic (Kim & Kreps, 2020).

A so-called 'intelligent lockdown' was introduced, in which the Dutch were still allowed to go outside, and shops, parks, and beaches in which 1,5m distancing could be observed were permitted to stay open (Reinders Folmer et al., 2020).

In March, adherence to COVID-19 regulations in the Netherlands was very good with 99% of the respondents reporting that they were keeping to the distance of 1,5m and 87% of people report that they were staying home if they felt unwell (Van 't Veld et al., 2020). However, in subsequent studies at the beginning and end of May, it became clear that adherence to the 1,5m rules was decreasing, together with public support for the regulations and the social norms for complying (Reinders Folmer et al., 2020). Lunn et al. (2020) suggested that one of the reasons for this decrease in compliance was that many people are actually "conditional co-operators" (Chaudhuri, 2011 as cited in Lunn et al., 2020) which means that they are willing to do sacrifices for the public good but only if the majority engages in the sacrifices as well.

Individual behaviour seemed to influence the curve of new infections the most, but individual behaviour is also difficult to change (Lunn et al., 2020; Van den Broucke, 2020). Health promotion plays a vital role in setting up campaigns to inform the public about the virus and increasing the possibility for greater adherence because it is important that information is not just available but also understood, accepted, and applied. It is therefore important that the information is provided understandably, decisions are explained transparently, new evidence and information is communicated swiftly without being afraid to

contradict previous messages, and blame is avoided to increase public trust(Van den Broucke, 2020,p.2-3). The three most important factors in increasing public-spirited behaviour seem to be communication, group identity, and punishment (Lunn et al., 2020). By targeting individual groups in the society with specially tailored messages it is easier to convince these groups that social norms have changed (Lunn et al., 2020).

The World Health Organization (WHO) has identified young adults as a group that needs specific attention with possible low compliance (Nebehay, 2020). A low compliance rate amongst young adults is especially problematic as they are more likely to have active social lives and large social networks, and often show only mild or no symptoms while being contagious (Nivette et al., 2020). An investigation into clusters of COVID-19 outbreaks in Japan seems to confirm this concern as the researchers identified that half of the patients from clusters that were acquired from social events were between 20 and 39 years old, considerably younger than the age distribution of all cases of COVID-19 in Japan. Many of the clusters were associated with activities popular with younger people such as singing karaoke, cheering in a club, having conversations in a bar, or exercising in a fitness club (Furuse et al., 2020).

Quarantine measures in other pandemics have shown that a higher level of knowledge about regulations and understanding the regulations has a positive effect on adherence to those regulations (Kavanagh et al., 2011). Surveys have shown that young adults know less about COVID-19 and follow the regulations less conscientiously than adults (Boekee et al., 2020; Roy-Chowdhury et al., 2020). Oosterhoff & Palmer (2020) have shown that a greater awareness of the risks of contracting the virus in young adults was associated with greater adherence to the social distancing rules, disinfecting behaviour, and following the news. However, twenty-three per cent of Dutch young adults report that they actively avoid any news about COVID-19 (Boekee et al., 2020).

Defining adolescence and young adulthood is not as clear cut nowadays as it was in the past as cultural change meant that the transition into adulthood has become longer (J. J.

Arnett et al., 2014). Sawyer et al. (2018) state that the age range of adolescence is not between 10 -19 years anymore but rather 10 to 24 years as this reflects the biological growth as well as the important social role transitions from child to adult. In this article, we chose to use young adults as a descriptor for the age range because this seemed to be the best way to describe the sample used in the study which had a medium age of 20.

Young adults are dealing with their role change and expectations in society while their hormones and brains are changing as well (Hartley & Somerville, 2015). Young adults do not feel themselves as adolescents anymore because they experience a higher degree of independence but neither do they feel like adults yet because the markers which seem to indicate adulthood ("accepting responsibility for one's self" and "making independent decisions") are gradual and happen over a longer period (Arnett et al., 2014). Because young adults do not yet have all of the responsibilities of adults but have more independence than adolescents, this is also the time in which they explore identities and different possibilities for their future (Arnett, 2006). They are also more self-focused which does not mean that they do not consider other people's feelings or points of view but this is the time in their life with the fewest daily social roles and obligations to others (Arnett et al., 2014). The lockdown and social distancing measures reduced the opportunities for young adults to explore their new independence. In this pandemic young adults felt twice as alone as adults and one of the reasons for that could be that they experience a big change in their social life which is developmentally an important factor in their life (Van 't Veld et al., 2020). The lack of peer contact can harm the well-being of young adults (Fegert et al., 2020; Gunn et al., 2018).

In certain situations, young adults are more likely to make riskier choices because they do not have the experiences necessary yet, especially if they experience an immediate gain from their actions (Hartley & Somerville, 2015). Concerning the current pandemic, this means that the immediate gain that young adults experience when they go to an illegal party can override their sense of responsibility and care for themselves and others. Young adults have also not yet fully developed their impulse control and response inhibition and rely more

on social factors and emotions (Fleary et al., 2018). Peers and peer pressure play a large role in young adults' decision-making and often leads them towards riskier behaviour (Hartley & Somerville, 2015). Rozendaal et al. (2021) have identified the perceived descriptive norm as the most important determinant of adhering to social distancing.

Considering the developmental characteristics of young adults, health behaviour interventions need to be designed specifically for young adults (Abbott et al., 2020; Fleary et al., 2018). For example, since future-oriented processes such as planning or anticipating consequences of actions is still a developing skill in young adults and, young adults rely on the opinion of their peers more than adults (Hartley & Somerville, 2015), especially when it comes to social distancing regulations around COVID-19 (Rozendaal et al., 2021). Interventions aimed at young adults should focus on the collective responsibility to reduce the spread of the virus so that vulnerable family members are protected instead of highlighting their health risks (Abbott et al., 2020; Oosterhoff et al., 2020). Public health messaging needs to increase the self-efficacy of young adults when it comes to following the regulations around COVID-19. Young adults need to know the regulations but equally important is that they know how to comply with them and how to overcome pitfalls (Abbott et al., 2020). It is crucial that the messaging efforts are tailored specifically to young adults regarding the information they need, how they want the information presented, and the communication channels in which the message is presented (Abbott et al., 2020). Giving young adults the opportunity to design and deliver their own campaigns utilizes the initative of young adults to change in a purposeful way and makes them their own agents of change (Abbott et al., 2020; Andrews et al., 2020).

Social media provides the space for effective communication between young adults and public health organisations as the information can be shared quickly and efficiently while still being tailored to the group (Hyland-Wood et al., 2021). Using influencers to promote health messages has been shown to have a positive effect on message credibility and receptivity (Guo et al., 2020). The Dutch government has tried to meet these challenges and

has, for example, launched the social media campaign “slimmer chillen = corona killen”(*Slimmerchillen.Nl*, 2020) in which they used influencers to promote the regulations to adolescents and young adults and a competition on social media for the most creative post about activities to do while being in lockdown.

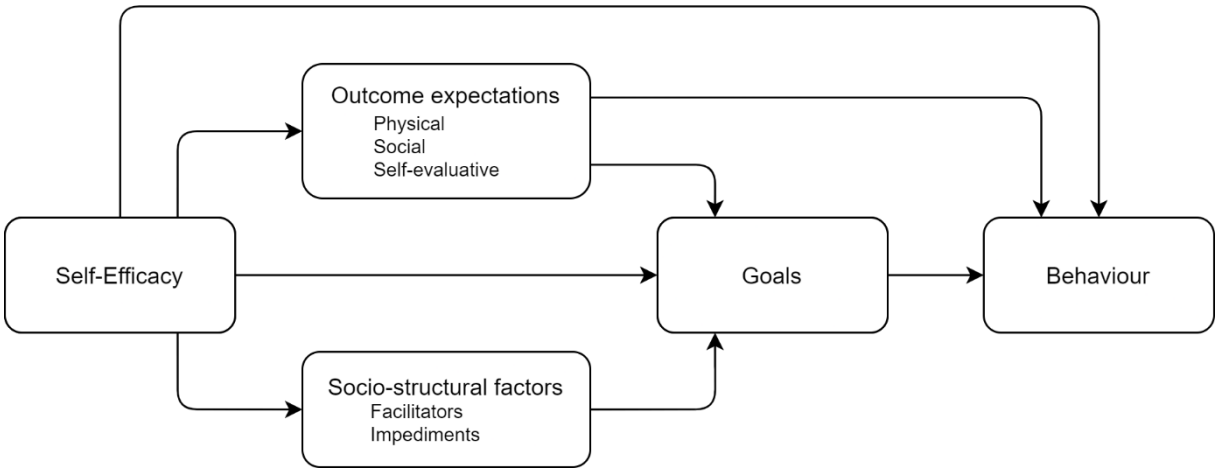
In summary, the current pandemic and the regulations implemented to control it offers unique challenges for young adults. It is important to communicate with young adults about COVID-19 and the regulations in a way that reaches them, and in a style that feels comfortable to them. The following section will describe the theoretical framework used to investigate a new approach in communicating with young adults about health behaviour with these goals in mind.

## Theoretical Framework

Social Cognition Theory (Bandura, 2004) states that knowledge is a core determinant for behaviour change because it creates the foundation for change. If the advantages or disadvantages of behaviour are not clear, then it is more difficult to see the need to change unbeneficial behaviour or maintenance of beneficial behaviour. While knowledge is the foundation on which change grows, self-efficacy is the driver that fuels the change, directly and indirectly. To achieve behaviour change, people need to understand the reasons for change, but they also need to believe that they are capable of change. Figure 1 shows the process through which self-efficacy directly affects behaviour as well as the health goals a

**Figure 1**

*Social Cognition Theory, adapted from (Bandura, 2004)*




person sets to achieve the desired behaviour. Health goals are also influenced by outcome expectations and perceived facilitators.

While knowledge is important in changing the behaviour concerning COVID-19 and the social distancing regulations, it has been shown that behaviour change interventions that just concentrate on increasing the knowledge in young adults do not work (Andrews et al., 2020). Young adults need to be given respect and autonomy in the behaviour change intervention (Andrews et al., 2020). Therefore, we argue that self-efficacy plays an important role in changing the behaviour of young adults (Abbott et al., 2020). If perceived self-efficacy is stronger, it should result in a greater intention to change (Bandura, 2004).

Knowledge and self-efficacy are the core means through which behavioural change can be achieved, and therefore the core concepts in this study. Knowledge is the foundation of behaviour change; it is essential to find the most effective method of building a strong knowledge foundation. Since learning is a generative activity in which incoming information is transformed into usable knowledge, one has to look at learning strategies for a successful public health information campaign and not at instructional methods (Fiorella & Mayer, 2016). It is more important how a person makes sense of the information than in what way the information is presented to them (Fiorella & Mayer, 2016). The ICAP Framework (Chi &

Wylie, 2014) builds on this proposition and distinguishes four modes of learning (shown in Table 1) in which the main prediction is that the more learners are cognitively engaged with the material, the better learning outcomes they achieve. It is necessary that the information is not just available but that it is also understood, accepted, and applied (Van den Broucke, 2020). It is important for young adults to not be spoon-fed the information but rather be self-responsible to compile the information themselves and present them in a way that fits them and their peer group (Abbott et al., 2020; Andrews et al., 2020).

Social Cognition Theory asserts that knowledge is the foundation, but behaviour change does not happen without perceived self-efficacy (Bandura, 2004). Self-affirmation theory introduces the notion that messages which threaten the self of the receiver can decrease their perceived self-efficacy, but self-affirmations can buffer against the threat (Critcher & Dunning, 2015). A message which is threatening to the person will incur negative emotions. Self-affirmation reinforces perceived self-efficacy by reflecting upon values important to the receiver before obtaining the threatening information. By priming the receiver to think about themselves as moral and competent, self-affirmation bolsters self-efficacy and can help the receiver to react more positively to threatening messages (Cohen & Sherman, 2014).

The COVID-19 regulations have a great impact on the developmental needs of young adults; messages about the regulations could be difficult to hear for them and they could react defensively. They could, for example, minimise the importance of adhering to the regulations by emphasising their small chances of getting seriously ill from a COVID-19 infection and therefore there is no need to decrease their social contacts.

**Table 1**

*Learning modes in the ICAP Framework*

| Learning mode | Description | Application to COVID 19 information |
|---|---|---|
| Passive | Receives information but does not engage with it other than listening or reading | Watching the press conference about the social distancing rules |
| Active | Engages to some extent with the information, e.g. by highlighting part of it | Rewinding part of the press conference to get more clarification about the rules |
| Constructive | Additional, new information has to be produced, e.g. taking notes in their own words, comparing and contrasting it with another situation | A poster is being made to make the rules more visual, the information is re-written in their own words |
| Interactive | The learner is engaged in a discussion with another entity. The discussion needs to follow the constructive learning mode and there has to be sufficient alternating between the two | After watching the news, a discussion about the pro and cons of the regulations arises |

As Fredrickson (2004, p. 1367) states; the "key to many theorists' models of emotion is the idea that emotions are, by definition, associated with *specific action tendencies*". The core idea of specific action tendencies is that when people experience certain emotions, e.g., fear, their possible courses of action narrow down to a specific set of actions, e.g., running away. Lazarus (1991, as cited in Fredrickson, 2004) stated that emotions normally start with an individual's assessment of a preceding event, which he called the person-environment relationship or adaptational encounter. Either consciously or unconsciously, this assessment triggers responses in the person such as remembering subjective experiences, having facial expressions and physiological changes. This does not necessarily mean that the person experiencing the emotion will follow through, it just means that their first instincts about how to deal with the situation are limited (Fredrickson, 2004).

When threatened the view of one's self narrows down to the threatened self which results in the aforementioned limitation in seeking a solution. Self-affirmations protects the self from this narrowing by boosting an unrelated, positive part of it (Critcher & Dunning, 2015). However, the basis on which this hypothesis is being built is still weak but has shown already promising results and is worth investigating.

Everybody has a certain view of themselves as a good and moral person. When that view is threatened by an outside message, they unconsciously want to protect their self-integrity as a person who would not engage in behaviour that may harm themselves or others (Jessop et al., 2016). When a smoker is confronted with an anti-smoking cigarette advertisement, they experience negative emotions because their self-view is of a person who does not harm other people, but the anti-smoking message states that smoking endangers others as well as themselves. To unify these two opposing messages, the person must deploy defensive mechanisms such as minimising the threat. By completing a self-affirmation task beforehand, they are reminded about their desirable qualities and this results in greater confidence to quit smoking (Cohen & Sherman, 2014). Fredrickson's (2004) Broaden-and-Build theory states that positive emotions encourage a person to be more open-minded and

engage with their environment which means that they are more likely to explore new situations, objects, and people. Positive emotions function as an antidote to the after-effects of negative emotions because they may broaden a person's momentary thought-action repertoire and therefore loosening the hold that negative emotions have on the person's body and mind (Fredrickson, 2004). The Trigger and Channel Framework (Ferrer & Cohen, 2019) states that self-affirmations trigger a psychological state which helps people to enter or remain in a positive environmental channel that promotes behaviour change. Self-affirmations could therefore be seen as an inoculation to the effects negative emotions have on the person and make them more open to the message they receive. Self-affirmation interventions have also been shown to increase post-message self-efficacy and the formations of implemental intentions which may be the decisive mechanism through which self-affirmation encourages health behaviour change (Ferrer et al., 2012).

Self-affirmation by itself though does not convince people to change their behaviour. It seems to allow the participants to take a 'time-out' and think about their whole self which then results in a more open-minded approach to the threatening message (Harris, 2011). Ferrer and Cohen's (2019) Trigger and Channel Framework proposes three conditions that need to be fulfilled to facilitate successful behaviour change: There needs to be a presence of the psychological threat, resources that foster change, and the self-affirmation intervention needs to be timely delivered before the threat and the resources need to be available shortly after it. Ferrer and Cohen (2019) state that the often mixed results of self-affirmation studies are a consequence of not meeting all of the conditions of this framework. When all three conditions are met, self-affirmations seems to have a significant and large positive effect on health behaviour (Ferrer & Cohen, 2019, p.299)

Self-affirmations do not just have an immediate impact when the threat occurs, they also can have long-term positive outcomes. Studies have shown that timely intervention with self-affirmations can help boost the self-efficacy of minority college students and increase their college grade point average over the time of two years (Brady et al., 2016; Cohen &

Sherman, 2014). This means that self-affirmations could increase the reach of young adults to the message of the importance of the regulations, and even long-term change could be possible.

The personality of a person is not a static item but rather consists of different representations and identities which can change depending on the situation (Cohen & Sherman, 2014). In university, the identity of 'being a good student' may be in the foreground and the most important part of the self at that moment. However, this does not mean that the other parts do not exist anymore or do not play a role. As part of one's self, they are still the 'good friend' which means that if a friend is asking them to skip class to drink coffee with them, their self conflicts.

Negative states like anxiety and fear result in a narrowing of the scope of attention for people which means that they are more likely to miss important information (Fredrickson & Branigan, 2005). Therefore, when one is receiving a threatening message which disturbs their life, then the negative emotions this message produces will dominate the self-concept and a negative thought spiral could be the result (Cook et al., 2012). The working self, the current parts of the identity at the forefront, will try to restore the equilibrium by using defensive mechanisms, for example, minimising the threat, questioning the source of the information or deny the implications of the threat (Schüz et al., 2017).

While negative emotions narrow the thought-action repertoire of a person so that they are less open to new ideas, positive emotions broaden the mindset momentarily and build long-term positive resources which can be accessed in later situations (Fredrickson, 2013). The self-concept of a person is assembled from many different identities in which certain identities are more centre stage at times than others (Sebastian et al., 2008). The self-concept of young adults is changing and their need to find their own identity independent from their parents while at the same time being more susceptible to peer pressure means that their self-concept is often more influenced by their peers (Sebastian et al., 2008). The COVID-19 regulations are limiting their autonomy and social contacts which means that they will most

likely experience the regulations as threatening which can result in defensive mechanisms and a reduced willingness to listen to the reasoning of the regulations (Critcher & Dunning, 2015). Self-affirmations are boosting the working self-concept by highlighting an unconnected, positive part of the self so that the threat does not narrow the view of the person to only the negative aspect and defensive mechanisms are therefore not necessary (Cohen & Sherman, 2014). They are using the broadening effect of Fredrickson's Broaden-and-Build theory (2001) to make the person more curious and willing to explore new insights so that the threatening message is better received. The threat is not minimised, rather the person is reminded that they are not just that one threatened identity (Critcher & Dunning, 2015). Self-affirmations seem to increase prosocial feelings and behaviours in young adults which means that not only are they more open to receiving knowledge that is important for them but they are also more likely to become attune to the needs of others (Thomaes et al., 2012).

Self-affirmations do have to be employed before the person's self has engaged defensive mechanism, therefore in practice, they should be used before a threatening message (Critcher et al., 2010). Since mood influences the perceived self-efficacy and the willingness to explore new ideas as stated in Fredrickson's broaden-and-build theory, it is important to also measure how the young adults are feeling concerning COVID-19 and the current situation (Kavanagh & Bower, 1985). Ferrer et al. (2012) have shown that positive affect moderated the association between self-affirmation and implementation intentions. They predicted that only individuals who are experiencing positive affect will benefit from the self-affirmation intervention, and this was confirmed. They hypothesize that because positive affect can lead to heuristic information processing while negative affect is more associated with systematic information processing, individuals who are experiencing positive affect are more likely to use biased processing and recall only information which is consistent with their already held beliefs. Positive affect is also associated with mood maintenance which means that these individuals want to avoid information that would decrease their positive

**Figure 2**

*Self-affirmation as perspective model (adapted from Critcher & Dunning, 2015)*


affect. Self-affirmation could then be used as a mechanism for mood maintenance while still processing the information systematically

The practical application of this theory can be seen in Figure 2. The working self exists out of different identities, good student and at the same time partygoer, and representations (Figure 2a). The message of the Dutch government that social distancing regulations are now in place is narrowing their view of the self to the threatened part, their love of going to a party. This means that defensive mechanisms are employed to restore their view of the self as

adequate. This could mean that they rationalise their behaviour because COVID-19 is seemingly not as dangerous for young adults, or they deny the danger to get infected (Figure 2b).

By writing a value essay in which they chose 'hard-working' as their core value, their identity of being a good student is being strengthened (Figure 2c). The threatening message has then less of an impact on the self-concept, there is less need for defensive mechanisms to restore their view of the self. They are more open to the actual reason behind the social distancing regulations, namely the importance of staying away from other people to limit the spread of the virus. (Figure 2d).

**Objectives of this study**

This research aims to investigate two aspects of how to change behaviour in young adults. To change the behaviour of young adults, the young adults must be sufficiently informed about the regulations to adjust their behaviour accordingly. When it comes to public health communication with young adults, the focus lies on the possibilities social media offers. This study explores the possibilities a constructive learning approach can offer when used in the context of social media to increase the knowledge of young adults.

Andrews et al. (2020) state that increasing knowledge does not change the behaviour of young people therefore another objective of this study was to activate and empower the self-efficacy of young adults. By combining self-affirmation with a constructive learning approach, this study aims to increase young adults' knowledge of COVID-19 regulations and strengthen their intentions to adhere to them by increasing their self-efficacy. Due to the cross-sectional nature of this study, intention to change behaviour was used as a proxy for actual behavioural change. Different learning approaches are combined with a value essay writing intervention intended to activate a more unified self-concept.

Five hypotheses were tested:

1. Participants who perform a self-affirmation task have stronger perceived self-efficacy and are more likely to intent to adhere to the COVID-19 regulations than participants who have not performed the self-affirmation task.
2. Participants with higher perceived self-efficacy are more likely to intent to adhere to COVID-19 regulations than participants with lower perceived self-efficacy.
3. Participants who perform a constructive learning task have higher learning gains and are more likely to intent to adhere to the COVID-19 regulations than their peers who perform a passive learning task.
4. Combining constructive learning with self-affirmation has a larger effect on participants' intention to adhere to COVID-19 regulations than either intervention on its own.

Finally, an additional hypothesis was tested to investigate the theoretical basis of self-affirmation:

5. A self-affirmation task has a positive effect on participants' moods.

## Research Methodology

### Participants

Participants were recruited through the SONA system of the University of Twente and the network of the author. After removing the participants who had not finished the survey or did not fit in the age range of 16 to 23 years old ($n$ = 26), the average age range of the sample ($N$ = 118) was 20,3 years (SD =1,31). The vast majority of the sample was female (79,7%) and went to university (86,4%). Table 2 shows the demographic characteristics of the sample.

**Table 2**

*Demographic characteristics of the sample*

| | | Mean (SD) | Count (%) |
|---|---|---|---|
| Age | | 20,3 (1,32) | 118 |
| Sex | Female | | 94 (79,7%) |
| | Male | | 24 (20,3%) |
| Education | Vocational training | | 1 (0,8%) |
| | University of applied science | | 11 (9,3%) |
| | University | | 102 (86,4%) |
| | Other | | 4 (3,4%) |

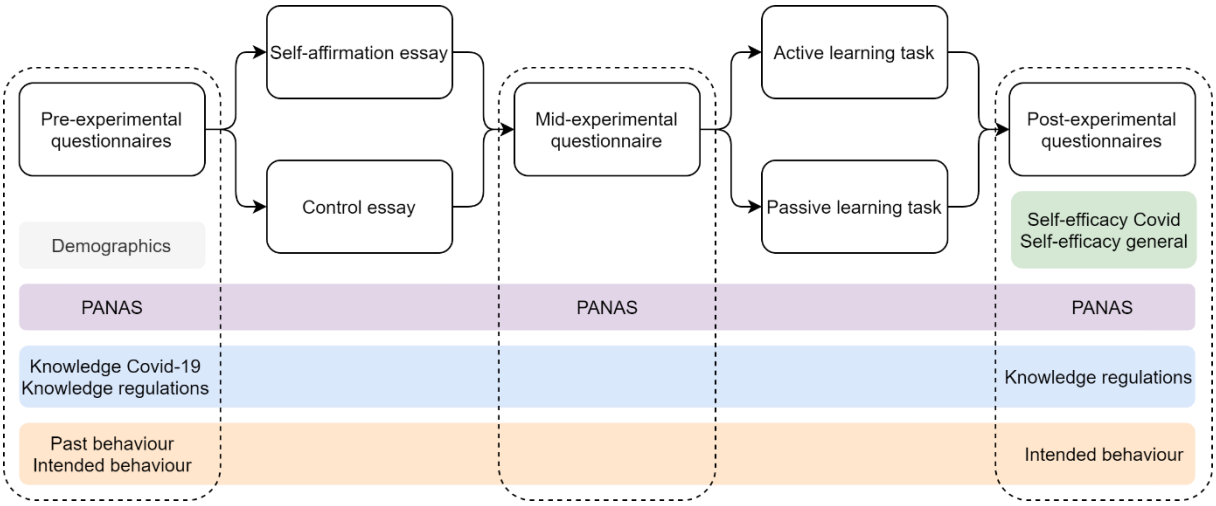
## Design and Procedure

To test the intervention, and test for interactions between self-affirmation and active learning, a fully crossed 2x2 experimental design has been used. Figure 3 shows an overview of the experimental design.

The pre-test questionnaire asked basic demographic questions (age, sex, current level of education). The participants were then asked to rate their perceived knowledge of COVID-19 and the current regulations in the Netherlands around the pandemic (*How well do you think your knowledge is about COVID-19/regulations?)* on a 7-point Likert scale, their risk perception of the pandemic on a 5-point Likert scale (Dryhurst et al., 2020) and if they already had COVID. The questions about the knowledge of COVID-19 were adapted from Granderath et al. (2020) and Clements (2020). The knowledge questions of the Dutch regulations were adapted from the official website of the Dutch government (Rijksoverheid, 2021) and were presented in both the pre- and post-test. The participants were then asked to indicate their past behaviour with following the regulations and their intention to adhere to the regulations next week. Post-test they were asked again about their intentions next week.

**Figure 3**

*Experimental design*




*Note.* Experimental phases are given from left to right in chronological order. Dashed boxes show the measurements instruments used before, between and after the interventions. Coloured regions show measurements related to demographics (grey), self-efficacy (green), mood (purple), knowledge (blue) and behaviour (orange). Group assignment in both interventions was randomized and independent of assignment in the other intervention.

Participants were asked to fill out a short-form PANAS questionnaire (I-PANAS-SF, Karim et al., 2011) before each intervention, and after completing both interventions. Participants were randomly assigned to the experimental or control condition of each intervention when needed.

In the first intervention, participants in the self-affirmation group were asked to write a value essay in which the participants were asked to “write about an event in your life where you were especially kind to others”, while those in the control group were given a neutral cue, “write about your favourite TV series”.

After finishing their essay and completing the second PANAS questionnaire, participants were again randomly assigned to either a passive or constructive learning task (Chi & Wylie, 2014). In the passive learning task participants were provided with a text about the current regulations in the Netherlands. This text was adapted with only minor cosmetic

changes from the official government site. Participants were asked to carefully read the text before copying the information into a text box.

Participants who were assigned to the constructive learning task were only provided with a link to the official government regulations and instructed to use this as a starting point for creating a social media post in which they inform their peers about the regulations. Participants in the experimental condition were explicitly instructed that they could use their creativity.

After the second intervention, a third and final PANAS questionnaire was administered. Participants were then given the post-test questionnaire on their perceived knowledge about COVID-19, the regulations surrounding COVID-19, their self-efficacy, and their intentions to follow the regulations. The self-efficacy questions were specifically around COVID-19 (Jørgensen et al., 2020) as well as from the SEQ-C questionnaire (Suldo & Shaffer, 2007).

## Instruments

### *Self-Efficacy*

Self-efficacy was measured with a scale designed for COVID by Jørgensen et al. (2020) and an adapted SEQ scale for children (Suldo & Shaffer, 2007). The self-efficacy scale for COVID (Jørgensen et al., 2020) consisted of five questions which can be seen in Table 3. The general self-efficacy scale was adapted to consist of five questions which are listed in Table 4.

**Table 3**

*Questions of the self-efficacy for COVID questionnaire with answering categories 1 (none at all) to 5 (a great deal)*

| To what degree do you feel you know enough about the following? |
|---|
| How to avoid being infected and/or infecting others with the Coronavirus |
| The symptoms of the Coronavirus |
| What you should do if you fall ill with the Coronavirus |
| What you as a citizen should do to decrease the spread of the Coronavirus |
| To what extent do you agree or disagree with the following statement: I'm certain I can follow official advice to "distance myself" from others if I want to. |

Confirmatory factor analysis showed that the two scales measured different underlying concepts and could not be combined into a single scale. Therefore, two distinct self-efficacy measures were constructed by taking the mean of responses for the general and COVID-19 related self-efficacy questionnaires, respectively. The internal validity of each scale was tested using Cronbach's $\alpha$. With the COVID-19 related self-efficacy questionnaire having a Cronbach's α of $\alpha = .525$ and the general self-efficacy questionnaire having Cronbach's α of $\alpha = .717$.

### *Past behaviour and intentions to adhere*

Participants´ past behaviour and intentions to adhere were measured using the behaviours listed in Table 5. These behaviours were chosen to represent the main themes of the Dutch regulations (Rijksoverheid, 2021). Participants used a slider from 0 (never) to 100 (always) to indicate their adherence to the regulations. For past behaviour, the prompt "When you think back to the last week, how much did you comply to the following measures?" was used, while for intentions to adhere the prompt was: *"When you think about next week, how much do you intend to adhere to the following regulation?"*.

**Table 4**

*Selection of the general SEQ-C questionnaire*

| |
|---|
| The following questions are general questions about the concept of "self-efficacy". Please read each question carefully and rate how well it describes you, with answering categories 1 (none at all) to 5 (very well) |
| How well can you express your opinions when other classmates disagree with you? |
| How well can you become friends with other young people? |
| How well can you succeed in cheering yourself up when an unpleasant event has happened? |
| How well do you succeed in suppressing unpleasant thoughts? |
| How well do you succeed in not worrying about things that might happen? |

After doing an exploratory factor analysis with a maximum likelihood extraction and an oblique rotation, two underlying factors were discovered, "hygiene" and "social". The scale "hygiene" was made from the items "wash hands frequently" and "avoid touching eyes, nose, and mouth". The two items had a significant correlation in past behaviour (Spearman's $\rho(118) = .566, p < .001$). The items were also significantly correlated in the intentions to adhere. In the pre-test, the correlation was ($\rho\ (118) = .722, p < .001$) and in the post-test it was ($\rho\ (118) = .723, p < .001$). The "social" scale consisted of the remaining five items with a Cronbach's alpha of α = .771 for the past behaviour, α = .719 for the intentions pre-test and α = .751 for the intentions post-test. Both scales were summarized by taking the mean of the responses on the respective items.

Past behaviour was measured in the pre-experimental phase, intentions to adhere were measured both in the pre- and post-experimental phase. Gains in intentions to adhere were calculated as the difference between pre- and post- experimental measurements.

***Knowledge of the Dutch regulations***

**Table 5**

*Measurement of intentions to adhere to the regulations*

| |
|---|
| Staying home as much as possible |
| Maintaining the 1,5m distance |
| Using face masks |
| Avoid meeting friends and family outside of the household |
| Wash hands frequently |
| Avoid touching eyes, nose, and mouth |
| Staying inside during the lockdown hours |

The questions about the Dutch regulations were formulated by using the official regulations (Rijksoverheid, 2021). The questions were made in a way to incorporate the whole spectrum of the regulations, therefore they ranged from simple questions e.g. "*It is important to wash your hands for at least 20 seconds with water and soap before you go outside"* to more legal questions e.g. "*What are the legal consequences of not wearing a mask?"*. The full set of questions are listed in Appendix A.

The scale has a very low Cronbach's alpha of $\alpha = 0.35$ which can at least partially be attributed to the fact that many questions were answered correctly and that there was therefore not enough variety in the answers.

All questions were given equal weight. Questions with a single correct answer were scored as either correct (1) or incorrect (0). Questions with multiple correct responses were coded as the proportion of response options that were correctly marked (ranging from 0 to 1). A single measure for knowledge was calculated by taking the mean of the scored responses. Knowledge gain from pre- to post-test was calculated by taking the difference between the two measures.

### *Gains in Intentions to adhere after both interventions*

The hypothesis stated that intention to adhere to the regulations was increased the most when combining the two interventions was measured by comparing the results of their intentions in a 2x2 crossed design. The scale for the gain in intention to adhere was made by using the mean of the “hygiene” scale and the “social” scale pre- and post-test. These new variables were then used in the further tests.

### *Mood*

Positive and negative affect were measured using the short form international PANAS questionnaire (Karim et al., 2011). Internal consistency of the scales was confirmed using Cronbach’s $\alpha$. The cronbachs' alpha ranged from .79 to .87 across five of the six PANAS measurement, and .64 for the pre-test positive mood PANAS measurement. Summary measures for both scales were created by taking the sum of responses on items for each scale. The same questionnaire was used for the pre-, mid-, and post-experimental PANAS measures, and changes in affect were calculated by taking the difference between these measures.

## Analyses

Five hypotheses were tested in this study. The first hypothesis states that participants who perform a self-affirmation task have stronger perceived self-efficacy and are more likely to intent to adhere to the COVID-19 regulations than participants who have not performed the self-affirmation task. This hypothesis was tested by performing a one-way MANOVA with the self-affirmation task as the independent variable and COVID-related and general self-efficacy and gains in intention to adhere to social and hygiene regulations as the dependent variables. The residuals are independent and multivariate normal distributed, it is a random sample which an equal sample size in each condition.

The second hypothesis states that participants with higher perceived self-efficacy are more likely to intent to adhere to the regulations than participants with lower perceived self-efficacy. This was tested using two linear regressions predicting intentions to adhere by

general self-efficacy and COVID-related self-efficacy. The analysis was performed using only the reported intentions to adhere before the tests.

The third hypothesis states that participants who performed a constructive learning task had increased learning gains and were more likely to intend to adhere to the regulations than their peers who performed a passive learning task. The hypothesis was tested using a one-way MANOVA with gains in knowledge of the regulations, gains in intention to adhere to both the social and hygiene regulations as the dependent variables and the constructive learning task as the independent variable.

The fourth hypothesis states that combining the self-affirmation task and the constructive learning task will have a larger effect on intentions to adhere to the regulations than either the control task or the passive learning task separately. This hypothesis was tested using a one-way MANOVA with gain in intentions to adhere to both hygiene and social regulations as the dependent variables and doing the self-affirmation task and the active learning task as the independent variables.

The fifth hypothesis states that the self-affirmation task increases participants positive affect and was tested using an independent t-test with gain in positive affect during the self-affirmation task as the dependent variable and doing the self-affirmation task as the grouping variable.

### *Additional testing*

After testing the hypotheses additional testing was done to give possible greater insight into the constructive learning group. The submitted constructive learning assignments were analysed qualitatively about how much effort has been put into the assignment. The creative works were scored into low effort and high effort. For high effort, the assignment needed to name at least two current regulations and had to have an original creative input. Simply downloading the template of the government regarding the regulations was therefore considered low effort while making their own was considered high effort.

Examples of low and high effort can be found in Appendix B. When it was unclear if it was an original work, the work was checked by doing a reverse image search. It was hypothesised that participants who put more effort into their work had a greater learning gain and increased intention to follow the regulations. This was tested by performing a one-way MANOVA with gains in knowledge of the regulations gains in intention to adhere to both the social and hygiene regulations as the dependent variable and the high effort assignments as the independent variable. Of the 55 participants, 40 were classed as low effort which included 17 participants who did not hand in any assignment.

## Results

Table 6 contains the distribution of participants across both conditions and shows the successful randomisation of the participants. The majority of the participants were female and went to university which was expected as most of the participants were recruited through the university's participant pool. The mean age of the participants was 20,3 years.

**Table 6**

*Demographic distribution of participants across control and experimental conditions for self-affirmation and active learning intervention.*

| | Constructive Learning Condition | | | |
|---|---|---|---|---|
| | control | | experimental | |
| | Self-Affirmation | | Self-Affirmation | |
| | control | experimental | control | experimental |
| | N (%) | N (%) | N (%) | N (%) |
| Count | 28 | 29 | 35 | 26 |
| *Gender* | | | | |
| Male | 6 (21,4%) | 6 (20,7%) | 7 (20,0%) | 5 (19,2%) |
| Female | 22 (78,96%) | 23 (79,3%) | 28 (80,0%) | 21 (80,8%) |
| *Education* | | | | |
| University of applied science | 2 (7,1%) | 3 (10,3%) | 4 (11,4%) | 2 (7,7%) |
| University | 25 (89,3%) | 26 (89,7%) | 29 (82,9%) | 22 (84,6%) |
| Other | 1 (3,6%) | 0 | 1 (2,9%) | 2 (7,7%) |
| Age [Mean (SD)] | 20,5 (1.36) | 20,0 (1.18) | 20,0 (1.26) | 20,7 (1.45) |

**Descriptive**

Table 7 shows an overview of the mean and standard deviation of the dependent variables used in this study split up by the different conditions are shown.

**Hypothesis 1: Participants who Perform a Self-Affirmation Task have Stronger Perceived Self-Efficacy and are more likely to Intent to Adhere to the Regulations.**

The effect of the self-affirmation task on self-efficacy and intentions to adhere to the regulations was tested using a MANOVA. The analysis revealed no significant effect of being assigned to the self-affirmation condition ($F(2, 115) = .514, p = .6$), so no further post-hoc tests were conducted.

**Hypothesis 2: Participants with Higher Perceived Self-Efficacy are more likely to Adhere to the Regulations.**

Regression analysis showed that the COVID-related self-efficacy scale had a significant influence on both the hygiene ($\beta_{SEQ\_Covid} = .268,\ t(115) = 2.96, p = .004$) and social ($\beta_{SEQ\_Covid} = .235,\ t(115) = 2.59, p = .011$) components of intentions to adhere to the regulations. The general self-efficacy scale did not have a significant influence on either component ( $\beta_{SEQ\_C} = -.06,\ t(115) = -.67, p = .5$ and $\beta_{SEQ\_C} = .08,\ t(115) = .88, p = .38$ for hygiene and social, respectively).

**Hypothesis 3: Participants who Perform a Constructive Learning Task have a Higher Learning Gain and Intention to Adhere than Participants who Perform the Passive Learning Task.**

The effect of the constructive learning condition on learning gains on knowledge about the Dutch COVID-19 regulations and the intention to adhere to them was tested using a one-way MANOVA. The analysis showed a significant difference between the experimental and control group ($F(3,114) = 0,85, p < .001$). Tests of between-subjects effects showed that

constructive learning only affected knowledge gain ($F(1,116) = 17.9, p < .001$) while having no significant effect on the intention to adhere to either the hygiene regulations ($F(1,116) = 53.4, p = .49$), or the social regulations $F(1,116) = 32.21, p = .22$).

The passive learning condition had an estimated marginal mean of .219 ($\sigma = .016$), whereas the constructive learning condition had an estimated marginal mean of .118 ($\sigma = .017$). The difference between these conditions was significant ($p < .001$), but not in the direction we anticipated. The passive learning condition had a significantly larger increase in knowledge gain than the constructive learning condition.

**Table 7**

*Descriptive statistics of the dependent variables across control and experimental conditions for self-affirmation and active learning intervention.*

| | *Self-affirmation Condition* | | | |
|---|---|---|---|---|
| | control | | experimental | |
| | *Constructive learning* | | *Constructive learning* | |
| | control | experimental | control | experimental |
| | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD |
| *Self-efficacy* | | | | |
| COVID | 4.04 (.56) | 4.06 (.53) | 3.91 (.48) | 4.13 (.45) |
| general | 3.11 (.65) | 3.37 (.71) | 3.16 (.71) | 3.06 (.70) |
| *Intentions to adhere to the regulations* | | | | |
| hygiene, pre | 78.43 (23.46) | 77.26 (22.88) | 77.94 (24.07) | 81.63 (19.5) |
| hygiene, post | 77.48 (22.33) | 75.74 (25.8) | 80.36 (25.05) | 82.44 (22.62) |
| hygiene, gain | -.95 (12.23) | -1.53 (13.03) | 2.41 (6.44) | .81 (9.52) |
| social, pre | 86.86 (9.23) | 86.22 (12.64) | 89.11 (13.81) | 85.61 (11.76) |
| social, post | 88.96 (7.67) | 86.61 (15.56) | 89.85 (15.27) | 86.38 (11.34) |
| social, gain | 2.11 (5.52) | -.12 (4.56) | .74 (3.74) | .77 (4.72) |

| | | | | |
|---|---|---|---|---|
| *Knowledge of the regulations* | | | | |
| pre | .51 (.19) | .62 (.17) | .59 (.16) | .56 (.15) |
| post | .74 (.14) | .74 (.16) | .80 (.10) | .67 (.15) |
| gain | .22 (15) | .12 (.11) | .22 (.15) | .11 (.10) |
| *Mood (PANAS)* | | | | |
| positive, pre | 13.96 (3.25) | 14.07 (3.34) | 14.46 (3.62) | 12.85 (3.58) |
| positive, mid | 14.21 (3.9) | 14.41 (3.97) | 14.51 (4.14) | 13.85 (4.18) |
| positive, post | 14.11 (3.74) | 14.59 (4.52) | 13.23 (4.17) | 13.85 (4.79) |
| positive, gain (pre-mid) | .25 (2.58) | .35 (3.44) | .06 (3.09) | 1.0 (2.42) |
| negative, pre | 11.25 (4.68) | 12.62 (4.67) | 11.31 (4.94) | 11.92 (4.6) |
| negative, mid | 9.36 (4.81) | 9.72 (4.78) | 9.2 (4.52) | 9.92 (4.97) |
| negative, post | 9.68 (5.23) | 9.76 (4.8) | 9.74 (4.96) | 9.88 (4.59) |
| negative, gain (pre-mid) | -1.89 (3.85) | -2.89 (4.09) | -2.11 (2.94) | -2.00 (3.05) |
| *Risk perception* | | | | |
| | 4.07 (.72) | 4.00 (.66) | 4.07 (.58) | 4.07 (.59) |

**Hypothesis 4: Combining Constructive Learning with Self-Affirmation has a larger Effect on Intentions to Adhere to the Regulations than either Task on Its Own.**

The effect of the combined self-affirmation and constructive learning condition on a gain in intention to adhere to the regulations was tested using a two-way MANOVA. The analysis showed no significant difference in intention to adhere to the regulations based on being assigned to the constructive learning task, the self-affirmation task, both tasks, or neither task ($F(2,113) = 0,98, p = .38$). While neither condition has a significant effect on intentions to adhere, Figures 4 and 5 suggest that a negative effect of the constructive learning task on intentions to adhere to the regulations related to the social component might be mediated by the self-affirmation task.

**Hypothesis 5: A Self-Affirmation Task Increases the Mood of the Participants Positively.**

The effect of the self-affirmation condition on participants' positive mood was tested using a one-sided independent t-test. There was no significant effect of self-affirmation on positive mood ($t(116) = -0,3, p = 0.38$).

**Additional Testing**

The effect of high effort in the constructive learning task on learning gains and intentions to adhere to the regulations was tested using a MANOVA. The analysis revealed no significant effect of being assigned to high effort ($F(3, 51) = 0.03, p = 0.99$), so no further post-hoc tests were conducted.

**Figure 4**

*Profile plot of marginal means of the hygiene component of intentions to adhere for pre and post-test measurements for each combination of experimental conditions*

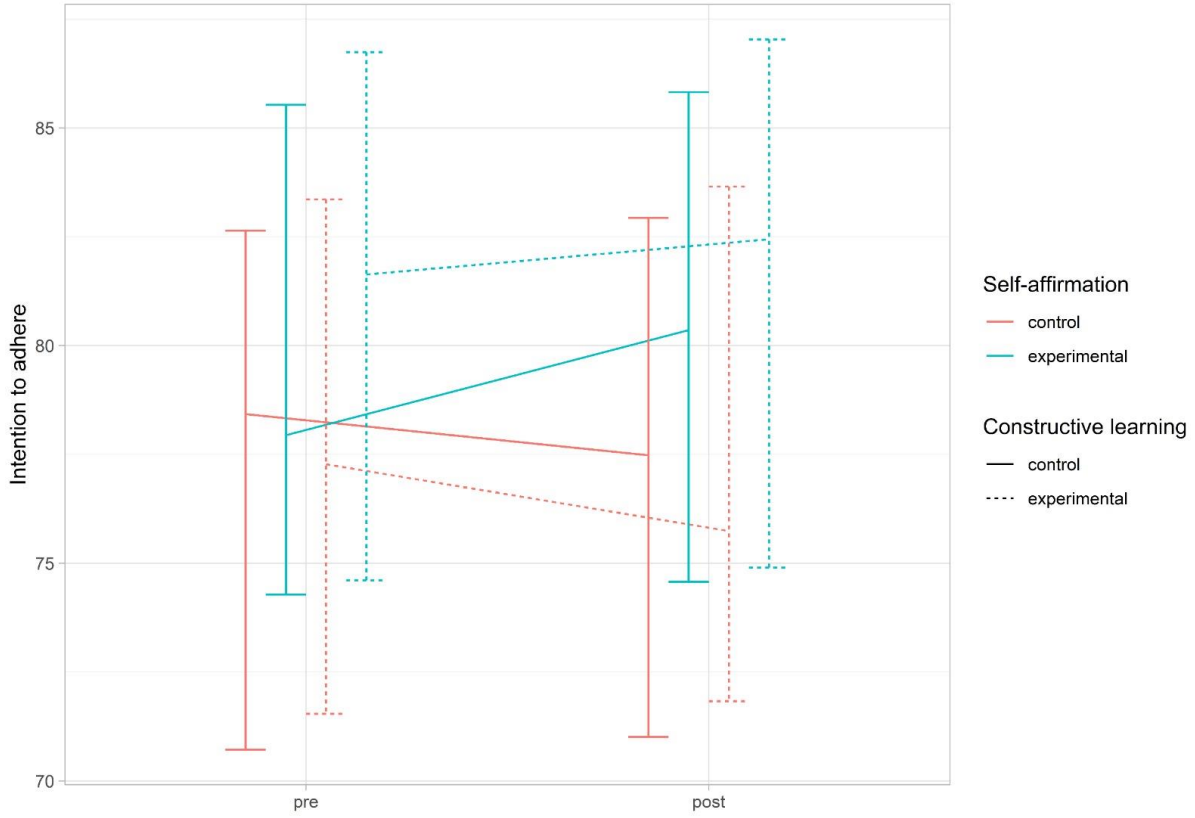
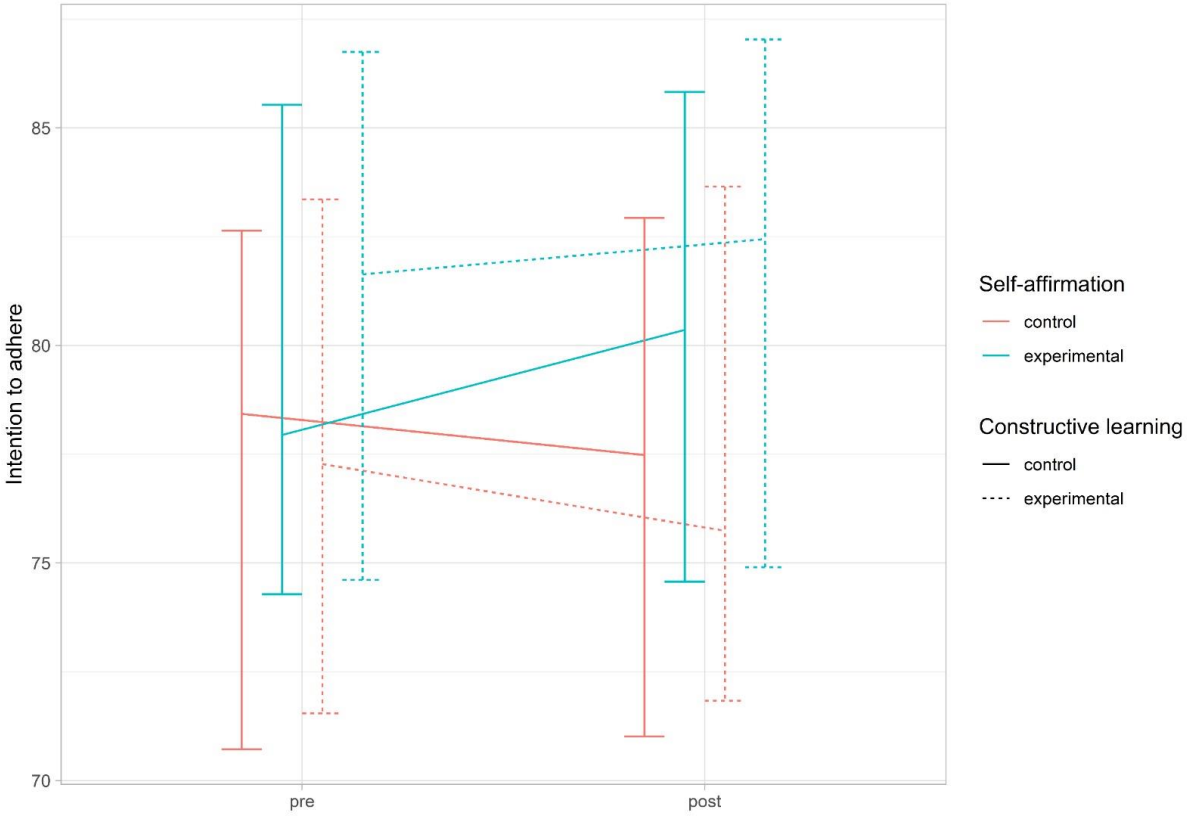


**Figure 5**

*Profile plot of marginal means of the social component of intentions to adhere for pre- and post-test measurements for each combination of experimental conditions.*




## Discussion

This study was performed because people, and young adults, in particular, needed to change their behaviour to slow the spread of the virus, but it was unclear how the government should communicate this message. Young adults were often seen as irresponsible and unable or unwilling to follow the regulations. This study investigates if encouraging young people to make social media posts was a constructive way to increase their knowledge and change their behaviour.

This study hypothesised that both knowledge and perceived self-efficacy are required for behavioural change and that by improving both, young adults would be more likely to adhere to COVID-19 regulations. We designed an experiment in which young adults were

asked to write a self-affirmation essay before creating a social media post about COVID-19 regulations.

It was hypothesised that by writing an essay about a recent act of kindness, participating young adults would increase their self-efficacy and be more open to following the regulations by making their own social media post young adults would be more engaged with COVID-19 regulations and have better knowledge of the regulations than their peers who were told to only read the regulations. While both conditions alone should have some effect, the greatest effect in changing the intentions to adhere was expected by combining the two conditions.

In the end, these expectations could not be supported by the data. The self-affirmation task did not increase participants' self-efficacy, nor did it increase their intentions to adhere nor the mood of the participants. While general self-efficacy did not have an impact on participants' intention to adhere to the regulations, self-efficacy related to COVID-19 had a significant positive influence on intentions to adhere. The constructive learning task did not increase participants' knowledge of the COVID-19 regulations, nor did it change their intentions to adhere in a positive direction. Rather, the constructive learning task had a detrimental effect on intentions to adhere. While the self-affirmation task did not increase intentions to adhere significantly, it did show a positive direction and it seemed to buffer the negative effect of the constructive learning task. That is, participants who received the self-affirmation task and the constructive learning task showed a higher gain in intentions to adhere than participants in the constructive learning condition who did not perform the self-affirmation task.

**Hypothesis 1: Participants who Perform a Self-Affirmation Task have Stronger Perceived Self-Efficacy and are more likely to Intent to Adhere to the Regulations.**

The first hypothesis of this study was that a self-affirmation task increases the self-efficacy and the intention to adhere to the regulations of the participants to a greater effect

than the control condition. This was not substantiated as neither the concrete COVID-related self-efficacy was raised to a significant effect nor the general self-efficacy. The intention to adhere to the regulations was also not significantly associated with self-affirmation. Harris (2011) stated that self-affirmations seem to give people the necessary bandwidth to approach a threatening message more open-minded but that it did not change the behaviour on its own.

We hypothesised that a self-affirmation task increases the self-efficacy of participants by reminding them that their working self is more than just the part which is threatened by the messaging. By counteracting the narrowing effect of the threatening message, their self-efficacy should increase, and they then feel more able to interact with the message. While studies have shown that self-affirmation can change the self-efficacy in students over a longer period (Brady et al., 2016; Cohen & Sherman, 2014), an increase in self-efficacy was not detected in this short-term study. It may therefore be that repeated self-affirmation tasks are needed to increase the self-efficacy in participants.

It is also possible that the wording of the task influenced the success of the self-affirmation task. Research has identified two basic and distinct sets of traits that reflect two corresponding value domains, namely values relating to competence and values relating to morality (Jessop et al., 2016). Competence values are connected to health risks that are jeopardising the individual while morality values are more connected to the welfare of others (Jessop et al., 2016). Since the lockdown and the pandemic had such an encompassing influence on the life of young adults, it would be difficult to find a value that is not, at least tangible, connected to the pandemic and the lockdown. For this reason, the decision was made to let the young adults write about a time in their life in which they were especially kind to another person, hypothesizing that this would result in the least connected topics. It is possible though that the self-affirmation task was not as successful because it did not adhere to this, and the task still reminded the participants too much about the negative effects of the pandemic.

**Hypothesis 2: Participants with Higher Perceived Self-Efficacy are more likely to Adhere to the Regulations.**

The hypothesis that participants with higher self-efficacy are more likely to adhere to the regulations was supported concerning the COVID-specific self-efficacy but not general self-efficacy. This confirms Bandura's (2012, p. 13) findings that *"people's beliefs in their capabilities vary across activity domains and situational conditions rather than manifest uniformly across tasks and contexts in the likeness of a general trait"*. It seems therefore that participants who feel more able to follow the regulations are also more willing to follow them.

This study corroborates the results of Chong et al. (2020) who determined that COVID related self-efficacy was a moderating factor in adhering to the regulations. Unfortunately, our hypothesis that self-affirmation increases the self-efficacy of participants was not substantiated. To use this potential, another method of increasing self-efficacy needs to be found. Rozendaal et al. (2021) hypothesised that higher levels of self-efficacy and perceived response efficacy would lead to more physical distancing behaviour, unfortunately, they did not measure self-efficacy because of a technical problem (Rozendaal et al., 2021). Their study identified response efficacy as a complementary predictor of physical distancing in young adults. Response efficacy was conceptualised as the belief that engaging in a certain behaviour will result in the reduction of a health threat (Witte, 1992), it is therefore comparable to the outcome expectancy of Bandura's Social Cognition Theory (2004) which is influenced by self-efficacy. This further supports our findings of the importance of self-efficacy for following the regulations around COVID-19.

**Hypothesis 3: Participants who Perform a Constructive Learning Task have a Higher Learning Gain and Intention to Adhere than Participants who Perform the Passive Learning Task.**

At the beginning of the pandemic, it was unclear to what extent the messaging regarding hygiene and social distancing regulations were received by young adults, especially

as the messaging was continually adjusted when new information became available. Using a medium with which young adults are comfortable (van der Veer et al., 2020) to reach young adults seemed to be a successful way of increasing their knowledge of the regulations (Abbott et al., 2020). We hypothesised that young adults who created a social media post about the regulations would learn more about the regulations than their peers who were told to just read the regulations and copy/paste them into a text box. It was expected that creating a social media post would fulfil the definition of constructive learning *"in which learners **generate** or produce additional externalized output or products beyond what was provided in the learning material"* (Chi & Wylie, 2014). In the task description, a link to the governmental regulations was provided and it was stressed that the product should be creative and made by the participant. The task should have resulted in a more in-depth knowledge of the topic when compared to the control task which fell under the passive learning mode (reading and copying the regulations) and should therefore also have shown an increase in the intention to adhere to the regulations. From a practical standpoint, this was also a feasible public-health intervention if it would have been successful.

The results show that the constructive learning group did not show a significant increase in knowledge, while the passive learning group did show a significant increase. While neither group showed any significant increase in their intentions to adhere to the regulations. It seems that in this instance the passive learning task of just reading the regulations again was more successful than the more in-depth task of collecting information and creating a social media post. Chi and Wylie (2014) confirm that even if a task is formulated to result in constructive learning, it is possible for the participant to not carry it out in an intended way and fulfil the requirements for constructive learning. A review of the created social media posts confirms that their quality varied wildly, with only 15 out of 55 posts fulfilling the requirements to be considered constructive learning. A further 15 participants did not submit a social media post even though they were in the constructive learning group. While some participants put a lot of effort into their posts, most of the participants did not. Often only one regulation was mentioned, or a reference was made to

current events (e.g., one participant handed in a short video of the riots about the curfew in Enschede). This seems to indicate that the necessary step of independent research was skipped, and participants relied solely on their recollection of the regulations.

Hattie and Donoghue (2016) state that when the retention of accurate details is the goal then lower-level learning strategies, under which reading the regulations fall, will be more successful than higher-level learning strategies. They also identified three major sources of input which they named *"the skill, the will, and the thrill"* (Hattie & Donoghue, 2016, p.2). The skill is the prior knowledge, the will is the disposition of the learner, and the thrill is conceptualised as the motivation to learn. Most of the participants were recruited from a university test subject pool, in which they are required to participate in several studies. These participants were aware that the credits they would receive for participating were assigned by the researcher, and thus had an external incentive to complete the study to the researchers' satisfaction. Of the 37 participants who were not recruited through the test subject pool and therefore had no incentive to have to finish the study, 20 did not finish the study. Of these 20 participants, twelve stopped during the pre-experimental questionnaires, and the remaining eight dropped out during the constructive learning task. None of these participants dropped out during the passive learning task. While these participants were motivated enough to start the study without any external incentive, the constructive learning task was seen as too much effort. When looking at the drop-out rates and the lack of quality in the results, it is possible that participants needed to be highly motivated to perform the task.

While constructive learning strategies can enhance interest, creativity, and motivation in students, there exits some resistance to active learning in learners because they may be unfamiliar with the practice, struggle with uncertainty if there is no guidance, and the extra effort they have to make (Owens et al., 2020). Mikalayeva (2016) has concluded that for active learning strategies guidance is an important part to tackle the intrinsic problems (over motivation, alienations, confusion, and hostility) and cooperative guidance of the instructor

resulted in more motivation and an increase in the learning potential. A recent meta-study about inquiry learning came to a similar conclusion, namely that guided inquiry was positively associated with higher scores and affective outcomes while unguided inquiry was negatively associated with learning outcomes (Aditomo & Klieme, 2020). This could explain why even after doing additional testing with the social media post classified as 'high effort' no significant increase in knowledge nor intention to adhere to the regulations were found.

Theories from learning psychology can therefore explain how the lack of structure and guidance in the task could have affected the performance of the participants negatively. However, when looking beyond the formulation of the task, other possible explanations for the worse performance of the constructive learning group are feasible. The Extended Parallel Process Modell (EPPM) (Witte, 1992) states that it is not the actual threat that motivates people to act but rather how they perceive the threat. The threat is evaluated by its perceived severity and its perceived susceptibility (Maloney et al., 2011). The perceived efficacy of the recommended action, split into self-efficacy (belief in one's ability to act) and response efficacy (belief in the effectiveness of the response), influences if the response to the threat is adaptive and controls the danger by following the recommendation or maladaptive by using denial and avoidance coping mechanisms to control the fear (Maloney et al., 2011).

The participants in this study rated their risk perception of the pandemic as slightly high with no significant difference between the experimental and control groups. Following the EPPM, both groups, therefore, perceive COVID as a threat but it can be assumed that the perceived efficacy of the recommended action was different in the groups. One explanation for the difference in learning gain between the passive learning group and the constructive learning group is that the passive learning group while having an equally high-risk perception, received a text which possibly increased their perceived efficacy by stating that the recommended actions to decrease the spread of the pandemic are effective and giving them concrete actions to follow which increased their self-efficacy. The constructive learning group had to look up the information themselves and this extra step may have made the

difference between an adaptive response to the threat and a maladaptive one. It is possible that the constructive learning group responded with a fear control process to the task instead of a danger control process because the constructive learning task did not offer any concrete help to increase their perceived efficacy. Therefore, the group may have chosen to avoid the task altogether. They could also have experienced an information overload by having to look up the information themselves while the passive learning group had clear, structured information. Information overload is connected to information anxiety which can result in information avoidance (Soroya et al., 2021).

Considering that the constructive learning task increased neither learning gains nor intentions to adhere, it has become clear that an unstructured constructive learning task is not a suitable broad public health campaign. Further research would have to be done to assess if this could be used in a different setting, e.g., a classroom with a teacher as a guide, or through providing a controlled and scaffolded environment to create social media posts.

**Hypothesis 4: Combining Constructive Learning with Self-Affirmation has a larger Effect on Intentions to Adhere to the Regulations than either Task on Its Own.**

Building on the previous hypotheses we expected that a combination of self-affirmation and constructive learning tasks would result in a larger effect in intending to adhere to the regulations. It was assumed that the self-affirmation would decrease any possible threatening effect of the regulations which means that the reasoning behind the regulations could easier penetrate their mindset. The constructive learning task would be deepening their knowledge and allow them to transfer their knowledge to their own life by making their own creative social media post. More in-depth knowledge and a more rational mindset would then result in the decision to adhere better to the regulations.

This was not substantiated by the results of this study. There were no significant differences in intentions to adhere to either the social or hygiene components of the regulations, in any of the four combinations of interventions.

Self-affirmation did appear to buffer the negative effect of the constructive learning task on intentions to adhere. While not significant, Figures 4 and 5 show that the self-affirmation task might have had a positive mediating effect on the negative relation between the constructive learning task and intentions to adhere.

As stated above, the constructive learning task could be seen as a stressor if the participants were not motivated, overwhelmed by the information, or used maladaptive coping mechanisms to control their fears. This could explain the negative effect of the constructive learning task as well as the buffering effect of the self-affirmation task. Self-affirmation has been shown to reduce adverse psychological and physiological responses to acute stress situations (Creswell et al., 2005; Dutcher et al., 2020; Sherman et al., 2009). Creswell et al. (2013) showed that even a brief self-affirmation activity reduced the negative effects of chronic stress and improved the problem-solving performance of stressed individuals. Morgan and Atkin (2016) further showed that this stress-reducing effect is also present in real-world situations, reducing stress in teachers and producing healthier emotional regulation strategies. While our results were not significant, it seems prudent to further research the positive effects of self-affirmation in public health campaigns.

**Hypothesis 5: A Self-Affirmation Task Increases the Mood of the Participants Positively.**

The mechanisms behind self-affirmation are not yet clearly defined. This study contributes to the current studies by investigating if Fredrikson's Broaden-and-Build theory (2004) can explain the positive effects of self-affirmation. While negative emotions can narrow down the thought-action repertoire of a person, the broaden-and-built theory (Fredrickson, 2013) states that positive emotions can broaden the mindset and even build long-term positive resources. In two experiments with college students, Fredrickson and Branigan (2005) provided evidence that positive emotions broaden the scope of attention and thought-action repertoires while negative emotions narrowed the thought-action repertoire. We hypothesised that positive emotions would have an interaction with self-

affirmation and that after a self-affirmation task the participants would be in a more positive mood. While the current theory of how self-affirmation works suggests that a threatening message challenges the self-integrity of the receiver and to maintain their view as a good and whole person, the threat needs to be eliminated (Cohen & Sherman, 2014). That can happen through maladaptive problem solving, e.g., minimising the threat level for themselves or questioning the source of the information (Schüz et al., 2017). Self-affirmation seems to help the receiver not fall into the trap of maladaptive responses. It seems to help maintain their worldview as a whole person which can result in a more rational approach to the threatening message (Critcher & Dunning, 2015).

This study could not find any support for the theory that self-affirmation increases the positive mood of the participants and that this increase in positive feelings could be responsible for the effect of self-affirmation. The buffering effect we observed in the constructive learning group could be explained by the stress-reducing effect of self-affirmation (Sherman et al., 2009). Dutcher et al. (2020) has looked into the neural mechanisms of self-affirmations stress-buffering effects and suggests that it can reduce both affective and neural responses to stress exposure. Reduced stress responses for the participants in the self-affirmation group to the stressor of being invited to the constructive learning task, could explain the buffering effect we found. Crocker et al. (2008) raised the interesting idea that the mediator for self-affirmation was not self-feelings but rather positive other-related feelings, such as love and connection. They proposed that self-affirmation enables people to transcend their self rather than affirm it. As this study did not show a reduction in negative affect either after the self-affirmation theory, it seems to be an interesting possibility.

While the international short-form PANAS questionnaire (Karim et al., 2011) measures the positive and negative affect a person feels at the moment, it does have shortcomings when it comes to measuring other-related feelings. It is therefore not possible to use this study to suggest that other-related feelings are part of how self-affirmation works.

We suggest that future studies incorporate a questionnaire that includes questions on other-related feelings.

**Strengths and Weaknesses**

The strengths of this study were that the study was built on a firm intersectional theoretical basis which combined theories of health psychology and learning psychology. It provided valuable contextual results in a timely debate. Current scientific studies were used to try to build the foundations of a possible practical intervention. This study has provided valuable suggestions for future research and which areas are less valuable in possible social media interventions. Additionally, the size of the study was reasonably high and fulfilled our expectations even though the recruitment of participants was more difficult because of the pandemic.

A limitation of this study might be that the wording of the self-affirmation task may have led participants to reflect on values with a direct connection to COVID-19. The consequences of using values related to the threat are debated, with some suggesting a negative effect and strengthened defensive behaviour (McQueen & Klein, 2006), others reporting successfully using domain-relevant self-affirmation tasks (Sherman & Cohen, 2006), and yet others finding that the type of self-affirmation task has no impact on the outcome (Armitage & Rowe, 2011).

Additionally, the constructive learning task was unstructured, and part of the task was that the participants had to do their own research beforehand while the participants in the passive learning task were presented with the regulations again. Even though the theory behind the ICAP Framework (Chi & Wylie, 2014) states that constructive learning should result in a more in-depth analysis of the topic and deepening of the knowledge, when it came to this study, the passive learning task did better. A more structured and guided constructive learning task seems to be necessary so that the task is more doable as has been shown in multiple studies (Aditomo & Klieme, 2020; Kirschner et al., 2006).

Another possible weakness of this study was that intention to adhere to the regulations was used instead of reporting the actual behaviour. However, the Theory of Planned Behaviour (Ajzen, 1991) states that intentions are the most important determinant of behaviour. Therefore, we feel that measuring intentions is justified.

**Future research**

This study has shown that at least when it comes to COVID-19 and the Dutch regulations, knowledge was not the problem with regard to the adherence of young adults. It seems that the public health campaigns were successful in raising awareness of the regulations even when being confronted with rapidly changing advice and regulations.

Using social media to reach young adults has been shown to be successful and has positive effects when it comes to public health communication (Lin et al., 2020), the current strategies of the Dutch government that were employed in campaigns such as “slimmer chillen = corona killen” (*Slimmerchillen.nl*, 2020) seem to fall short in their reach. Encouraging people to make their own posts seemed to be a logical use of the possibilities social media offers. Our study has shown though that these kinds of unstructured tasks were not successful in increasing the knowledge nor in changing behaviours. If one wants to use a constructive learning task, then the campaign needs to offer structure and scaffolding (Kirschner et al., 2006) and should also consider incorporating other behaviour change interventions such as self-affirmation. When using well-known influencers, peer pressure and greater reach could increase the chances for such a campaign, though it will probably still only reach the most highly motivated people.

This study did not take into consideration the motivation of the participants. Most of the participants were incentivised to finish the survey by getting points in SONA which they needed for their study. However, the quality of the constructive learning products varied greatly and from the participants who had no incentive to finish, an unusually high number stopped when they were confronted with the constructive learning task. It seems therefore interesting to look into motivation as a possible moderator for constructive learning. Self-

affirmation did have a small, but not significant, effect on the negative effect of the constructive learning task. It would be interesting to look further into the possibilities self-affirmation can offer when one is confronted with unmotivated participants or stressed participants.

Additionally, self-efficacy had a significant influence on the intention to adhere, but self-affirmation did not affect self-efficacy. More research needs to be done to see how the self-efficacy of young adults can be raised in a social media setting.

## Conclusion

The goal of this study was to further the research into how social media can be used for public health communication with young adults. It has shown that just encouraging them to make an unstructured social media post will most likely not work.

Self-affirmation seems to have a positive impact on intention to adhere to the regulations even though the results were not significant. It shows enough promise to warrant further research into how self-affirmation can be used in public health communication in social media.

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## Appendix A; Questions about the Dutch regulations in place at the time of the survey

Table A

Questions about the Dutch regulations in place at the time of the survey

| |
|---|
| How much distance do you need to keep to people from a different household? |
| It is important to wash your hands for at least 20 seconds with water and soap before you go outside |
| When do you need to wear a face mask? Multiple answers are possible. |
| What are the legal consequences of not wearing a mask? |
| When a member of your household was tested positive for COVID-19 but shows no symptoms, you do NOT need to quarantine |
| How many people can visit you at home? |
| When you arrive in the Netherlands from a country with a risk advice, you need to go into home quarantine for 10 days except if your COVID-19 test is negative. |
| When do you need to stay home because of the lockdown? |

## Appendix B; Examples of high and low effort posts

Figure A

Example of a post which was classed as “high effort”.


Figure B

Example of a post which was classed as “low effort”.