# Health Policies can Impact Citizens' Psychological Needs and Mental Health: Evidence from Covid-Safe Health Certifications

Joachim Waterschoot[a], Vincent Yzerbyt[b], Sofie Morbée[a], Richard M. Ryan[c, d] & Maarten Vansteenkiste[a]

[a]Department of Developmental, Personality and Social Psychology, Ghent University, 9000 Ghent, Belgium.

[b] Institute for Research in the Psychological Sciences. Université Catholique de Louvain, Louvain-la-Neuve, Belgium.

[c] Institute for Positive Psychology and Education, Australian Catholic University, North Sydney, NSW, Australia

[d] College of Education, Ewha Womans University, South Korea

## Statements and Declarations

- **Ethical Considerations:** This study was conducted in accordance with the ethical standards of institutional and national research committees and with the 1964 Declaration of Helsinki and its later amendments. Ethical approval was obtained from the Ethics Committee of Ghent University (approval number 2020/37). Due to the urgent and rapidly evolving context of the COVID-19 pandemic, the study was not preregistered with specific hypotheses.
- **Consent to Participate:** All participants provided informed consent prior to participation. Consent was obtained in written form through an online consent procedure. Participants were informed about the voluntary nature of participation, their right to withdraw at any time, the estimated duration of the survey (15-20 minutes), and the use of their data for scientific research and publication purposes.
- **Consent for Publication:** Not applicable. The manuscript does not include any identifiable individual data.
- **Conflicting Interests:** The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

This is the accepted author manuscript and not the final published Version of Record.
Please cite the published article as follows:
Waterschoot, J., Yzerbyt, V., Morbée, S., Ryan, R. M., & Vansteenkiste, M. (2026). Health policies can impact citizens' psychological needs and mental health: Evidence from Covid-safe health certifications. Journal of Health Psychology. https://doi.org/10.1177/13591053261497889

- **Funding:** This research was supported by the Belgian Science Policy Office (BELSPO) under the THRIVE project.
- **Author data**:
    - Joachim Waterschoot (Joachim.Waterschoot@ugent.be; ORCID: 0000-0003-0845-9310)
    - Vincent Yzebyt (vincent.yzerbyt@uclouvain.be; ORCID: 0000-0001-9544-5317)
    - Sofie Morbée (Sofie.Morbee@UGent.be; ORCID: 0000-0002-0444-1917)
    - Richard M. Ryan (Richard.Ryan@acu.edu.au; ORCID: 0000-0002-2355-6154)
    - Maarten Vansteenkiste (Maarten.Vansteenkiste@UGent.be; ORCID: 0000-0001-6983-3607)
- **Data Availability:** All analysis code and anonymized date are available at Open Science Framework: https://osf.io/s85uv/

**Acknowledgments:** not applicable

**Correspondence** concerning this article should be addressed to Joachim Waterschoot, Department of developmental, personality and social psychology, Ghent University, Henri Dunantlaan 2, 9000 Ghent, Belgium. Email: Joachim.Waterschoot@ugent.be

**Authors contributions**

All authors confirm their contributions will be reported at submission using the Contributor Roles Taxonomy (CRediT), and all have reviewed and agreed to their individual contribution(s).

- **Joachim Waterschoot:** Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization
- **Vincent Yzebyt:** Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing - Original Draft, Writing - Review & Editing, Supervision, Project administration, Funding acquisition
- **Sofie Morbée:** Conceptualization, Methodology, Investigation, Data Curation, Writing - Original Draft, Writing - Review & Editing
- **Richard M. Ryan:** Conceptualization, Methodology, Writing - Review & Editing, Visualization
- **Maarten Vansteenkiste:** Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing - Original Draft, Writing - Review & Editing, Visualization, Supervision, Project administration, Funding acquisition

# Health Policies Can Impact Citizens' Psychological Needs and Mental Health: Evidence from COVID-Safe Health Certifications


## Abstract

Health certification tools, like the COVID-Safe Ticket (CST), are common in public health policies, yet their psychological impact is underexplored. This longitudinal study tested whether the CST's introduction and removal affected basic psychological needs and mental health, whether effects differed by vaccination status, and whether perceived meaning of the CST (safety-enhancing vs. polarizing) explained outcomes. Across nine waves (March 2020-March 2022) in Belgium, 1,349 participants (12% unvaccinated) reported on basic psychological needs and mental health, and, during CST implementation, on CST perceptions. Multilevel analyses showed that the implementation of CST increased relatedness frustration only among unvaccinated persons, while autonomy differences between vaccinated and unvaccinated were amplified. Unvaccinated participants viewed the CST as more polarizing and less safety-enhancing, explaining differences in need experiences linked to mental health. Health certification tools undermined autonomy and relatedness among unvaccinated individuals. Framing such measures as promoting public safety may better preserve psychological needs and social cohesion.


*Keywords:* COVID-Safe Ticket, vaccination, basic psychological needs, Self-Determination Theory, mental health

Public health policies and regulations have long been used to reduce health risks and promote population safety. Historically, several such policies have proven effective, including mandatory seat belt use, restrictions on smoking in public spaces, and childhood vaccination programs (Wiley & Gostin, 2025). Yet despite their public health benefits, many of these measures initially generated substantial societal debate and resistance, often because they were perceived as restricting individual freedom or imposing unequal burdens across groups (Brewer et al., 2017). Understanding how public health policies shape citizens' psychological experiences and societal reactions therefore represents an important area of research, particularly during crises when governments must rapidly introduce large-scale behavioral regulations.

The COVID-19 pandemic provided a unique context to study these dynamics. Many countries introduced health certification systems (e.g., vaccine passports) to regulate access to public spaces while limiting viral spread (Hall & Studdert, 2021). Although intended to facilitate reopening, these measures were met with mixed reactions: some viewed them as necessary for public safety, whereas others perceived them as discriminatory or socially divisive (Bardosh et al., 2022; Drury et al., 2021).

The present study leverages this context as a natural experiment. In Belgium, the COVID-Safe Ticket (CST) granted access to public venues (e.g., cinemas, restaurants, events) for individuals who were vaccinated, recently recovered, or tested negative. As the CST was gradually expanded, it created differential access to public life: vaccinated individuals could participate with minimal effort, whereas unvaccinated individuals often faced the repeated burden of testing. This asymmetry fueled public debate and likely shaped how the policy was experienced.

Building on this context, we examine the psychological implications of the CST through the lens of Self-Determination Theory (SDT; Ryan & Deci, 2017; Ryan et al., 2021), which posits that autonomy, competence, and relatedness are essential for mental health. Specifically, we investigated (1) whether the CST was associated with changes in need-based experiences and mental health over time and as a function of vaccination status, and (2) whether these effects could be explained by how individuals interpreted the policy, as safety-enhancing versus polarizing. By focusing on these meaning-making processes, the study aims to clarify how the implementation and communication of public health policies shape psychological functioning and societal responses during crises.

**Health Certification Tools During the COVID-19 Crisis**

Health certification tools have been introduced in multiple countries as a method of disease management. These tools typically verify health status through indicators such as vaccination records or recent test results, granting access to countries (e.g., proof of yellow fever vaccination for entry into Ghana or Brazil; CDC, 2022), specific settings (e.g., tuberculosis screening certificates for nursing homes), or certain activities (e.g., medical clearance for competitive sports or military service; ENSREG, 2020). While designed to protect public health and enable participation, their ethical, legal, and psychological implications have been widely debated (e.g., Wiley & Gostin, 2025). During the COVID-19 pandemic, these debates intensified as governments worldwide adopted health certification systems to balance infection control with civil liberties (Attwell et al., 2021; Drury et al., 2021).

The pandemic disrupted daily life through restrictions such as mask mandates, telework, and social distancing. Although intended to reduce virus spread, these measures often negatively affected mental health, especially when perceived as disproportionate to the epidemiological

context (e.g., when hospitalization rates were low, but measures were highly strict, see Waterschoot et al., 2023). As vaccination rates increased over time, many of these measures were gradually lifted. Still, to manage ongoing risks and protect vulnerable populations, governments introduced certification systems regulating access to travel, hospitality, and leisure domains (e.g., Israel's Green Pass, China's Code app; Wang & Ping, 2022). While varying in scope across countries, these systems raised pressing questions about their psychological consequences. In Belgium, the introduction of the CST was particularly contested. Specifically, public opinion was sharply divided, with some viewing it as a necessary measure to protect public health and others perceiving it as a coercive and discriminatory tool (Gbenonsi et al., 2022).

Building on prior work on health certification (e.g., Zhu et al., 2023), the present longitudinal study leveraged a 9-wave dataset spanning two years (March 2020-March 2022) to examine how the introduction and expansion of the CST shaped mental health through basic psychological need experiences. Crucially, the design allowed us to account for pre-existing differences between individuals who were eventually vaccinated and those who were not, thereby strengthening the design to study its unique impact across time. In addition, we tested whether individuals' interpretations of the CST as safety-enhancing versus polarization-enhancing help explain its psychological impact.

**Basic Needs as a Psychological Lens**

To understand the psychological impact of the CST, and the pandemic more broadly, adopting a basic psychological need perspective is crucial (Vermote et al., 2022). Just as humans depend on physical needs like food and sleep, they also require psychological nutriments to grow and thrive (Ryan, 1995; Vansteenkiste et al., 2020). A central question has been which needs are most fundamental for mental health. SDT (Ryan & Deci, 2017; Ryan et al., 2021), one of the

most influential frameworks in this literature, identifies autonomy, competence, and relatedness as three universal needs (Vansteenkiste et al., 2020).

*Autonomy* refers to experiencing volition, self-governance, and authenticity; its satisfaction brings a sense of alignment with one's values and interests, while frustration evokes inner conflict and pressure. *Competence* involves feeling effective and capable, with satisfaction yielding mastery and frustration entailing inadequacy and failure. *Relatedness* concerns building meaningful, caring connections, with satisfaction bringing a sense of belongingness and social harmony, while frustration produces loneliness and rejection. The functional role of these needs has been found to hold universally; that is, across cultures, developmental stages, and life domains (Ryan & Deci, 2017; Vansteenkiste et al., 2020), a claim substantiated by several recent meta-analyses (e.g. Bureau et al., 2022; Ryan et al., 2022). Whereas need satisfaction fosters sustainable motivation and mental health, need frustration contributes to distress, anxiety, and psychopathology (Vansteenkiste & Ryan, 2013).

During the COVID-19 pandemic, the critical role of these needs and their experiences was demonstrated convincingly. First, need satisfaction was found to protect mental health even beyond the effects of uncertainty, showing that such needs are not luxuries reserved for prosperous times but vital resources in times of crisis (Vermote et al., 2022). Moreover, autonomy, competence, and relatedness served as sources of resilience, such that higher need fulfillment buffered the link between concerns and increases in depressive and anxiety symptoms, both compared to others (between-person) and relative to one's usual levels (within-person; Waterschoot et al., 2023). Finally, interventions that encouraged people to actively invest in their psychological needs proved effective in helping individuals to cope with pandemic stressors (Behzadnia & FatahModares, 2023).

**Health Certificates and Basic Psychological Needs**

As a policy tool to reopen society while safeguarding public health (Hall & Studdert, 2021; Muller et al., 2020), the CST potentially created opportunities for improved need satisfaction. It could foster *relatedness* by allowing people to reconnect socially, it could promote *competence* by allowing people to more fully participate in leisure activities or work, and it could support *autonomy* through the partial restoration of everyday freedoms. At the same time, the CST rapidly became a focal point of societal debate, raising concerns about fairness, privacy, and social polarization (Baylis and Kofler, 2021). In Belgium, the CST was implemented shortly after the vaccination campaign had achieved a relatively high uptake (approximately 70%). Despite this result, public attitudes toward vaccination and related containment measures were not uniformly positive, with some endorsing vaccination as a civic responsibility and public health necessity and others expressing hesitancy or even opposition (Waterschoot et al., 2023b).

Within this context, the operational structure of the CST linked participation in public life to people's vaccination status. Vaccinated individuals obtained automatic access to many public venues, whereas unvaccinated individuals' increased freedom was conditional, that is, dependent upon presenting proof of recent recovery or negative test result. As a consequence, vaccinated citizens had relatively unrestricted access to social and cultural activities, whereas unvaccinated individuals often faced recurring logistical and social barriers unless they repeatedly secured negative tests or documented prior infection (e.g., Drury et al., 2021).

Such differential access may carry important psychological implications. Although this issue has received little direct empirical attention, being excluded, stigmatized, or feeling coerced are known to frustrate the basic psychological needs for autonomy, relatedness, and competence (Ryan & Deci, 2017). For example, being denied a preferred choice has been shown

to thwart autonomy, while being ostracized and treated as an outsider undermines psychological need satisfaction and increases distress (Legate et al., 2021). Similarly, institutionalized forms of exclusion have been linked to poorer mental health outcomes (Nikrouy et al., 2025), a pattern that has also been observed among individuals who remained unvaccinated during the COVID-19 pandemic (Bor et al., 2023).

Thus, these considerations suggest that the CST may have had divergent psychological effects. For some individuals, the policy likely promoted well-being by restoring access to valued activities and supporting basic psychological needs. For others, particularly those who remained unvaccinated, it may have undermined these same needs by introducing barriers to participation in social life. This duality highlights the potentially mixed psychological consequences of health certification policies and raises the question whether their effects primarily depend on individuals' vaccination status, or rather on the meanings and interpretations that people attach to such policies.

**Perceived Meaning of Health Certificates**

Beyond examining *whether* (un)vaccinated persons' psychological need experiences and mental health were differentially linked to the CST, we also sought to understand *why*. From an SDT perspective, it is not the mere presence of a policy but its perceived meaning that shapes psychological effects (Ryan & Deci, 2017). Extensive SDT research shows that how individuals interpret external events, such as deadlines, feedback, or regulation, modulates their impact on motivation and well-being (e.g., Fong et al., 2019). In classic experiments, identical events (e.g., surveillance or reward) yielded opposite effects depending on whether they were seen as autonomy-supportive or controlling (e.g., Enzle & Anderson, 1993; Deci et al., 1999).

Applied to the CST, its impact might have depended on how people interpreted its purpose. Vaccinated individuals may have seen it as a safety-enhancing tool that reopened society, restored freedom of movement, and enabled safe social contact, thereby fostering autonomy and relatedness. The CST thus symbolized collective care and responsibility, particularly reinforcing bonds among vaccinated individuals. Unvaccinated individuals, in contrast, may have experienced the CST as coercive and exclusionary, such that they felt pressured into change and compliance and constrained in their daily choices. It thereby could have frustrated their autonomy and have undermined relatedness by implicitly marking them as outsiders. Restricted access to venues, workplaces, and events deepened feelings of exclusion, especially when policies were endorsed by friends, family, or coworkers. The toll was thus not only about being denied access but also about being denied belonging. Given the limited empirical evidence, the present study examined how perceptions of the CST, as safety-enhancing or polarization-enhancing, predicted both groups' need satisfaction and frustration, and how these related to mental health across the pandemic.

## The Present Study

Despite the widespread use of health certification tools during the COVID-19 pandemic, systematic research on their psychological impact remains scarce and largely limited to cross-sectional designs (e.g., Porat et al., 2021). Guided by SDT, the present study adopted a longitudinal design, tracking individuals' basic psychological needs and mental health across nine time points before, during, and after the implementation of the CST. This design allowed for a fine-grained examination of the CST's psychological impact over time.

We pursued two main objectives. In Objective 1 we examined whether the implementation of the CST was associated with changes in individuals' need-based experiences

(the satisfaction and frustration of autonomy, competence, and relatedness) and in mental health indicators (depressive symptoms and life satisfaction) over time, and whether these patterns differed as a function of vaccination status. Using longitudinal data collected before, during, and after the CST implementation allowed us to account for pre-existing differences in psychological needs and mental health prior to the introduction of the policy.

Based on these considerations, we expected the introduction of the CST to be associated with initial improvements in autonomy, competence, and relatedness, as citizens regained access to valued activities and social interactions. However, as the CST gradually expanded to cover a broader range of public spaces (October 2021 onward; see Figure S1) and as emerging variants such as Delta and Omicron raised doubts about its effectiveness, we anticipated that these initial benefits might weaken over time. We further expected vaccinated individuals to report higher need satisfaction, whereas unvaccinated individuals would experience greater need frustration, particularly as the CST restricted their access to leisure and social activities. These discrepancies were expected to diminish once the CST was lifted.

In Objective 2 we focused specifically on the period during which the CST was in place and examined whether differences between vaccinated and unvaccinated individuals could be explained by the subjective meanings both groups attached to the policy. We hypothesized that unvaccinated participants would be less likely to perceive the CST as a safety-enhancing measure and more likely to interpret it as divisive or polarizing. These interpretations were expected to predict individuals' experiences of need satisfaction and frustration, which in turn would account for differences in mental health outcomes. To test this proposition, we modeled indirect associations between vaccination status and mental health through participants' average CST perceptions at the between-person level.

## Method

### Sample and Procedure

This study was conducted within the broader Motivation Barometer project, a large-scale longitudinal initiative monitoring the psychological functioning of Belgian citizens during the COVID-19 pandemic (Vansteenkiste et al., 2024). Across the pandemic, nine waves of data were collected between March 2020 and March 2022 to capture psychological experiences during key phases of the crisis, including lockdown periods, the vaccination rollout, and the introduction of the COVID-Safe Ticket (see Table S1). Data were collected at regular intervals through online surveys distributed via websites, newspapers, social media, and partner organizations. As participants could voluntarily provide an email address for follow-up assessments, a convenience and potentially self-selective sample was collected. Yet, the data is unique because of its longitudinal nature spanning key phases in the pandemic. Through personal identifiers, which were clearly described in the survey instructions, waves could be linked. The informed consent emphasized confidentiality and data protection. The study protocol was approved by the ethics committee of the faculty of Psychology and Educational Sciences of Ghent University (N° 2020/37).

The sample was constructed in two steps (see Table S1). First, we selected participants who completed at least two of the four waves during the CST period (October 2021-January 2022; $n$ = 3,676). Second, we retained those who also completed at least two earlier waves (first lockdown: March-April 2020; second lockdown: October-November 2020; third lockdown: March 2021; vaccination rollout: May 2021) and the post-CST wave (March 2022). This yielded a final sample of 1,349 participants (37% of the initial group). Within this sample, 36.4%

completed five waves, 31.3% six, 20.4% seven, and 11.9% eight to nine waves. Response rates ranged from 410 (30.4%) to 1,250 (92.7%).

Participants had a mean age of 57.31 years (SD = 11.84; range = 18-89) and were predominantly women (65.9%). Regarding relationship status, 27.8% were single, with 9.5% reporting a change over time. In terms of education, 28.5% had no or only secondary education (6.2% obtained a Bachelor's during the study), 41.5% held a Bachelor's degree, and 30.1% a Master's degree. Employment status indicated that 9% were unemployed, 47.3% employed, and 43.7% retired; 9.8% reported changes over time. Finally, 12% remained unvaccinated at CST implementation (October 2021), after the vaccination campaign had concluded (March-May 2021), and this proportion remained stable through March 2022, with no changes in vaccination status during the observation period.

## Materials

For the key variables, all items were rated on a 5-point rating scale ranging from "Totally disagree" to "Totally agree", unless otherwise specified. For all key variables, we tested internal validity on both between- and within-person levels given the nested structure of the dataset.

### Basic Psychological Needs

Participants completed a brief 12-item version of the Basic Psychological Need Satisfaction and Need Frustration Scale (Chen et al., 2015), assessing their experiences over the past week. Six items measured the satisfaction of the basic psychological needs for autonomy, competence, and relatedness, all showing high (between-person) correlations as their assessment of internal consistency (2 items for each need; e.g., "I felt that my decisions reflected what I really wanted" [autonomy], $r$ = .64; "I felt confident that I could do things well" [competence], $r$ = .83; "I felt connected with people who care for me" [relatedness], $r$ = .77). The remaining six

items assessed frustration of these same needs (2 items for each need; e.g., "I felt pressured to do things I wouldn't choose myself" [autonomy], $r = .61$; "I felt insecure about my abilities" [competence], $r = .85$; "I had the impression that people I spent time with disliked me" [relatedness], $r = .77$; all $p$'s $<.001$).

**Mental Health**

Mental health was assessed by levels of life satisfaction and depressive symptoms. Life satisfaction was assessed using a single item adapted from the Satisfaction with Life Scale (Pavot & Diener, 1993): "In the previous week, I was satisfied with my life". This single-item approach was chosen for its practicality and demonstrated adequacy in past research (Waterschoot et al., 2023a). Depressive symptoms were measured with a 6-item version of the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). All items were introduced with the stem "During the past week," and responses were given on a 4-point scale ranging from 1 ("seldom or never, less than 1 day") to 4 ("most or all of the time, 5 to 7 days"). Internal consistency was acceptable ($\alpha_{between} = .76$; $\alpha_{within} = .61$).

**Attitude towards COVID-Safe Ticket**

During the CST implementation period, two items assessed the meaning attributed to the CST, starting with the prefix "Now that this ticket has been widely implemented, I experience it as… " followed by a safety-enhancing perception ("… a way to ensure the safety of the population in risky situations.") and a conflict-enhancing perception ("… a source of tensions and conflicts between people").

**Plan of Analysis**

Given the longitudinal design, we first examined missing data. Little's MCAR test was significant ($\chi^2(123) = 161.7$, $p = .011$), indicating data were not missing completely at random.

Logistic regression showed missingness was predicted by lower autonomy satisfaction and higher competence frustration ($p$'s < .05), consistent with a missing-at-random (MAR) pattern. This supported the use of Full Information Maximum Likelihood (FIML).

Next, we tested differences in outcomes by background variables (age, gender, partner status, education, employment, vaccination) using linear mixed-effects models with random intercepts. Age was entered as a standardized continuous predictor. Because the group comparisons in the present work include those with unbalanced designs (e.g., 12% unvaccinated) unequal cell sizes may reduce statistical power for the smaller group. We therefore report effect sizes next to statistical significance and rely on models robust to unequal group sizes across the analyses. Outputs included descriptive statistics, F-tests with p-values, and partial eta squared ($\eta^2p$), interpreted as small (> .0099), medium (> .0588), or large (> .1379; Cohen, 1988). We also assessed multicollinearity (VIF > 4), reported marginal and conditional $R^2$, and computed between-person Pearson correlations adjusted for within-person variance, supported by ICCs (Musca et al., 2011).

For Objective 1, we estimated linear mixed-effects models including significant covariates, time (pre-, during, and post-CST), and vaccination status (as reported after the vaccination campaign), adding their interaction in a second step. Model significance was evaluated with ANOVAs, and predicted trajectories were visualized. Significant interactions were probed using simple slopes (vaccinated vs. unvaccinated), with standardized coefficients and significance stars, allowing identification of time points where group differences emerged.

For Objective 2, we specified a multilevel structural equation model in the R package 'lavaan' (Rosseel, 2012), to account for the within-subject variance in the study variables (except for vaccination status). This time, the data were restricted to the four waves during the CST

implementation to test for differences in basic psychological need experiences, and in turn, mental health outcomes, by vaccination status via CST perceptions. Standardized path coefficients are reported at between-person level, and the model was visualized graphically. Model fit was evaluated using CFI ≥ .90, RMSEA < .06, and SRMR < .09 (Kline, 2005). Full syntax is available via https://osf.io/s85uv .

## Results

### Preliminary analyses

We first examined differences in study variables across sociodemographic groups (Tables S2-S6). Older participants reported higher satisfaction and lower frustration of all three needs, greater life satisfaction, fewer depressive symptoms, and perceived the CST as more safety-enhancing and less conflict-inducing. Gender differences indicated that men reported higher relatedness satisfaction, but also greater competence frustration, more depressive symptoms, stronger perceived safety, and lower perceived conflict.

Participants without a partner showed lower relatedness satisfaction, higher competence frustration, lower perceived CST safety, and more depressive symptoms. Higher education was associated with greater autonomy satisfaction, with individuals holding a Bachelor's degree reporting particularly strong perceptions of CST-related safety enhancement. Finally, employment status differences revealed that unemployed individuals reported lower competence satisfaction, higher competence frustration, more perceived conflict, lower life satisfaction, and higher depressive symptoms compared to retired individuals, with employed participants generally falling in between.

Table 1 presents descriptive statistics, intraclass correlations (ICCs), and between-person correlations. ICCs were moderate to high, especially for CST perceptions, indicating relative

stability over time and predominantly varied between individuals rather than within individuals. As expected, need satisfaction variables correlated positively with each other and negatively with their frustration counterparts, while need frustrations were positively interrelated. The two CST perceptions were negatively correlated: to the extent the CST was viewed as safety-enhancing it was less likely to be perceived as divisive. Safety perceptions related positively to autonomy and relatedness satisfaction and negatively to their frustration, whereas conflict perceptions showed the reverse. Finally, depressive symptoms and life satisfaction were consistently related to need experiences, with depressive symptoms being related negatively to satisfaction of basic needs and positively to frustration of basic needs, whereas life satisfaction showed the opposite pattern. Stronger safety perceptions predicted higher life satisfaction and fewer depressive symptoms, whereas conflict perceptions yielded the reverse pattern of correlates.

**Objective 1: The Psychological Impact of CST Across Time and Vaccination Status**

Table 2 summarizes the ANOVA outputs from linear mixed-effects models predicting basic need experiences and mental health outcomes, with Model 1 including covariates and main effects of time and vaccination status and Model 2 adding their interaction.

Model 1 demonstrated statistically significant time effects for all outcomes, showing meaningful variation across the nine waves. Specifically, competence and relatedness satisfaction showed a modest increase in October-November 2021 (during CST implementation), accompanied by reduced frustration (Figure 1A). Autonomy exhibited the most pronounced fluctuations over time, with a decline in March 2021, followed by a gradual increase leading up to the CST implementation. Thereafter, autonomy satisfaction decreased again toward the beginning of 2022 and the final measurement wave. Autonomy frustration showed a mirrored

trajectory. Mental health patterns showed declining life satisfaction and rising depressive symptoms during the first three lockdowns, with a low point in January 2022 (Figure 1B).

As can be shown in Table 2, vaccination status yielded significant main effects for four of the eight outcomes. Vaccinated individuals reported, across the different waves, higher autonomy satisfaction ($M_{vaccinated}$ = 3.32 versus $M_{unvaccinated}$ = 2.93), lower autonomy frustration ($M_{vaccinated}$ = 2.64 versus $M_{unvaccinated}$ = 3.27), lower competence frustration ($M_{vaccinated}$ = 1.94 versus $M_{unvaccinated}$ = 2.11), and lower relatedness frustration ($M_{vaccinated}$ = 1.92 versus $M_{unvaccinated}$ = 2.14), compared to unvaccinated individuals. No group differences emerged for competence satisfaction, relatedness satisfaction, life satisfaction, or depressive symptoms.

Three significant time × vaccination status interactions emerged in Model 2. For autonomy satisfaction (Figure 2A) and frustration (Figure 2B), group differences varied over time, with vaccinated and unvaccinated participants showing partially diverging trajectories. Although differences in autonomy dynamics were already present prior to CST implementation, they became more pronounced during the CST period. Differences disappeared after the CST and related measures were lifted. A third interaction was observed for relatedness frustration (Figure 2C). Different from the pattern for autonomy, differences in relatedness frustration between both groups emerged only after the implementation of the CST. Relatedness frustration increased among unvaccinated participants, whereas levels remained comparatively lower and more stable among vaccinated individuals. Similar to the pattern observed for autonomy, differences between both groups disappeared after the removal of the CST.

**Objective 2: The Explanatory Role of the Meaning of the CST**

To address Objective 2, we tested whether differences in basic psychological needs and mental health between vaccinated and unvaccinated participants could be explained by how the

CST was interpreted—as safety-enhancing versus conflict-inducing. We estimated a multilevel structural equation model focusing on between-person differences while controlling for within-person variance. Competence was excluded due to the absence of group differences (Table 2), whereas relatedness satisfaction was retained to account for shared variance with relatedness frustration.

Model fit was acceptable ($\chi^2(22) = 172.49$, $p < .001$; CFI = .91; RMSEA = .07; SRMR = .04; see Figure 3). Initially, vaccination status was associated with higher autonomy satisfaction ($\beta = .17$, $p < .001$) and lower autonomy ($\beta = -.22$, $p < .001$) and relatedness frustration ($\beta = -.25$, $p < .001$). However, these effects became non-significant after including indirect paths via CST perceptions, indicating that group differences were explained by how the CST was interpreted.

Vaccinated individuals were more likely to perceive the CST as safety-enhancing and less as conflict-inducing. In turn, perceiving the CST as safety-enhancing related to higher autonomy satisfaction ($\beta_{indirect} = .05$, $p < .001$), lower autonomy frustration ($\beta_{indirect} = -.13$, $p < .001$), and lower relatedness frustration ($\beta_{indirect} = -.12$, $p < .001$). Conversely, perceiving the CST as conflict-inducing was associated with lower autonomy satisfaction ($\beta_{indirect} = -.05$, $p = .01$) and higher autonomy frustration ($\beta_{indirect} = .05$, $p = .01$).

For mental health, vaccination status initially predicted fewer depressive symptoms ($\beta = -.13$, $p = .03$), but this effect became non-significant ($\beta = -.04$, $p = .14$) after accounting for CST perceptions and needs. This suggests that lower depressive symptoms among vaccinated individuals were explained by stronger safety perceptions, which related to higher autonomy satisfaction ($\beta = -.02$, $p = .06$) and lower relatedness frustration ($\beta = -.06$, $p = .001$). Although no direct differences emerged for life satisfaction ($\beta = .09$, $p = .14$), indirect effects indicated that safety perceptions predicted higher life satisfaction via autonomy satisfaction ($\beta = .04$, $p = .002$)

and lower relatedness frustration (β = .03, *p* = .01), with lower conflict perceptions also contributing indirectly via autonomy satisfaction (β = .01, *p* = .02).

## Discussion

The present study examined the psychological implications of a health certification tool (i.e., the COVID-Safe Ticket; CST) in Belgium through the lens of Self-Determination Theory (SDT), a framework widely used to understand health behavior and well-being during the COVID-19 pandemic (Vansteenkiste et al., 2024). Using a longitudinal design spanning nine waves before, during, and after CST implementation, we investigated whether the CST was associated with changes in basic psychological needs and mental health, whether these changes differed by vaccination status, and whether such differences could be explained by how individuals interpreted the CST. In doing so, this study moves beyond viewing health certification solely as a tool for infection control, highlighting its psychological meaning and consequences.

Overall, findings point to a mixed psychological impact of the CST. For vaccinated individuals, the CST facilitated access to valued activities and social life, supporting need satisfaction and better mental health. In contrast, for those who remained unvaccinated, the CST coincided with greater relatedness frustration and poorer psychological functioning. Crucially, these differences were explained by how the CST was perceived: vaccinated individuals were more likely to view it as safety-enhancing and less as polarizing, which in turn related to more favorable need-based experiences. Together, these findings underscore that the psychological impact of public health policies depends not only on their implementation, but on how they are subjectively interpreted by citizens.

### COVID-Safe Ticket and Autonomy

Although the CST was introduced to balance reopening with infection control, its psychological impact varied across individuals. As shown in Figure 1, autonomy was the need most under threat during the pandemic. For vaccinated individuals, the CST appeared to restore autonomy by enabling travel and valued activities, reflected in higher autonomy satisfaction and lower frustration. However, differences between vaccinated and unvaccinated individuals were already present before the CST and became more pronounced after its introduction. This is notable given that both groups initially faced the same restrictions. Those who remained unvaccinated may have perceived these measures as more restrictive, partly due to lower risk perceptions (Waterschoot et al., 2022), making the constraints feel less justified. With the CST, this gap widened: although access remained possible via testing, the added burden likely intensified feelings of constraint.

Consequently, unvaccinated individuals reported more persistent autonomy frustration and may have been particularly sensitive to the CST. In line with SDT, policies experienced as coercive or exclusionary can undermine autonomy and elicit reactance (Brehm, 1966; Morbée et al., 2021). The CST may therefore have been perceived as a form of social control, increasing resistance and reducing openness to its health goals. More broadly, these findings align with evidence that public health measures are less likely to be internalized when experienced as pressuring rather than autonomy-supportive (Waterschoot et al., 2023a).

**COVID-Safe Ticket and Relatedness**

Although autonomy and relatedness often covary, the present findings show both parallels and divergences. Similar to autonomy, the CST differentially affected relatedness frustration, such that unvaccinated individuals reported higher relatedness frustration (i.e., experiences of stigmatization and exclusion) relative to vaccinated individuals. By restricting

access to public venues, the CST made intergroup differences highly visible, fueling perceptions of rejection (Bardosh et al., 2022). Thus, a measure intended as a pragmatic health tool may have inadvertently fostered the feeling of social exclusion among part of the population.

Two results diverged from the autonomy pattern. First, no group differences in relatedness frustration emerged before the CST. This suggests that for unvaccinated persons, the CST symbolized more than a health regulation. It signaled social non-acceptance, particularly when exclusion from public and social spaces was enforced. These findings echo work on political exclusion, which shows that being marginalized based on group membership (e.g., political affiliation, health status) undermines psychological needs and can elicit withdrawal or antagonism (AuBuchon et al., 2025). They are also consistent with ostracism research, where excluded individuals report heightened relatedness frustration (Legate et al., 2021).

Second, while relatedness frustration rose among unvaccinated participants, relatedness satisfaction did not differ. This may reflect that unvaccinated individuals still experienced mutual understanding and solidarity within their peer group, even as they felt excluded by society at large. Such divergence highlights that need for relatedness may involve multiple facets (e.g., intimacy, mutual care, group cohesion) and may require an assessment at both the individual and collective level (Kachanoff, 2023; Waterschoot et al., 2026), as these facets and levels do not necessarily evolve in tandem.

**Attributed Meaning to the CST**

The differential pattern of findings, showing distinct effects for need satisfaction versus frustration (e.g., relatedness frustration but not satisfaction) and across needs (e.g., no effects for competence), suggests that the impact of the CST depended less on its mere presence than on how it was subjectively interpreted. Individuals who viewed the CST as a safety-enhancing

measure, primarily vaccinated participants, reported greater autonomy satisfaction and lower autonomy and relatedness frustration. In contrast, those who perceived the CST as coercive and divisive, primarily unvaccinated individuals, experienced heightened need frustration. Structural analyses further indicated that these perceived meanings helped explain group differences in need-based experiences, which in turn related to higher life satisfaction and lower depressive symptoms, particularly via increased autonomy satisfaction and reduced relatedness frustration. This aligns with prior work showing that the framing and perceived intent of external regulations shape motivational and well-being outcomes (Fong et al., 2019; Legate et al., 2021).

Importantly, SDT emphasizes that policies need not be permissive to support psychological needs. Laissez-faire contexts may fail to provide clear expectations, undermining competence and shared purpose. Conversely, even restrictive measures can be experienced as autonomy-supportive when communicated transparently and empathetically, and when individuals' perspectives are acknowledged (Martela et al., 2021). This reflects a key distinction between freedom and autonomy: whereas freedom concerns the absence of constraints, autonomy refers to experiencing one's actions as volitional and endorsed (Vansteenkiste et al., 2020). Thus, individuals may feel autonomous even under constraint, provided they understand and identify with its rationale.

At the same time, restrictive policies framed in moralizing or punitive ways risk undermining autonomy, increasing relatedness frustration, and deepening social divides. The CST illustrates this tension: rather than fostering cohesion, it may have amplified feelings of exclusion among those already hesitant about vaccination. These findings highlight the importance of not only promoting compliance but also shaping the psychological meaning of policies. Especially in polarized contexts, measures should be communicated in ways that foster

inclusion and relatedness, thereby reducing unintended harm (Martela et al., 2021). This principle extends to interpersonal contexts, such as healthcare, where providing clear rationales and autonomy-supportive communication has been shown to improve psychological functioning, including among unvaccinated individuals (Morbée et al., 2022).

**Limitations and Future Directions**

Several limitations should be acknowledged. First, perceptions of the CST were assessed using two items. Although these items were face valid and captured core interpretations of the policy, future research could benefit from more comprehensive (involving a broader set of meanings) and multidimensional (involving a broader set of items) assessments of these attributed meanings to health certifications tools.

Second, the study relied on a self-selected sample recruited through online media, newspapers, and partner organizations, which may limit the generalizability of the findings. Individuals who voluntarily participate in longitudinal online surveys may differ from the broader population in their interest in public affairs, engagement with societal issues, or willingness to express their views. Also, other sociodemographic variables like socio-economic status are not considered, although they might have a significant role in psychological experiences (e.g., Bradshaw et al., 2023).

To increase transparency regarding sample composition, we compared key demographic characteristics with available Belgian population statistics. Several deviations from national distributions emerged. National data indicate that approximately 79% of the Belgian population had received at least one COVID-19 vaccine dose in 2021, whereas vaccination uptake in the present sample was somewhat higher, suggesting a modest overrepresentation of vaccinated individuals. In addition, women and older adults were somewhat overrepresented, which likely

explains the relatively high proportion of retired participants in the sample. Educational level also appeared higher than population averages, indicating that individuals with higher levels of education may have been more likely to participate in the survey. At the same time, vaccination uptake in the sample broadly tracked the national vaccination rollout, and the dataset included participants from diverse work situations and socio-demographic backgrounds. Importantly, analyses of socio-demographic variables across the nine survey waves indicated relatively limited changes in characteristics such as partner status and work situation over time, suggesting that the composition of the longitudinal sample remained largely stable throughout the study period.

Third, participants' vaccination status was operationalized based on their final assessment during the pandemic (March 2022). Although analytically useful, this dichotomous classification likely obscures meaningful heterogeneity within both groups. In the vaccinated group, individuals may have differed in both timing and underlying motivation, ranging from early, self-endorsed uptake (e.g., driven by perceived protection or prosocial considerations) to more reluctant or externally pressured compliance (e.g., partial vaccination). Similarly, remaining unvaccinated may have reflected a deliberate and self-endorsed decision for some, whereas for others it may have resulted from structural barriers or constraints (e.g., access limitations or medical considerations). Such heterogeneity is likely to shape how individuals perceive and respond to policies such as the CST, particularly in terms of whether these measures are experienced as safety-enhancing or as controlling, and how they relate to psychological need satisfaction and frustration. Because the present study did not differentiate between these subgroups, it remains unclear to what extent the observed effects reflect differences in motivation, timing, or constraint. Future research would benefit from explicitly examining this

heterogeneity, for instance by investigating whether individuals' underlying motivations for vaccination moderate associations between policy perceptions, need-based experiences, and well-being.

Finally, although the present research focused on the CST in the Belgian context, similar certification systems were implemented across many countries during the pandemic (e.g., Green Pass in Israel, National Health Service Pass in the United Kingdom). Future cross-national comparisons could provide valuable insights into how cultural, political, and communicative contexts shape the psychological impact and societal acceptance of such public health policies.

## Conclusion

This study provides empirical evidence for the psychological impact of health certification tools, like the CST, during the COVID-19 pandemic, and how this impact depends not only on one's vaccination status but also, more crucially, on the meaning individuals assign to such policies. Measures designed to protect public health must also consider psychological well-being. Policymakers should be aware that support for public measures cannot be sustained by presumed effectiveness alone. It must also be nurtured through communication and implementation strategies that consider basic psychological needs and promote social cohesion. Better integrating psychological theory into public health policy should help policymakers navigating future crises in ways that are both protective and inclusive.

## References

Attwell, K., Lake, J., Sneddon, J., Gerrans, P., Blyth, C., & Lee, J. (2021). Converting the maybes: Crucial for a successful COVID-19 vaccination strategy. *PLOS ONE, 16*(1), e0245907.

AuBuchon, K. E., Stock, M. L., Raibley, E., Carter-Sowell, A. R., & Poppen, P. J. (2025). The effects of political exclusion: Threatened needs and decreased affiliation with increased anger and antisocial inclinations. *Journal of Applied Social Psychology, 55*(5), 305–321.

Bardosh, K., de Figueiredo, A., Gur-Arie, R., Jamrozik, E., Doidge, J., Lemmens, T., Keshavjee, S., Graham, J. E., & Baral, S. (2022). The unintended consequences of COVID-19 vaccine policy: Why mandates, passports, and restrictions may cause more harm than good. *BMJ Global Health, 7*(5), e008684. https://doi.org/10.1136/bmjgh-2022-008684

Baylis, F., & Kofler, N. (2021). A public health ethic should inform policies on COVID-19 immunity passports. *The Lancet Infectious Diseases, 21*(4), 456.

Behzadnia, B., & FatahModares, S. (2023). A self-support approach to satisfy basic psychological needs during difficult situations. *Motivation and Emotion, 47*(1), 61–83.

Bor, A., Jørgensen, F., & Petersen, M. B. (2023). Discriminatory attitudes against unvaccinated people during the pandemic. *Nature, 613*(7945), 704–711.

Bradshaw, E. L., DeHaan, C. R., Parker, P. D., Curren, R., Duineveld, J. J., Di Domenico, S. I., & Ryan, R. M. (2023). The perceived conditions for living well: Positive perceptions of primary goods linked with basic psychological needs and wellness. *The Journal of Positive Psychology, 18*(1), 44–60. https://doi.org/10.1080/17439760.2021.1991446

Brehm, J. W. (1966). *A theory of psychological reactance*. Academic Press.

Brewer, M. B., Sibley, C. G., & Barlow, F. K. (2017). Intergroup discrimination: Ingroup love or outgroup hate. *The Cambridge*.

Bureau, J. S., Howard, J. L., Chong, J. X., & Guay, F. (2022). Pathways to student motivation: A meta-analysis of antecedents of autonomous and controlled motivations. *Review of Educational Research, 92*(1), 46–72.

Centers for Disease Control and Prevention. (2022). *Travelers' health: Vaccination requirements*. U.S. Department of Health and Human Services. https://wwwnc.cdc.gov/travel

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K. M., Soenens, B., Van Petegem, S., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion, 39*(2), 216–236.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*(6), 627–668. https://doi.org/10.1037/0033-2909.125.6.627

Drury, J., Carter, H., Ntontis, E., & Guven, S. T. (2021). Public behaviour in response to the COVID-19 pandemic: Understanding the role of group processes. *BJPsych Open, 7*(1), e11.

ENSREG. (2020). *Guidelines on fitness-for-duty of workers in nuclear facilities*. European Commission.

Enzle, M. E., & Anderson, S. C. (1993). Surveillant intentions and intrinsic motivation. *Journal of Personality and Social Psychology, 64*(2), 257–266.

Fong, C. J., Patall, E. A., Vasquez, A. C., & Stautberg, S. (2019). A meta-analysis of negative feedback on intrinsic motivation. *Educational Psychology Review, 31*(1), 121–162.

Gbenonsi, G. Y., Labat, A., Oleffe, A., Jidovtseff, B., Servais, O., Vermeulen, N., & Paul, E. (2022). Factors associated with COVID-19 vaccination among individuals with vaccine hesitancy in French-speaking Belgium. *JAMA Network Open, 5*(9), e2234433.

Goggin, G., & Wilken, R. (2024). QR codes and automated decision-making in the COVID-19 pandemic. *New Media & Society, 26*(3), 1268–1289.

Hall, M. A., & Studdert, D. M. (2021). Public views about COVID-19 "immunity passports." *Journal of Law and the Biosciences, 8*(1), lsab016.

Kachanoff, F. J. (2023). A group-conscious approach to basic psychological needs theory. In R. M. Ryan (Ed.), *The Oxford handbook of self-determination theory* (pp. 1088–1105). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780197600047.013.56

Kline, T. (2005). *Psychological testing: A practical approach to design and evaluation*. Sage.

Legate, N., Weinstein, N., & Ryan, R. M. (2021). Ostracism in real life: Evidence that ostracizing others has costs, even when it feels justified. *Basic and Applied Social Psychology, 43*(4), 226–238.

Martela, F., Gómez, M., Unanue, W., Araya, S., Bravo, D., & Espejo, A. (2021). What makes work meaningful? Longitudinal evidence for the importance of autonomy and beneficence for meaningful work. *Journal of Vocational Behavior, 131*, 103631.

Morbée, S., Vermote, B., Waterschoot, J., Dieleman, L., Soenens, B., Van den Bergh, O., Ryan, R. M., Vanhalst, J., De Muynck, G.-J., & Vansteenkiste, M. (2021). Adherence to COVID-19 measures: The critical role of autonomous motivation on a short- and long-term basis. *Motivation Science, 7*(4), 487–496. https://doi.org/10.1037/mot0000250

Morbée, S., Vansteenkiste, M., Waterschoot, J., Klein, O., Luminet, O., Schmitz, M., Van den Bergh, O., Van Oost, P., Yzerbyt, V., & Morbée, S. (2023). The role of communication style and external motivators in predicting vaccination experiences and intentions: An experimental vignette study. *Health Communication, 38*(13), 2894–2903. https://doi.org/10.1080/10410236.2022.2125012

Muller, A. E., Hafstad, E. V., Himmels, J. P. W., Smedslund, G., Flottorp, S., Stensland, S. Ø., Stroobants, S., Van de Velde, S., & Vist, G. E. (2020). The mental health impact of the COVID-19 pandemic on healthcare workers, and interventions to help them: A rapid systematic review. *Psychiatry Research, 293*, 113441. https://doi.org/10.1016/j.psychres.2020.113441

Musca, S. C., Kamiejski, R., Nugier, A., Méot, A., Er-Rafiy, A., & Brauer, M. (2011). Data with hierarchical structure: impact of intraclass correlation and sample size on type-I error. *Frontiers in psychology, 2*, 74. https://doi.org/10.3389/fpsyg.2011.00074

Nikrouy, F., Mohammadi, K., & Samavi, S. A. (2025). Structural relationship model of basic psychological needs with intimate partner violence: The mediating role of gender discrimination and self-esteem. *Journal of Interpersonal Violence, 40*(5–6), 1387–1411.

Pavot, W., & Diener, E. (1993). Review of the Satisfaction With Life Scale. *Psychological Assessment, 5*(2), 164–172.

Porat, T., Burnell, R., Calvo, R. A., Ford, E., Paudyal, P., Baxter, W. L., & Parush, A. (2021). "Vaccine passports" may backfire: Findings from a cross-sectional study in the UK and Israel on willingness to get vaccinated against COVID-19. *Vaccines, 9*(8), 902.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385–401.

Rosseel, Y., Oberski, D., Byrnes, J., Vanbrabant, L., Savalei, V., Merkle, E., Hallquist, M., Rhemtulla, M., Katsikatsou, M., Barendse, M., Rockwood, N., Scharf, F., Du, H., Jorgensen, T. D., & Van Lissa, C. (2017). *Package "lavaan."*

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63*(3), 397–427. https://doi.org/10.1111/j.1467-6494.1995.tb00501.x

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. The Guilford Press. https://doi.org/10.1521/978.14625/28806

Ryan, R. M., Deci, E. L., Vansteenkiste, M., & Soenens, B. (2021). Building a science of motivated persons: Self-determination theory's empirical approach to human experience and the regulation of behavior. *Motivation Science, 7*(2), 97–110. https://doi.org/10.1037/mot0000194

Ryan, R. M., Duineveld, J. J., Di Domenico, S. I., Ryan, W. S., Steward, B. A., & Bradshaw, E. L. (2022). We know this much is (meta-analytically) true: A meta-review of meta-analytic findings evaluating self-determination theory. *Psychological Bulletin, 148*(11–12), 813–842. https://doi.org/10.1037/bul0000385

Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration, 23*(3), 263–280. https://doi.org/10.1037/a0032359

Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic Psychological Need Theory: Advancements, critical themes, and future directions. *Motivation and Emotion, 44*, 1–31. https://doi.org/10.1007/s11031-019-09818-1

Vansteenkiste, M., Waterschoot, J., Morbée, S., Van Oost, P., Schmitz, M., Brisbois, M., Raemdonck, E., Klein, O., Luminet, O., Yzerbyt, V., & Van den Bergh, O. (2024). Psychological science and its societal mission during the SARS-CoV-2 pandemic: The motivation barometer as an evidence-informed policy instrument in Belgium. *Social Issues and Policy Review, 18*(1), 59–88.

Wang, B., & Ping, Y. (2022). A comparative analysis of COVID-19 vaccination certificates in 12 countries/regions around the world: Rationalising health policies for international travel and domestic social activities during the pandemic. *Health Policy, 126*(8), 755–762.

Waterschoot, J., Morbée, S., Van den Bergh, O., Yzerbyt, V., Raemdonck, E., Brisbois, M., Schmitz, M., Klein, O., Luminet, O., Van Oost, P., & Vansteenkiste, M. (2023). How the stringency of the COVID-19 restrictions influences motivation for adherence and well-being: The critical role of proportionality. *International Journal of Health Policy and Management, 12*(1), 1–13. https://doi.org/10.34172/ijhpm.2023.8021

Waterschoot, J., Bradshaw, E. L., Duineveld, J. J., & Ryan, R. M. (2025). The link between perceived group need support and thwarting and personal wellness: The moderating role of identity centrality. *Group Dynamics: Theory, Research, and Practice, 29*(4), 227–245. https://doi.org/10.1037/gdn0000242

Wiley, L. F., & Gostin, L. O. (2025). *Public health law and ethics: Power, duty, restraint*. University of California Press

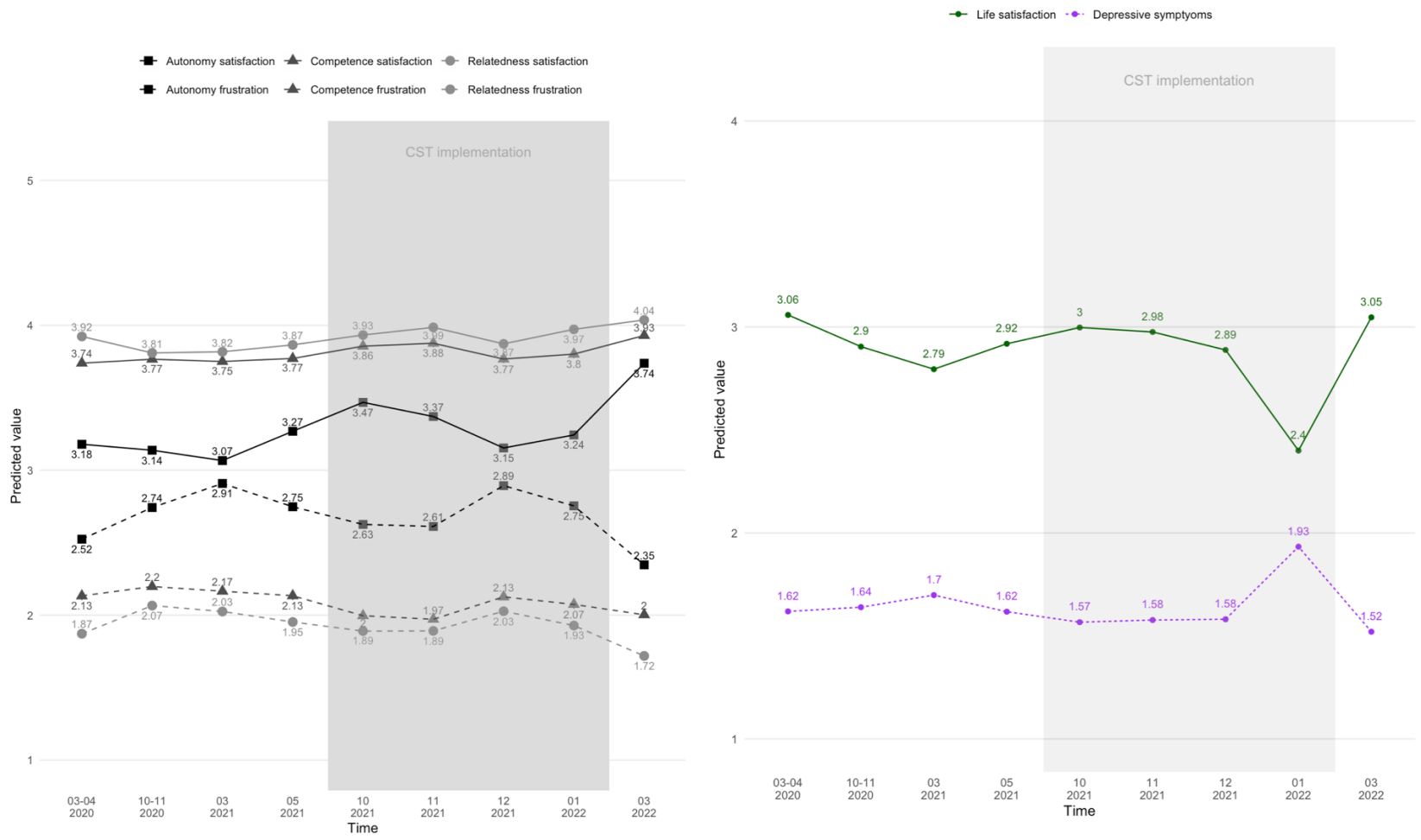
Zhu, D. T., Serhan, M., Mithani, S. S., Smith, D., Ang, J., Thomas, M., & Wilson, K. (2023). The barriers, facilitators, and association of vaccine certificates on COVID-19 vaccine uptake: A scoping review. *Globalization and Health, 19*(1), 73.

## Figures

*Figure 1.* Visualization of need experiences and mental health outcomes across time

A. Need experiences

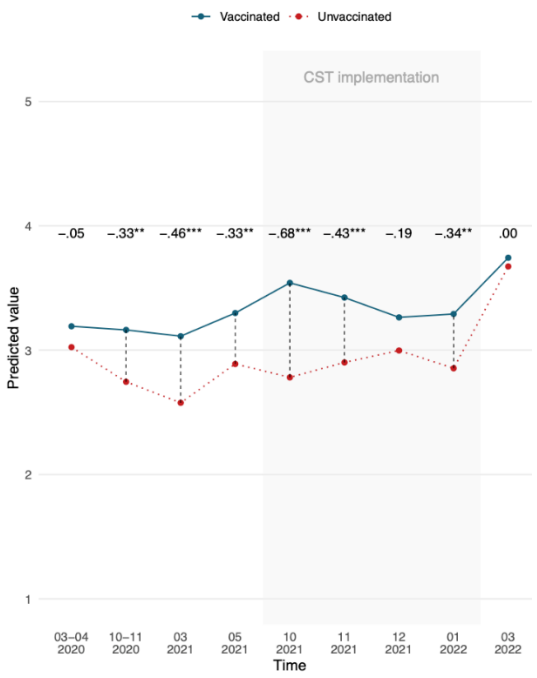
B. Mental health outcomes



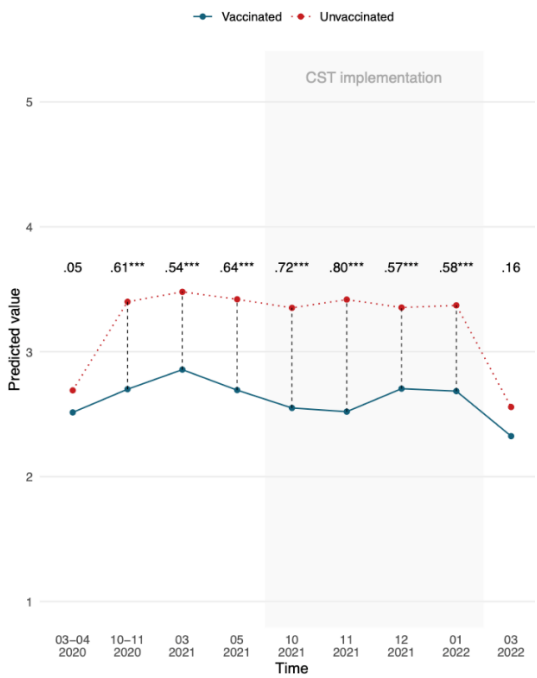

*Note.* With mean scores for the sake of interpretation

*Figure 2.* Visualization of interaction effects between time and vaccination status with standardized simple slope coefficients

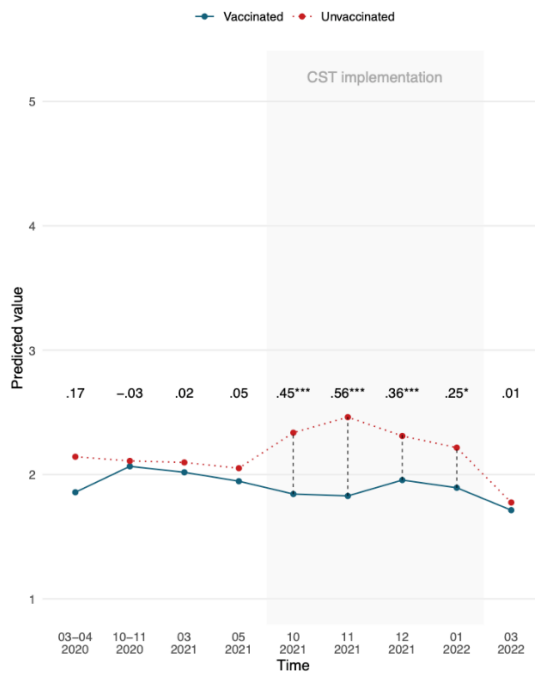
A. Autonomy satisfaction




B. Autonomy frustration

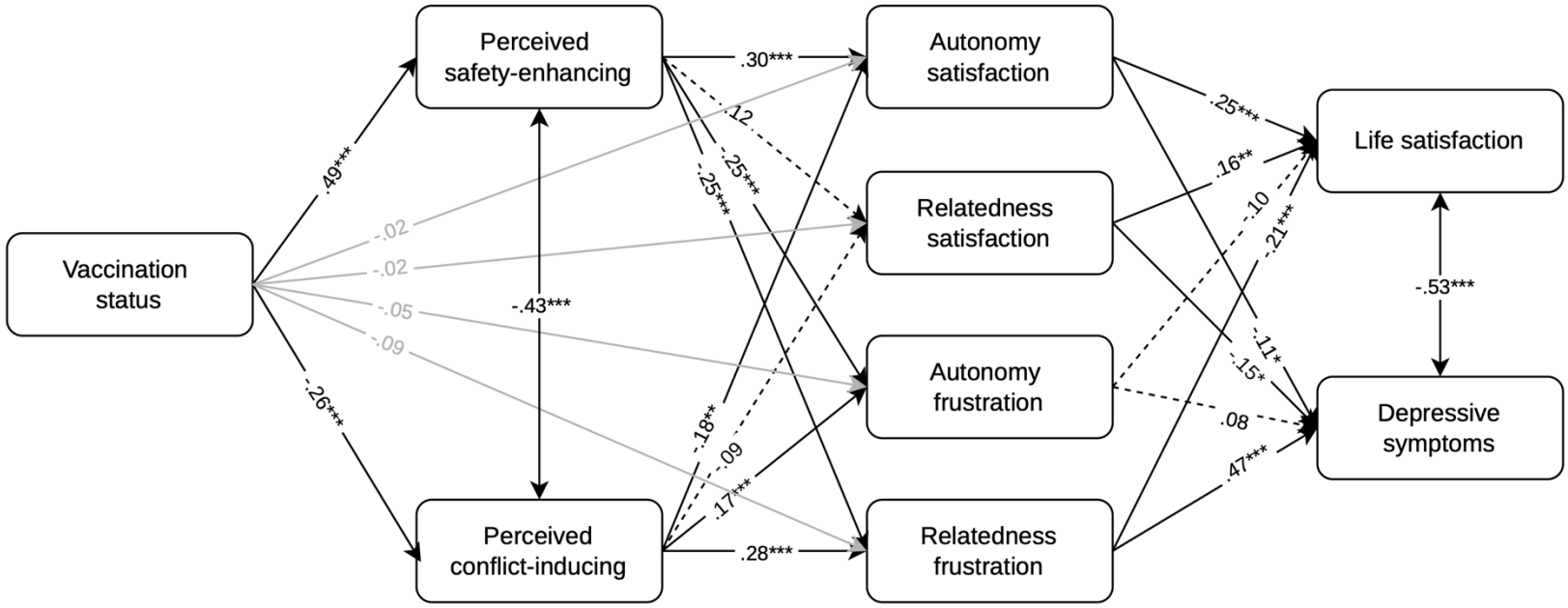



C. Relatedness frustration




*Note.* *** $p < .001$, ** $p < .01$, * $p < .05$; dashed vertical lines refer to significant differences between groups

*Figure 3.* Visualization of structural regression model with standardized coefficients




*Note.* *** *p*< .001, ** *p*< .01, * *p*< .05; dashed lines refer to non-significant differences between groups

## Tables

Table 1. *Pearson correlation table at the between-person level with descriptive statistics and intra-class correlation coefficients*

| **Variables** | ***M*** | ***SD*** | **ICC** | **1.** | **2.** | **3.** | **4.** | **5.** | **6.** | **7.** | **8.** | **9.** | **10.** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Autonomy satisfaction | 3.29 | 0.96 | .53 | | | | | | | | | | |
| 2. Competence satisfaction | 3.81 | 0.79 | .54 | .61*** | | | | | | | | | |
| 3. Relatedness satisfaction | 3.90 | 0.79 | .52 | .53*** | .60*** | | | | | | | | |
| 4. Autonomy frustration | 2.70 | 1.04 | .54 | -.69*** | -.51*** | -.44*** | | | | | | | |
| 5. Competence frustration | 2.09 | 0.91 | .58 | -.46*** | -.82*** | -.49*** | .50*** | | | | | | |
| 6. Relatedness frustration | 1.94 | 0.89 | .58 | -.46*** | -.57*** | -.63*** | .52*** | .68*** | | | | | |
| 7. Perceived safety (CST)[a] | 3.33 | 1.56 | .73 | .43*** | .11*** | .21*** | -.42*** | -.02 | -.18*** | | | | |
| 8. Perceived conflict (CST)[a] | 3.57 | 1.24 | .70 | -.41*** | -.20*** | -.21*** | .43*** | .13*** | .22*** | -.61*** | | | |
| 9. Depressive symptoms | 1.61 | 0.64 | .67 | -.49*** | -.66*** | -.50*** | .52*** | .71*** | .65*** | -.11*** | .19*** | | |
| 10. Life satisfaction | 2.93 | 1.01 | .57 | .52*** | .62*** | .52*** | -.52*** | -.63*** | -.53*** | .13*** | -.18*** | -.76*** | |

*Note. *** p<.001, **p<.01, *p<.05.* [a] perceptions of COVID-Safe Ticket (CST) were only assessed at four time occasions, while the other correlations refer to assessments across all time points.

Table 2. *ANOVA output of linear mixed regression models with F-values and statistical and practical significances*

| | Autonomy satisfaction | | Competence satisfaction | | Relatedness satisfaction | |
|---|---|---|---|---|---|---|
| | *Model 1* | *Model 2* | *Model 1* | *Model 2* | *Model 1* | *Model 2* |
| Age | 76.01*** (.04) | 75.58*** (.04) | 40.70*** (.02) | 40.82*** (.02) | 20.81*** (.01) | 20.87*** (.01) |
| Gender | 0.24 (.00) | 0.22 (.00) | 1.11 (.00) | 1.12 (.00) | 8.18** (.01) | 8.20** (.01) |
| Partner | 1.18 (.00) | 0.78 (.00) | 13.08*** (.00) | 12.95*** (.00) | 26.01*** (.01) | 25.18*** (.01) |
| Education level | 3.07* (.00) | 3.09* (.00) | 0.28 (.00) | 0.27 (.00) | 0.22 (.00) | 0.22 (.00) |
| Employment status | 0.16 (.00) | 0.16 (.00) | 10.16*** (.01) | 10.34*** (.01) | 0.07 (.00) | 0.06 (.00) |
| Time (1) | 65.65*** (.11) | 40.60*** (.07) | 8.54*** (.02) | 5.71*** (.01) | 19.63*** (.03) | 10.71*** (.02) |
| Vaccination status (2) | 22.32*** (.02) | 22.94*** (.02) | 1.17 (.00) | 0.93 (.00) | 3.57 (.00) | 3.14 (.00) |
| Interaction (1) by (2) | | 7.13*** (.01) | | 1.42 (.00) | | 1.99 (.00) |
| Maximum VIF | 1.04 | 1.04 | 1.02 | 2.41 | 1.04 | 1.05 |
| $R^2$ | .11/.57 | .05/.55 | .05/.55 | .05/.53 | .05/.54 | .05/54 |

Table 2 (continued). *ANOVA output of linear mixed regression models with F-values and statistical and practical significances*

| | Autonomy frustration | | Competence frustration | | Relatedness frustration | |
|---|---|---|---|---|---|---|
| | *Model 1* | *Model 2* | *Model 1* | *Model 2* | *Model 1* | *Model 2* |
| Age | 46.53*** (.03) | 45.80*** (.02) | 38.75*** (.02) | 39.29*** (.02) | 50.53*** (.03) | 50.23*** (.03) |
| Gender | 2.11 (.00) | 2.06 (.00) | 3.20 (.00) | 3.21 (.00) | 0.57 (.00) | 0.59 (.00) |
| Partner | 5.41* (.00) | 4.51* (.00) | 22.65*** (.00) | 23.00*** (.01) | 33.53*** (.01) | 31.55*** (.02) |
| Education level | 0.04 (.00) | 0.03 (.00) | 0.03 (.00) | 0.04 (.00) | 0.96 (.00) | 1.04 (.00) |
| Employment status | 0.02 (.00) | 0.05 (.00) | 18.83*** (.01) | 19.24*** (.01) | 2.21 (.00) | 2.43 (.00) |
| Time (1) | 44.71*** (.08) | 25.93*** (.05) | 11.48*** (.02) | 3.41** (.01) | 17.07*** (.03) | 8.23*** (.02) |
| Vaccination status (2) | 52.57*** (.04) | 51.46*** (.04) | 10.26** (.01) | 10.91*** (.01) | 8.95** (.01) | 5.64* (.01) |
| Interaction (1) by (2) | | 4.95*** (.01) | | 1.47 (.00) | | 9.60*** (.01) |
| Maximum VIF | 1.04 | 2.41 | 1.04 | 3.92 | 1.04 | 2.42 |
| $R^2$ | .10/.47 | .10/.58 | .06/.59 | .06/.62 | .06/.59 | .07/.63 |

*Note. *** p< .001, ** p< .01, * p< .05;* partial eta-squared mentioned between brackets; VIF = Variance Inflation Factor

Table 2 (continued). *ANOVA output of linear mixed regression models with F-values and statistical and practical significances*

| Variables | Depressive symptoms | | Life satisfaction | |
|---|---|---|---|---|
| | *Model 1* | *Model 2* | *Model 1* | *Model 2* |
| Age | 32.82*** (.02) | 33.24*** (.02) | 19.58*** (.01) | 19.76*** (.03) |
| Gender | 6.62* (.01) | 6.63* (.01) | 0.82 (.00) | 0.78 (.00) |
| Partner | 40.32*** (.02) | 38.74*** (.02) | 432.76*** (.02) | 31.16*** (.02) |
| Education level | 0.13 (.00) | 0.12 (.00) | 0.32 (.00) | 0.34 (.00) |
| Employment status | 14.01*** (.01) | 14.14*** (.01) | 10.74 *** (.01) | 10.70 *** (.01) |
| 1. Time | 10.39*** (.03) | 5.58*** (.02) | 7.91*** (.02) | 5.28*** (.01) |
| 2. Vaccination status | 0.09 (.00) | 0.26 (.00) | 0.29 (.00) | 0.24 (.00) |
| Interaction (1) by (2) | | 2.47 (.00) | | 2.64 (.00) |
| Maximum VIF | 1.04 | 4.65 | 1.04 | 4.52 |
| $R^2$ (marginal/conditional) | .09/.68 | .09/.69 | .06/.58 | .06/.58 |

*Note. *** p< .001, ** p< .01, * p< .05;* partial eta-squared mentioned between brackets; VIF = Variance Inflation Factor

## Supplementary Materials

Table S1. *Timeline overview of data collection and selection of participants in the current study*

| **Timeline** | Mar-April 2020 | Oct-Nov 2020 | March-2021 | May-21 | Oct-21 | Nov-21 | Dec-21 | Jan-21 | Mar-22 |
|---|---|---|---|---|---|---|---|---|---|
| **Context** | First lockdown | Second lockdown | Third lockdown | General vaccination rollout | CST implementation | | | | Restrictions removal (including CST) |
| **Step 1** | | | | | **During CST** | | | | |
| | | | | | 3676 completed at least 2/4 waves | | | | |
| **Step 2** | **Pre-CST** | | | | | | | | **Post-CST** |
| | 1349 participants (37% of 3676, Step 1) completed at least 2/4 pre-CST implementation waves + the finale wave March 2022 | | | | | | | | |

Table S2. *ANOVA output for continuous variable age*

| Outcome | NumDF | DenDF | F value | *p*-value | $\eta^2_p$ |
|---|---|---|---|---|---|
| Autonomy satisfaction | 1 | 1813.90 | 108.89 | <.001 | .06 |
| Competence satisfaction | 1 | 1841.49 | 47.89 | <.001 | .03 |
| Relatedness satisfaction | 1 | 1809.57 | 31.43 | <.001 | .02 |
| Autonomy frustration | 1 | 1826.47 | 72.62 | <.001 | .04 |
| Competence frustration | 1 | 1890.22 | 44.28 | <.001 | .02 |
| Relatedness frustration | 1 | 1866.58 | 67.73 | <.001 | .04 |
| Perceived safety (CST) | 1 | 858.49 | 64.41 | <.001 | .07 |
| Perceived conflict (CST) | 1 | 849.11 | 20.41 | <.001 | .02 |
| Life satisfaction | 1 | 1634.17 | 24.16 | <.001 | .01 |
| Depressive symptoms | 1 | 1761.43 | 41.52 | <.001 | .02 |

Table S3. *ANOVA output for categorical variable gender with mean (standard deviations)*

| Outcome | Male | Female | NumDF | DenDF | F value | *p*-value | $\eta^2_p$ |
|---|---|---|---|---|---|---|---|
| Autonomy satisfaction | 3.28 (±0.95) | 3.30 (±0.98) | 1 | 2533.70 | 0.00 | .97 | .00 |
| Competence satisfaction | 3.77 (±0.78) | 3.87 (±0.80) | 1 | 2633.38 | 10.79 | .001 | .00 |
| Relatedness satisfaction | 3.93 (±0.77) | 3.85 (±0.83) | 1 | 2509.69 | 23.33 | <.001 | .01 |
| Autonomy frustration | 2.69 (±1.03) | 2.72 (±1.06) | 1 | 2566.58 | 2.01 | .16 | .00 |
| Competence frustration | 2.15 (±0.91) | 1.99 (±0.90) | 1 | 2820.70 | 22.1 | <.001 | .01 |
| Relatedness frustration | 1.96 (±0.88) | 1.90 (±0.90) | 1 | 2687.54 | 28.01 | <.001 | .01 |
| Perceived safety (CST) | 3.47 (±1.49) | 3.06 (±1.67) | 1 | 860.29 | 3.45 | .06 | .00 |
| Perceived conflict (CST) | 3.49 (±1.24) | 3.72 (±1.23) | 1 | 850.83 | 0.89 | .35 | .00 |
| Life satisfaction | 2.88 (±1.00) | 3.03 (±1.02) | 1 | 1991.99 | 28.76 | <.001 | .01 |
| Depressive symptoms | 1.66 (±0.64) | 1.51 (±0.62) | 1 | 2258.36 | 34.54 | <.001 | .02 |

Table S4. *ANOVA output for categorical variable partner status with mean (standard deviations)*

| Outcome | Single | Partner | NumDF | DenDF | F value | *p*-value | $\eta^2_p$ |
|---|---|---|---|---|---|---|---|
| Autonomy satisfaction | 3.25 (±0.95) | 3.30 (±0.96) | 1 | 1364.07 | 0.31 | .58 | .00 |
| Competence satisfaction | 3.66 (±0.84) | 3.87 (±0.76) | 1 | 1368.17 | 1.57 | .21 | .00 |
| Relatedness satisfaction | 3.76 (±0.85) | 3.96 (±0.76) | 1 | 1366.02 | 8.26 | .01 | .01 |
| Autonomy frustration | 2.77 (±1.02) | 2.67 (±1.04) | 1 | 1369.32 | 3.27 | .07 | .00 |
| Competence frustration | 2.29 (±0.98) | 2.01 (±0.87) | 1 | 1375.71 | 4.39 | .04 | .00 |
| Relatedness frustration | 2.11 (±0.96) | 1.87 (±0.85) | 1 | 1382.37 | 0.36 | .55 | .00 |
| Perceived safety (CST) | 3.27 (±1.52) | 3.36 (±1.58) | 1 | 830.78 | 26.71 | <.001 | .03 |
| Perceived conflict (CST) | 3.54 (±1.28) | 3.58 (±1.23) | 1 | 820.27 | 16.03 | <.001 | .02 |
| Life satisfaction | 2.68 (±1.05) | 3.04 (±0.97) | 1 | 1256.04 | 1.4 | .24 | .00 |
| Depressive symptoms | 1.81 (±0.70) | 1.52 (±0.59) | 1 | 1293.25 | 7.81 | .01 | .01 |

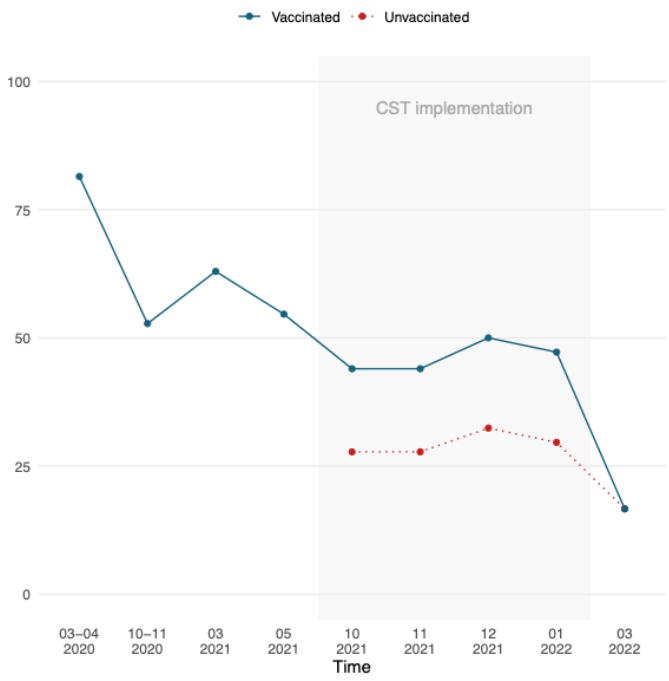
Table S5. *ANOVA output for categorical variable education level with mean (standard deviations)*

| **Outcome** | **No/Secondary** | **Bachelor's degree** | **Master's degree** | **NumDF** | **DenDF** | **F value** | ***p*-value** | **$\eta^2_p$** |
|---|---|---|---|---|---|---|---|---|
| Autonomy satisfaction | 3.29 (±0.98) | 3.30 (±0.95) | 3.31 (±0.96) | 2 | 1669.03 | 5.64 | .01 | .01 |
| Competence satisfaction | 3.83 (±0.77) | 3.81 (±0.75) | 3.82 (±0.84) | 2 | 1698.71 | 0.35 | .70 | .00 |
| Relatedness satisfaction | 3.93 (±0.77) | 3.93 (±0.77) | 3.88 (±0.83) | 2 | 1664.26 | 0.56 | .57 | .00 |
| Autonomy frustration | 2.66 (±1.05) | 2.65 (±1.03) | 2.75 (±1.04) | 2 | 1681.87 | 0.28 | .76 | .00 |
| Competence frustration | 2.04 (±0.87) | 2.07 (±0.88) | 2.10 (±0.94) | 2 | 1755.51 | 0.04 | .96 | .00 |
| Relatedness frustration | 1.92 (±0.86) | 1.90 (±0.86) | 1.99 (±0.94) | 2 | 1724.55 | 1.02 | .36 | .00 |
| Perceived safety (CST) | 3.13 (±1.65) | 3.47 (±1.51) | 3.34 (±1.55) | 2 | 856.51 | 7.19 | .001 | .02 |
| Perceived conflict (CST) | 3.59 (±1.32) | 3.53 (±1.18) | 3.58 (±1.26) | 2 | 847.00 | 1.57 | .21 | .00 |
| Life satisfaction | 3.00 (±1.00) | 2.93 (±1.00) | 2.95 (±1.02) | 2 | 1430.76 | 0.34 | .72 | .00 |
| Depressive symptoms | 1.60 (±0.65) | 1.61 (±0.63) | 1.61 (±0.63) | 2 | 1528.59 | 0.32 | .72 | .00 |

Table S6. *ANOVA output for categorical variable employment status with mean (standard deviations)*

| **Outcome** | **Retired** | **Unemployed** | **Working** | **NumDF** | **DenDF** | **F value** | ***p*-value** | **$\eta^2_p$** |
|---|---|---|---|---|---|---|---|---|
| Autonomy satisfaction | 3.48 (±0.91) | 3.19 (±1.05) | 3.15 (±0.98) | 2 | 2965.38 | 0.64 | .53 | .00 |
| Competence satisfaction | 3.91 (±0.73) | 3.55 (±0.89) | 3.78 (±0.81) | 2 | 3079.95 | 11.21 | <.001 | .01 |
| Relatedness satisfaction | 3.99 (±0.75) | 3.92 (±0.77) | 3.83 (±0.83) | 2 | 2936.57 | 0.1 | .91 | .00 |
| Autonomy frustration | 2.53 (±0.97) | 2.89 (±1.11) | 2.84 (±1.06) | 2 | 3002.43 | 0.44 | .65 | .00 |
| Competence frustration | 1.96 (±0.83) | 2.41 (±1.04) | 2.13 (±0.93) | 2 | 3287.79 | 19.7 | <.001 | .01 |
| Relatedness frustration | 1.81 (±0.83) | 2.12 (±0.95) | 2.02 (±0.92) | 2 | 3138.02 | 3.14 | .04 | .00 |
| Perceived safety (CST) | 3.77 (±1.41) | 3.04 (±1.71) | 3.01 (±1.58) | 2 | 884.94 | 0.01 | .99 | .00 |
| Perceived conflict (CST) | 3.21 (±1.24) | 3.90 (±1.20) | 3.81 (±1.18) | 2 | 876.96 | 3.79 | .02 | .01 |
| Life satisfaction | 3.09 (±0.97) | 2.55 (±1.10) | 2.85 (±1.00) | 2 | 2238.18 | 11.24 | <.001 | .01 |
| Depressive symptoms | 1.50 (±0.58) | 1.89 (±0.75) | 1.64 (±0.65) | 2 | 2515.34 | 15.31 | <.001 | .01 |

*Figure S1*. Stringency of measures across time by vaccination status




*Note.* The figure displays the Oxford COVID-19 Government Response Stringency Index, a composite measure ranging from 0 to 100 that reflects the strictness of government policies related to COVID-19 containment (e.g., school closures, travel bans, stay-at-home orders). Higher values indicate more stringent public health measures. Data were obtained from the Oxford COVID-19 Government Response Tracker (Hale et al., 2021).