Do Psychological Needs Play a Role in Times of Uncertainty?

Associations with Well-being During the COVID-19 Crisis

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Abstract

Across the world, measures were taken to contain the spreading of the COVID-19 virus. Many of these measures caused a sudden rupture in people's daily routines, thereby eliciting considerable uncertainty and potentially also hampering the satisfaction of individuals' psychological needs for autonomy, relatedness, and competence. Drawing upon Maslow's Hierarchical Need Theory and Self-Determination Theory, this study examined the unique role of felt insecurity and the psychological needs, as well as their dynamic interplay, in the prediction of mental health. A large and heterogeneous sample of adults (N = 5118; Mage = 43.45 years) was collected during the first ten days of the lockdown period in [details removed for peer review]. A subsample (N = 835, Mage = 41.39) participated during a second wave one week later. Hierarchical regression analyses indicated that felt insecurity, need satisfaction and need frustration all independently predicted various positive (life satisfaction, sleep quality) and negative indicators depressive symptoms, anxiety) of mental health, with little systematic evidence for interactions between the predictors. The pattern of findings obtained concurrently largely held in the longitudinal analyses. Finally, results showed that associations between felt insecurity and lower concurrent and prospective mental health were partially mediated by need satisfaction and frustration, with especially psychological need frustration predicting changes in mental health over time. Overall, the findings suggest that satisfaction of the psychological needs for autonomy, competence, and relatedness is not just a 'luxury good'. Satisfaction of these needs is important also in times of insecurity, while need frustration represents a risk factor for maladjustment during such times.

Keywords: Hierarchical Needs Theory, insecurity, basic psychological needs, Self-Determination Theory, Well-being

The worldwide COVID-19 crisis poses a global threat to various domains of societal functioning, including the domains of public health, economy, and mental health (Brooks et al., 2020). In terms of mental health, this crisis comes with a number of threats, such as the restrictions of citizens' daily behavior (e.g., Das et al., 2020), increasing loneliness due to self-isolation (e.g., Killgore et al., 2020) and the difficulties to combine work and family roles (e.g., Spinelli et al., 2020). Considered from a Self-Determination Theory perspective (SDT; Ryan & Deci, 2017; Vansteenkiste et al., 2020), these threats may hamper the satisfaction of individuals' basic psychological needs for autonomy (i.e., experiencing a sense of volition and choice), relatedness (i.e., experiencing warmth, belonging and caring), and competence (i.e., experiencing a sense of mastery and effectiveness). These threats may even engender frustration of the basic psychological needs, resulting in experiences of external pressure (autonomy need frustration), solitude (relatedness need frustration), and inadequacy (competence need frustration). Although it is challenging for individuals to satisfy their psychological needs during these times, need satisfaction may still be a key resource of resilience in the face of stress (Weinstein & Ryan, 2011). In contrast, frustration of the psychological needs may increase individuals' vulnerability for maladjustment (Vansteenkiste & Ryan, 2013).

At the same time, the pandemic also elicits a lot of worry and insecurity in individuals (Brodeur et al., 2020), including uncertainty regarding one's health (e.g., Mertens et al., 2020), financial concerns (e.g., Fetzer et al., 2020; Kleinberg et al., 2020), and the unpredictable nature of the quickly evolving situation at large (Bao et al., 2020). During the first days of the lockdown measures, in many countries, there was even uncertainty regarding the availability of food and medication (Arafat et al., 2020). From a Maslowian perspective (Maslow, 1954), when strong concerns for safety/security become salient, such concerns would play a preeminent role in individuals' functioning, leaving less room for other needs in the need-hierarchy, such as those studied in SDT, to play a supplementary role.

The first days of the lockdown period offered a unique opportunity to study the role of individuals' need for security as emphasized by Maslow and SDT's psychological needs, as well as their interplay, in the prediction of citizens' adjustment to times of distress. Sampling a large and heterogeneous group of citizens in terms of age and living situation, the present study aimed to examine whether SDT's psychological needs still matter for individuals' mental health after taking into account individuals' experiences of uncertainty/insecurity. This research question is important not only from a theoretical point of view but also from an applied perspective because these psychological needs are potential targets for interventions aimed at strengthening individuals' resilience in stressful conditions (Weinstein & Ryan, 2011).

Psychological Needs

SDT is one of the most intensively studied contemporary theories of human motivation and well-being (Sheldon & Prentice, 2019). *Basic Psychological Need Theory* (BPNT; Ryan & Deci, 2017), one of SDT's six mini-theories, assigns a strong and prominent role to the psychological needs for autonomy, competence, and relatedness in mental health (Vansteenkiste et al., 2020).

The need for autonomy entails experiences of volition, choice, and authenticity in one's actions. Autonomy frustration involves the experience of feeling controlled or coerced to act in certain ways. Clearly, the lockdown measures restricted individuals' room for independent decision-making. Due to the various "do's" (e.g., the obligation to keep physical distance) and "don'ts" (e.g., prohibition to leave the house for non-essential transportation), many citizens likely experienced less autonomy than usual. However, even limits and obligations can be experienced as autonomous to the extent that individuals accept their value and concur with their importance (Ryan & Deci, 2017; Vansteenkiste et al., 2018). In addition, for some people the lockdown may have even afforded new opportunities for autonomy need satisfaction. For example, because there was no longer an obligation to commute and because there was a

decrease in social commitments, at least some people may have found more time to pursue their personal interests (e.g., Güzel et al., 2020).

Relatedness, the second of BPNT's psychological needs, denotes the experience of warmth, belonging, and mutual care. Relatedness frustration involves the experience of rejection, loneliness, and disconnection. As citizens were required to self-isolate, some may have missed the physical contact and warmth with close others (e.g., Lades et al., 2020), thereby experiencing relatedness frustration. At the same time, the lockdown brought new opportunities for relatedness satisfactions, as many citizens became creative in connecting with others through digital channels, and/or by participating in collective activities that fostered a sense of mutual care and group identity.

Finally, competence satisfaction occurs through the mastery of tasks, attainment of goals, and the full use and development of individuals' skills. Competence frustration involves the experience of ineffectiveness and diminished confidence. During the lockdown, some people likely doubted their capacity to harmonize different roles (e.g., parent, teleworker, homeschool teacher, Spinelli et al., 2020). Similarly, the cancellation of organized leisure activities that typically offer opportunities for skill development, may hamper competence satisfaction. Yet for others the lockdown period may have offered opportunities to acquire new skills and knowledge (e.g., digital communication, learning a new language) or to optimize skills for which little time was available before (e.g., Güzel et al., 2020).

In BPNT, these three psychological needs are considered as *essential* nutrients for individuals' well-being (Ryan, 1995). This assumption implies that the satisfaction of individuals' needs would contribute to individuals' adjustment, and resilience. In contrast, the frustration of these needs, which occurs when individuals' psychological needs are actively thwarted or blocked (Bartholomew et al., 2011), increases risk for problem behavior and psychopathology (Ryan et al., 2016; Vansteenkiste & Ryan, 2013). Consistent with the dual process model (Vansteenkiste & Ryan, 2013), need satisfaction was found to contribute

primarily to individuals' psychological well-being, as indexed by life satisfaction (Tay & Diener, 2011), vitality (Ryan & Deci, 2008), and meaning (Martela et al., 2018) as well as to their physical health, as indexed by increased longevity (Weinstein et al., 2019). In contrast, need frustration relates primarily to ill-being as indexed by symptoms of anxiety, stress, and depression (e.g., Bartholomew et al., 2011; Vandenkerckhove et al., in press), while also predicting poor physical health, as indexed by poorer sleep quality (Campbell et al., 2017b) and greater stress reactivity (Reeve & Tseng, 2011).

In addition to being essential, SDT assumes that these needs are *universally* important, that is, crucial across developmental periods, cultures, and life domains (Ryan & Deci, 2017; Vansteenkiste et al., 2020). Congruent with this assumption, various studies have shown that the benefits associated with need satisfaction and the costs associated with need frustration generally hold across populations and contexts (e.g., Chen et al., 2015b; Church et al., 2013; Rodriguez-Meirinhos et al., 2019). Yet, only few studies have examined whether these psychological needs continue to play a role in times or circumstances of distress and uncertainty (e.g., Tay & Diener, 2011). Such an examination is important because, as highlighted in Maslow's need pyramid, psychological needs may become less important when the deficit-need for security becomes salient, as is the case during the COVID-19 Crisis.

Security/safety in Maslow's Hierarchical Model

In Maslow's highly popularized and hierarchically organized need-pyramid, the need for security/safety is placed at the second level, in between the biological needs (e.g., hunger, thirst) and "growth-based needs", such as having self-esteem, love, and self-actualization. BPNT's psychological needs for autonomy, competence, and relatedness would also belong to this higher-order category of growth-based needs. The need for safety/security is broadly defined as the need to feel safe from environmental threats and to perceive oneself as having sufficient material resources to ensure basic survival (Maslow, 1943). This broad need involves different facets (Maslow, 1970), such as the need to feel protected from physical harm and

threats (i.e., environmental safety), the need to have sufficient material resources for basic survival (i.e., financial safety), and the need to protect oneself against threatening diseases (i.e., health-related safety). Clearly, the COVID-19 crisis poses a threat to all three of facets of the safety need, with the initial lockdown phase likely activating the salience of this safety/security need. Past research has shown that heightened insecurity with respect to each of these three facets predicts greater ill-being. Financial hardship (Frankham et al., 2020), unpredictable and dangerous environments (Grillon et al., 2004), and health concerns (Goodwin et al., 2010) all come with a psychological cost, including symptoms of stress, anxiety, and depression.

Further, Maslow' *principle of prepotency* implies that ''the appearance of a need rests on other prepotent needs; needs or desires must be arranged in hierarchies of prepotency'' (p. 91, 1943). That is, the need for security/safety would be a more fundamental concern in times of uncertainty, thereby starting to dominate individuals' functioning and constraining the potency of BPNT's psychological needs in terms of both salience and effects. We examine this possibility in two ways.

First, based on Maslow's prepotency principle it can be expected that need satisfaction and frustration would fail to play an incremental role in predicting individuals' adjustment during the COVID-19 crisis after controlling for felt security/safety. This expectation contrasts with BPNT's argument that the effects of autonomy, competence, and relatedness are *pervasive* (Vansteenkiste et al., 2020), which implies that the effects of need satisfaction should manifest in myriad outcomes and across different life conditions. Both in peaceful and stable conditions, such as during vacation periods, as well as in distressing and unstable conditions, such as during the COVID-19 crisis, these psychological needs should play a predictive role. That is, during stressful times, psychological need satisfaction would help to replenish one's resources, thereby fostering well-being, while simultaneously serving as a source of resilience and buffering against ill-being and maladjustment. In contrast, need frustration would create additional risk

for mental health problems (i.e., diminished well-being and more ill-being) beyond the effect of felt uncertainty.

The second way in which we examine whether safety/security plays a constraining role in the effects of BPNT's psychological needs is by examining moderation effects. One interpretation of Maslow's prepotency hypothesis is that "growth-based" need satisfactions would contribute to individuals' well-being *only* among individuals feeling sufficiently physically safe and secure. The well-being enhancing effect of psychological needs would not manifest among people whose needs for security/safety are unmet because they would be less able to savor and appreciate the benefits of need satisfaction, suggesting a form of desensitization (Rasskazova et al., 2016). Such a finding would again contradict BPNT's universality principle, which suggests that all individuals should benefit from need satisfaction, and pay a cost for their frustration, even when people encounter considerable threats to their security.

Only a handful of studies have examined the interplay between safety/security and BPNT's needs. Sheldon et al. (2001; Study 3) asked university students to think of both a satisfying and an unsatisfying event during the past semester. For each of these self-generated events, participants then rated their experienced need satisfactions, including BPNT's needs, security, and six other need-candidates, as well as their event-related affect. In terms of *salience*, all three BPNT needs ended up in the top-4 of the most satisfied needs during 'satisfying events', with security being seventh. Yet, the pattern of need saliency was different in the case of unsatisfying events, with a lack of security coming out third. Similarly, the unique role of BPNT's needs and security in predicting affect-balance during both events differed somewhat, with BPNT's needs being stronger predictors in the case of satisfying events and with a lack of security/safety being a particular strong predictor in the case of unsatisfying events. Such findings fit with the idea that safety/security represents a deficit need, the salience and predictive validity of which becomes stronger under unsatisfying or distressing circumstances.

However, one reason why the role of BPNT's needs might have appeared more limited during the unsatisfying events is because Sheldon et al.'s' measure only assessed the satisfaction side and not the frustration of these needs. In line with the dual pathway model, need frustration may play a particularly critical role in unsatisfying events, as it does in predicting ill-being and psychopathology (Vansteenkiste & Ryan, 2013).

Further, Tay and Diener (2011) examined the interplay between satisfaction of the psychological needs and the need for safety in a large cross-national study comprising 123 samples. BPNT's psychological needs yielded a fairly independent association with psychological well-being above and beyond the contribution of safety satisfaction, with the BPNT effects not being moderated by safety/security. Similar findings were reported by Chen et al. (2015a), who purposefully collected data in adult samples that were heavily deprived in terms of security/safety, that is, South-African students at risk for environmental threats (e.g., criminality) and Chinese immigrant workers at risk for financial instability. In both samples, safety/security and BPNT's growth-based needs uniquely contributed to individuals' psychological well-being, with no evidence for moderation effects.

Finally, in two large samples of Russian employees occupying financially precarious jobs in a rather unstable work context, Rasskazova et al. (2016) reported that work-related need satisfaction but also financial and environmental stability yielded unique positive associations with desirable outcomes (e.g., engagement and intrinsic work motivation) and unique negative associations with undesirable outcomes (e.g., boredom and alienation at work). Some evidence for an interaction effect between both sets of needs was obtained in Study 2, with workers high in safety satisfaction benefitting somewhat more from psychological need satisfaction. Rasskazova et al. (2016) also examined the possibility that felt insecurity may both yield a direct contribution to (mal)adjustment and an indirect one, that is via reduced psychological need satisfaction. The reasoning behind this mediation sequence is that (perceived) insecurity hampers satisfaction of BPNT's needs, with a lack of psychological need satisfaction in turn

relating to lower well-being. Their analyses indicated that psychological need satisfaction partially mediated associations between felt insecurity and outcomes.

The Present Study

Although the BPNT literature has grown exponentially over the past two decades, only few studies have addressed the interplay between individuals' psychological needs and their physical needs, including the physical need for security (Maslow, 1954). Because it is assumed that physical needs are dynamically related to BPNT's psychological needs (Vansteenkiste et al., 2020), it is important to study the independent roles and the interplay between psychological and physical needs in the prediction of (mal)adjustment. The COVID-19 crisis offered a unique window of opportunity to address this issue.

First, based on BPNT, we expected that satisfaction of the needs for autonomy, competence, and relatedness would represent a critical resource of mental health, even after controlling for security/safety. In contrast, the frustration of these needs would pose a risk for ill-being (Hypothesis 1a). This hypothesis is derived from the presumed *essential* and *pervasive* role of psychological needs in mental health, meaning that their effects should remain significant even after controlling for security/safety. This hypothesis contrasts with Maslow's depiction of the needs in a hierarchy, where security/safety is assigned a more fundamental and basic role than BPNT's needs. On the basis of that hierarchical representation of the needs, it could be expected that the need for security/safety has the strongest effects at a time when this need is highly salient (such as the COVID-19 lockdown period) and that this needs even cancels out effects of psychological needs (Hypothesis 1b).

Second, to test SDT's criterion of universality, we examined whether safety/security satisfaction would interact with autonomy, competence, and relatedness in the prediction of the mental health outcomes. Based on BPNT's universality principle, safety/security is unlikely to cancel out the benefits associated with need satisfaction (Hypothesis 2a). Based on Maslow's interpretation of the prepotency principle, however, the well-being enhancing effects of SDT's

psychological needs would be restricted under conditions of high insecurity. According to this hypothesis, BPNT's needs would play only *a conditional role.* That is, the benefits associated with psychological need satisfaction would emerge only when individuals feel sufficiently secure and protected from uncertainty and danger (Hypothesis 2b).

Third, in line with Rasskazova et al. (2016), we examined whether BPNT's needs could also be modelled as mediators in associations between felt insecurity and (mal)adjustment. (Hypothesis 3). Finally, in order to obtain a fine-grained insight in the role of different sources of insecurity (i.e., health-, situation-, medication-, and finance-related), we aimed to do all analyses both with a composite score of insecurity and with separate scores for each type of insecurity instead of a composite score, which can be found in the Appendix. This approach allows for an examination of the question which type of insecurity matters the most and for an examination of the generalization of effects across different types of insecurity.

These hypotheses were examined in a large, heterogeneous sample of [details removed for peer review] adults, which was collected during the first ten days of the lockdown in [details removed for peer review], a time when health threats, concerns about obtaining basic goods, and economic fears were especially salient. We chose to include a variety of psychological and health-related outcomes, both positive and negative, that are highly relevant in the context of the COVID-19 crisis, including participants' life satisfaction (Zhang et al., 2020), sleep quality (Xiao et al., 2020), and symptoms of anxiety and depression (e.g., Rajkumar, 2020). Each of these mental health outcomes were also measured during a follow-up assessment 1 week later among a subsample of participants.

Method

Participants and Procedure

Starting from March 18th, 2020, the [details removed for peer review] government announced a national lockdown, in which citizens were only allowed to go outside for essential matters such as work or to do grocery shopping in the supermarket. Citizens had to avoid

contact with the outside world as much as possible. People could meet outside with one friend only, thereby keeping a distance of at least 1.5 meters. One day after the start of the lockdown, a cross-sectional online survey was launched among [details removed for peer review] citizens in [details removed for peer review] aged 18 years or above. Participants were recruited through social media using an advertising campaign and by contacting several organizations (e.g., sport clubs, elderly organizations) who distributed a link to the questionnaire. Participants who filled out the questionnaire in the first ten days of the lockdown measures in [details removed for peer review] (between March 19th, 2020 and March 28th, 2020) were included. After filling out an online built-in informed consent, a total of 5118 citizens (M_{age} = 43.45, *SD* = 16.04, range = 18 – 87 years) participated, with 77.2% being female. Of the total sample, 60.5% reported being in a relationship. A majority of participants had a higher education degree (30.8% bachelor, 39.5% master) and a minority of participants (20%) suffered from one or more chronic diseases, making them at higher risk for COVID-19 complications.

At the end of the cross-sectional survey, participants who took the initial survey during the first seven days of the lockdown were asked whether they were willing to participate in a follow-up assessment. Of those participants (*N* = 3284), 1367 citizens (41,63%) agreed to participate in a follow-up assessment one week later. Of those expressing the willingness in follow-up measures, 835 participants did so at Time 2 (75.1% female, M_{age} = 41.39, *SD* = 14.8, range = 18 – 82 years). In the analyses for this paper, we included the participants' scores on each of the mental health outcomes (i.e., life satisfaction, sleep quality, depressive symptoms, and anxiety) at this follow-up moment. A comparison of participants willing to participate a second time with those actually participating at T2 using Little's (1988) MCAR test showed that this attrition at T2 was completely at random ($\chi^2(1) = 0.42$, $p = .52$). The procedure used in this study was approved by the ethical committee of [details removed for peer review] (nr. 2020/37).

Measures

Participants completed all the reported measures in [details removed for peer review].

Background variables. Several demographic variables were assessed: age, marital status (alone versus in a relationship), number of children, educational level (high school degree, higher non-university education and university education), comorbidity (not at risk versus at risk due to medical conditions such as diabetes or a heart condition) and number of days that had passed since the lockdown was declared.

Insecurity. Inspired by the measures for environmental and financial safety used in Chen et al. (2015a), a total of 8 items were developed specifically for this study to assess experienced insecurity during the lockdown. Following the item stem (i.e., "In the past week during the corona crisis…"), participants were asked to indicate their worries (e.g., "I was worried about…") and feelings of threat and insecurity (i.e., "I felt that … is under threat") with regards to their health, financial situation, the availability of supplies and medication, and how the situation would evolve. Each item was rated on a scale ranging from 1 (*not at all true*) to 5 (*totally true*) and the internal consistency of the overall scale was good (α = .79).

Psychological Needs. Participants filled out the Basic Psychological Need Satisfaction and Need Frustration Scale (BPNSNFS; Chen et al., 2015b; 24 items). Items were formulated with reference to the preceding week and were rated on a scale ranging from 1 (*not at all true)* to 5 (*totally true*). The scale measures both the satisfaction and frustration of psychological needs for autonomy, relatedness, and competence, with each subscale (3 needs x satisfaction or frustration) comprising 4 items. Example items are: "I felt that my decisions reflected what I really wanted" (i.e., autonomy satisfaction), "I had the impression that people I spent time with disliked me" (i.e., relatedness frustration), and "I felt confident that I could do things well" (i.e., competence satisfaction). In the current study, the scale yielded good internal consistencies for all subscales ($.72 < \alpha < .85$) and for the overall composite scores for need satisfaction (α = .85) and need frustration (α = .88).

Life Satisfaction. To measure life satisfaction, the most face valid item of the Satisfaction with Life Scale (Pavot & Diener, 1993) was selected. Participants were asked to what extent they were satisfied with their life during the past week, using a scale going from 1 (*seldom or never, less than 1 day*) to 4 (*mostly or all the time, 5 to 7 days*). Such a single item assessment has been successfully used in the past to measure life satisfaction (e.g., Fujita & Diener, 2005) and has proven to be equally valid as a multi-item measure (Cheung & Lucas, 2014).

Sleep Quality. Sleep quality was measured with the subjective sleep quality component of the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989). On a single item participants rate their overall sleep quality during the past week on a scale ranging from 1 (*very bad*) to 4 (*very good*). Previous research in general populations showed that the sleep quality component of the PSQI shows the strongest correlation with the total PSQI score (Hinz et al., 2017).

Depressive symptoms. To assess depressive symptoms, participants filled out a 6-item version (Van Hiel & Vansteenkiste, 2009) of the Center for Epidemiological Studies – Depression scale (CES-D; Radloff, 1977). Following the item stem (i.e., "During the past week"), participants rated the items (e.g., "I felt sad") on a scale ranging from 1 (*seldom or never, less than 1 day*) to 4 (*mostly or all the time, 5 to 7 days*). Internal consistencies were sufficient (α = .79 at T1 and α = .78 at T2).

Anxiety symptoms. To measure anxiety symptoms, participants were asked to indicate on 5 items how anxious they felt using the same rating scale as for depressive symptoms. Four items were selected from the short form of the State Trait Anxiety Inventory (STAI, Marteau & Bekker, 1992) based on their relevance to the context of the COVID-19 crisis (e.g., "I felt tense"). In addition, we added one item from the full version of the STAI to tap into anxiety in a more direct way (i.e., "I felt anxious"). Internal consistencies were good at T1 (α = .86) and T2 (α = .84).

Results

Descriptive Statistics and Preliminary Analyses

Descriptive statistics and bivariate correlations among the measured variables can be found in Table 1. The mean scores reveal that participants, on average, experienced a moderately high level of need satisfaction but also low to moderate levels of need frustration. Participants also reported moderate levels of life satisfaction and sleep quality, whereas symptoms of depression and anxiety were rather low. Results of a repeated measures ANOVA showed that participants experienced the most insecurity about the unpredictability of the situation (M = 3.56; SD = 0.82), followed by insecurity in the domains of health (M = 3.24; SD = 1.02), finances (M = 2.50; SD = 1.17), and medication (M = 2.29; SD = 1.01), with all means differing significantly from each other; $F(2.69, 12102.90) = 2295.66$, $p < .001$, $\eta^2 = .34$. Correlational analyses showed that experiencing higher insecurity in all domains related to lower levels of need satisfaction, life satisfaction and sleep quality, and higher levels of need frustration and symptoms of depression and anxiety. Further, need satisfaction was positively correlated with life satisfaction and sleep quality and negatively with depressive and anxiety symptoms, whereas need frustration showed an opposite pattern of relations. Finally, all four domains of insecurity were highly interrelated.

To examine the relation between the assessed background variables and the four outcome variables, two MANCOVAs were performed (one per time point). Results with the variables assessed at T1 showed that all seven background variables were significantly related to the outcomes: age ($F(4, 4478) = 36.58$, $p < .001$, $\eta^2 = .03$), number of crisis days ($F(4, 4478) = 16.43$, $p < .001$, $\eta^2 = .01$), gender ($F(4, 4478) = 40.14$, $p < .001$, $\eta^2 = .04$), marital status ($F(4, 4478) = 79.44$, $p < .001$, $\eta^2 = .07$), number of children ($F(4, 4478) = 10.61$, $p < .001$, $\eta^2 = .01$), educational level ($F(8, 8956) = 9.22$, $p < .001$, $\eta^2 = .01$), and comorbidity ($F(4, 4478) = 7.28$, $p < .001$, $\eta^2 = .01$). A MANCOVA conducted with the outcomes assessed at T2 showed that only age ($F(4, 772) = 7.80$, $p < .001$, $\eta^2 = .04$), gender ($F(4, 772) = 4.97$, $p = .001$, $\eta^2 = .03$),

and marital status ($F(4, 772) = 15.51$, $p < .001$, $\eta^2 = .07$) were significantly related to the outcomes (non-significant F-values ranged between 0.67 and 2.30, η^2 ranged between .00 and .01). Based on these findings, we controlled for all background variables in the main analyses.

Primary Analyses

Unique and Interactive Roles of Insecurity and Need-based Experiences. To examine the first two hypotheses, we performed hierarchical regression analyses per outcome (i.e., life satisfaction, sleep quality, depressive symptoms, and anxiety symptoms). In Step 1, we entered all background variables that yielded a significant multivariate effect. In Step 2, insecurity, need satisfaction and need frustration were entered as predictors to examine whether these predictors would relate uniquely to mental health (Hypothesis 1a and 1b). In Step 3, we added the two two-way interactions between insecurity and need satisfaction or need frustration to investigate whether the effects of need-based experiences were dependent on the level of insecurity (Hypothesis 2a and 2b). The two interaction terms were created by multiplying the z-scored variables of insecurity and need satisfaction/ frustration. Diagnostic analyses showed that the models included no multicollinearities, no influential outliers (Cook's distance) and that the assumptions for linearity (residual versus fitted plot), normality (Normal Q-Q and residual distribution plot) and homoscedasticity (residual versus fitted plot) were not violated.

The results of these analyses are displayed in Table 2 for life satisfaction and sleep quality and in Table 3 for depressive and anxiety symptoms[1]. Findings obtained with the background variables in Step 1 indicated that women scored lower than men on life satisfaction and sleep quality and higher on depressive and anxiety symptoms. With increasing age, participants reported better mental health. Participants in a relationship (compared to singles) reported higher life satisfaction and lower depressive symptoms. Higher educational levels were generally related to better mental health. After controlling for the other background

variables, the number of children in the family and comorbidity were largely unrelated to the outcome variables.

Results of Step 2 showed that felt insecurity, need satisfaction and need frustration were significantly and uniquely related to all four outcomes in the expected direction. Specifically, need satisfaction related positively to life satisfaction and sleep quality and negatively to depressive and anxiety symptoms, whereas need frustration and felt insecurity showed an opposite pattern of relations. Finally, the interaction terms were not significant in three of the four models, indicating that the relation between need-based experiences and life satisfaction, sleep quality and anxiety are not dependent upon the experience of insecurity. As displayed in Figure 1, insecurity did interact significantly with need satisfaction (Panel A) and need frustration (Panel B) in the prediction of depressive symptoms. These significant interactions were further examined by means of standardized simple slope analyses, in which the significance of the slopes of the regressions at three levels of the moderator were calculated, that is, at low (i.e., < 1 *SD* below the mean), mean and high (i.e., > 1 *SD* above the mean) levels of insecurity (Hayes & Matthes, 2009). Concerning need satisfaction, the strength of the negative association with depressive symptoms increased with individuals reporting high insecurity (β = -.27; t = 9.81; p < .001), compared to individuals having average (β = -.25; t = 11.95; p < .001) and low scores (β = -.22; t = 6.65; p < .001). The opposite was found for need frustration, with the positive relation between need frustration and depression being stronger when high in insecurity (low: β = .32; t = 5.06; p < .001; average: β = .38; t =11.94; p < .001; high: β = .45; t = 11.63; p < .001).

We repeated these series of regression analyses in the subsample of participants who completed the follow-up assessment (N = 835), this time including the T2 measures as outcomes while controlling for the outcome at T1. The results are displayed in Table 4 for life satisfaction and sleep quality and in Table 5 for depressive and anxiety symptoms. In spite of the high rank order stability in all outcomes, felt insecurity contributed significantly positively to the

prediction of depressive and anxiety symptoms, but not to the prediction of life satisfaction and sleep quality. Need satisfaction did not predict changes in the outcomes at T2, whereas need frustration was uniquely related to changes in all outcomes. Finally, none of the interactions between insecurity and need-based experiences were significant in Step 3. To gain more insight into the domain-specific effects of insecurity, all above reported hierarchical regression analyses were repeated, this time including the four domain-specific scores of insecurity instead of the global score. Results of these analyses can be found in the Appendix.

The Mediating Role of Need-based Experiences. To test the mediational hypothesis (Hypothesis 3), Structural Equation Modeling (SEM) was performed using Mplus 8.3 (Muthén & Muthén, 2017) with Robust Maximum Likelihood as estimator. The full information maximum likelihood procedure was employed to estimate missing data (Schafer & Graham, 2002). We employed several indices to evaluate the fit of these path models, namely the χ^2 test, the Comparative Fit Index (CFI), the Standardized Root Mean Square residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA). An acceptable fit was indicated by χ^2/df ratio of 2 or below, CFI values of .95 or above, SRMR values of .08 or below, and RMSEA values of .06 or below (Hu & Bentler, 1999; Kline, 2005). To control for background variables, all variables were first regressed on the background variables and the unstandardized residual scores derived from these regressions were used as variables in the SEM models.

In a first path model, we entered insecurity as a predictor of need satisfaction and need frustration which, in turn, were modelled as predictors of outcomes assessed at T1. Because we expected that need-based experiences would play a partially mediating role, direct effects from insecurity to the four outcomes were allowed. As the model was fully saturated, the model initially had a perfect fit ($\chi^2/ df = 0$; CFI = 1.00; SRMR = 0; RMSEA = 0). As displayed in Figure 2 (coefficients appearing before the slash), insecurity related negatively to need satisfaction and positively to need frustration, with need-based experiences in turn relating significantly and in expected directions to all four outcomes. Insecurity also related directly to

the outcomes, displaying negative associations with life satisfaction and sleep quality and positive associations with depressive and anxiety symptoms. To test the significance of indirect effects, we used bootstrapping (using 1000 draws), a nonparametric resampling procedure that is currently recommended (Preacher & Hayes, 2008). All indirect effects were found to be significant. That is, insecurity was related indirectly via need satisfaction (NS) and need frustration (NF) to life satisfaction (NS: 95% CI [-.093, -.069]; NF: 95% CI [-.120, -.089]), sleep quality (NS: 95% CI [-.038, -.018]; NF: 95% CI [-.088, -.056]), depressive symptoms (NS: 95% CI [.053, .075]; NF: 95% CI [.148, .182]), and anxiety symptoms (NS: 95% CI [.037, .055]; NF: 95% CI [.091, .121]).

We repeated this mediational model in the longitudinal subsample, this time including T2 outcomes while controlling for T1 outcomes. Specifically, insecurity (T1) was entered as a predictor of need-based experiences (T1) which, in turn, were modeled as predictors of the outcomes at T2 while controlling for levels of the outcomes at T1. This model had a good fit ($\chi^2/ df = 2.06$; CFI = 1.00; SRMR = .03; RMSEA = .03). As displayed in Figure 2 (coefficients appearing after the slash), insecurity related to both need-based indicators. However, only need frustration (but not need satisfaction) was related to changes in the outcomes, with higher levels of need frustration predicting a decrease in life satisfaction and sleep quality and an increase in symptoms of depression and anxiety. Different from the concurrent path model, only one direct effect was significant: insecurity related positively to increases in anxiety symptoms. Finally, the indirect effects from insecurity via need frustration to life satisfaction (95% CI [-.120, -.067]), sleep quality (95% CI [-.105, -.053]), depressive symptoms (95% CI [.074, .124]), and anxiety symptoms (95% CI [.077, .129]) were all significant. To gain more insight into the domain-specific effects of insecurity, the two above stated path models were repeated, this time including the four domain-specific scores of insecurity instead of the global score. Results of these analyses can be found in the Appendix.

Discussion

The worldwide COVID-19 pandemic poses major challenges for individual citizens and for society at large. It is critically important to address the question how to support individuals' mental health and resilience in times of threat. To the extent that predictors of well-being can be identified, they can be targeted during interventions as to help citizens replenish their mental resources. The present study, conducted during the first ten days of the lockdown period in [details removed for peer review], offered a unique opportunity to study the separate and combined roles of felt security, as emphasized by Maslow (1955), and the psychological needs for autonomy, competence, and relatedness, as studied within Basic Psychological Need Theory (Ryan & Deci, 2017), in the prediction of citizens' mental health. Although Maslow's ideas regarding the role of different needs in well-being have been heavily popularized and appear in almost every basic textbook on psychology (e.g., Pawlik & Rosenzweig, 2000), there is a lack of systematic research on this theory. In contrast, the topic of psychological needs as proposed within BPNT has been researched avidly over the past two decades (Vansteenkiste et al., 2020). The present study sought to examine the unique roles and interplay of these psychological needs during times of distress as elicited by the COVID-19 crisis, both from a cross-sectional as well as a longitudinal perspective.

Felt Insecurity

The lockdown required a flexible and resilient response from citizens. From one day to the other, all [details removed for peer review] citizens were obliged to stay at home, to minimize social contacts, to keep physical distance when doing essential displacements (e.g., grocery shopping), to take extra care of personal hygiene (e.g., washing hands), and to engage in teleworking as much as possible. This sudden rupture in people's daily routine elicited considerable insecurity. The present findings suggest that the situational insecurity, that is, the lack of clarity and predictability of the situation at large, was the most salient concern. At the beginning of the lockdown, [details removed for peer review] citizens were required to adhere

to a set of intrusive measures, but no information could be given at that point about how long the measures would apply. Because the government communicated in a scattered and fragmented way, some individuals may even have perceived the situation as chaotic [details reference removed for peer review]. As an increasing number of COVID-19 virus infections were identified in the first weeks, citizens also were worried about getting infected themselves. These factors help explain why health-related insecurity was also peaking at that moment.

Financial worries and insecurity with respect to the availability of food and medical care were also prevalent, albeit to a lesser extent. Interestingly, for all types of insecurity assessed, the standard deviation around the mean was substantial, indicating that some individuals felt overwhelmed by the sudden change and others perceived the situation as less threatening, perhaps even as a welcome change of their daily routines. Most likely, these differences in appraised insecurity do not merely reflect *perceived* differences, as if they would exist only in the eye of the beholder. Instead, perhaps some individuals were exposed to more *objective* threats than others, with the crisis involving a direct loss of income for some or a confrontation with the virus in one's immediate or distant social network for others. With a stronger accumulation of actually threatening life events, people are likely to experience more subjective insecurity.

After controlling for various sociodemographic characteristics, felt insecurity at T1 was found to predict individuals' life satisfaction (T1) as well as their symptoms of depression and anxiety (T1 and T2). Insecurity was related particularly strongly to symptoms of anxiety, which is logical as strong worries and concerns easily translate into anxiety. Interestingly, the cost associated with felt insecurity was also visible through reduced sleep quality (T1). This suggests that physical security, located by Maslow on the second tier of the need pyramid, relates to lower satisfaction of the biological need for sleep, which is situated at the first tier of Maslow's need pyramid.

These findings are congruent with previous studies in specific populations that suffered from specific types of threats, including South-African adults growing up in an unsafe neighborhood, Chinese labor worker immigrants living in poor circumstances (Chen et al., 2015a), and Russian workers occupying precarious jobs (Razzkazova et al., 2016). In the present study, the threats examined were not sample-specific, but population-wide as all [details removed for peer review] citizens were confronted with a range of different insecurities.

Interplay between Basic Psychological Needs and Felt Insecurity

In addition to felt insecurity, the basic psychological needs were found to uniquely predict individuals' (mal)adjustment. Both the satisfaction as well as the frustration of the psychological needs related uniquely to individuals' mental health, above and beyond the role of felt insecurity. In the longitudinal analyses, need frustration appeared the most robust predictor, accounting for shifts in (mal)adjustment over a 1-week period. These findings confirm Hypothesis 1a and suggest that the effects of need-based dynamics cannot be explained away by felt insecurity. These findings speak to the robust character of the basic psychological needs and contradict predictions derived from Maslow's hierarchical needs model that 'growth' needs play a minimal role on a moment when felt insecurity is peaking. These findings converge with similar evidence for the role of BPNT's psychological needs obtained in prior studies (Chen et al., 2015a; Sheldon et al., 2001). Also, congruent with the dual-pathway model, need frustration was the more systematic predictor of ill-being (Bartholomew et al., 2011) and poor sleep quality (Campbell et al., in press). Although need satisfaction uniquely predicted concurrent life satisfaction, as has been documented in prior cross-sectional work (e.g., Chen et al., 2015a), it did not predict shifts in life satisfaction. Perhaps, experiences of need frustration may have been most salient in the beginning of the sudden lockdown, thereby affecting people's life satisfaction more strongly.

Further, no systematic evidence was obtained for the hypothesis that felt security would moderate effects of either the satisfaction or frustration of BPNT's needs (Hypothesis 2b). Out

of the eight examined interaction effects, only two were found to be significant, each time in the prediction of depressive symptoms. In neither of both cases did insecurity cancel out the effects of need-based dynamics, as can be expected on the basis of Maslow's pre-potency principle (1955). Instead, the costs associated with experienced need frustration or a lack of need satisfaction were amplified at high levels of insecurity. Said differently, when two risk factors are present simultaneously, individuals are extra vulnerable for symptoms of depression. In addition, the association between need satisfaction and depressive symptoms was magnified at high levels of insecurity.

Overall, in the present study we found little evidence for an interactive relation between insecurity and BPNT's needs. We also examined a different type of interplay, whereby the effects of felt insecurity on mental health would be partially mediated by the basic psychological needs. This possibility of mediation implies that insecurity may hamper opportunities for need satisfaction and may even come with more need frustrating experiences (Rasskazova et al., 2016). To illustrate, the unpredictability and rapidly changing character of the pandemic may lead individuals to question their competencies to effectively handle the situation, may require individuals to re-organize their lifestyle in non-desired directions, or may elicit relational tension between individuals in their way of coping with adversity. Evidence for the hypothesized partial mediational model was obtained, with felt insecurity relating both directly and indirectly to (mal)adjustment via need-based dynamics. In contrast, anxiety remained directly related to adjustment outcomes, both concurrently and longitudinally, a plausible result given that felt insecurities may be a direct source of anxiety. Strikingly, need frustration continued to play a systematic mediating role, even in the longitudinal analyses and in spite of the strong linkage between the predictor and outcome. Similar evidence has been reported for a mediating role of need satisfaction in the relation between job insecurity and job-related well-being (Van der Elst et al., 2012).

Theoretical and Practical Implications

The present study has important theoretical and practical implications. Theoretically, Maslow (1943) called for the study of individuals' motivations and needs in an integrative fashion, thereby highlighting the role of biological, physical and psychological needs that were theorized to operate in a hierarchical-sequential way. To evolve towards a broader need theory, current psychological theories, like BPNT, would do well to additionally study other needs, like the need for physical security.

In this context, it is important to be precise about the specific conceptualization of psychological needs within Maslow and BPNT. From a Maslowian perspective, psychological needs are growth needs (e.g., love, self-esteem, self-actualization), meaning that their functional role becomes salient when lower-order deficiency-needs are met first. Yet, from a BPNT perspective, the needs for autonomy, competence, and relatedness are not just growth-oriented in nature. Instead, they are basic in nature. The term "basic" implies that their functional role is not dependent upon the satisfaction of other needs. Much like organisms need sufficient food and water to survive and to grow physically (termed basic needs by Maslow), the satisfaction of BPNT's basic psychological needs represent essential ingredients of adjustment across contexts and cultures. As a result, from a BPNT-perspective, no hierarchical ordering in the functional role of felt insecurity and psychological need dynamics would be argued for.

Having said this, we concur with Maslow's assumption that physical security and psychological needs are dynamically related. Within this study, we aimed to contribute to insight in the nature of this dynamic interplay, thereby testing both the possibility of an interactive interplay and a sequential, mediational interplay. Future work on this important theme would do well to adopt a longitudinal design with multiple assessments of all measured constructs to examine how different needs affect each other across time. This would allow for the examination of reciprocal dynamics. For example, studies have shown that people who were

deprived from sleep experience less need satisfaction over time, in part because they do have less energy to proactively seek need-fulfilling activities (Campbell et al., 2017a).

Additionally, the present study confirms that both the satisfaction and frustration of psychological needs matters, both in terms of affecting wellness outcomes, but also in playing a directional role in our functioning (Vansteenkiste et al., 2020). Much like deficiency needs begin to dominate the organism when unfulfilled, also experiences of need frustration can steer individuals towards more need-conducive choices [details reference removed for peer review]. Yet, even when satisfied, the needs continue to guide people's functioning, as they influence the aims a person volitionally pursues. In this way, the above results show that citizens' basic psychological needs could potentially serve as a lever for mental health in times of threat. From a practical perspective, people receive ideally contextual support for their psychological needs from close others (e.g., family members and friends). At a macro-level, individuals' need-based experiences also depend to some extent upon governmental policy and, in particular, the government's capacity to systematically use a motivating communication style such that citizens more willingly endorse the measures (Martela et al., 2021), while also taking sufficiently risk-reducing measures to keep citizens' feelings of worry and insecurity under control.

In addition to such contextual support for the needs, citizens may proactively seek and engage in need satisfying activities, an approach that has been referred to as need crafting in recent research (De Bloom et al., 2020; Laporte et al., 2021). An important prerequisite for need crafting is awareness of the activities, contexts and relational partners that are conducive to one's psychological need satisfactions (Laporte et al., 2021). By acting upon this awareness, people can then maximize opportunities for need satisfaction in their life (Laporte et al., 2021). Congruent with the idea that need crafting may serve as a factor of resilience in stressful conditions, Weinstein et al. (2016) showed in a study with Syrian refugees residing in a fugitive camp that seeking out need satisfying activities was associated with less need frustration and

lower distress. Next to interventions targeting an agentic and proactive focus on the basic psychological needs, citizens could benefit from adequate emotion regulation as a more reactive resource because they inevitably also encounter need frustrating and emotionally troubling episodes. Support for emotion regulation could be offered for instance in an E-health intervention that informs people about how to cope better with feelings of insecurity and need frustration. Experimental research has shown that integrative emotion regulation is linked with less anxiety and stress in stressful conditions (e.g., Roth et al., 2014). As such, integrative emotion regulation, which involves an active interest in one's emotions and a tendency to use these emotions as informational input for one's behavior (Roth et al., 2019), could be a target for interventions.

Limitations

Several limitations need to be acknowledged when interpreting the results. First, all constructs were measured via self-reports, and using single items for some outcomes (e.g., sleep quality and life satisfaction). Although this approach has been used in previous studies (e.g. Fujita & Diener, 2005), future research would do well to use multiple items or objective markers of mental health and sleep quality (e.g., actigraphy; Morgenthaler et al., 2007) to reduce same-source and shared method variance. Moreover, a broader set of outcomes that are more observable could be examined, including acting-out behaviors and self-medication. In the context of the restrictions imposed by the government to contain the coronavirus, oppositional defiance to follow the rules might be an important outcome to include. Second, the generalizability of the results may be hampered because our sample was predominantly female and highly educated, thus forming a rather homogeneous group. In addition, the participants at wave 2 may represent a selective subset of the total population. Participating at Wave 2 was voluntary and a fairly large percentage of those being willing to participate at Wave 2 eventually did not do so. As a counterargument, attrition analyses indicated that dropout was completely at random with respect to the demographics and study variables of interest. Third, given the

cross-sectional nature of some results, caution is needed when interpreting the findings. Although the longitudinal component was a strength of the study, future research would do well to include three waves of data withing a longer timeframe in order to more fully examine mediation mechanisms. In that respect, a baseline assessment before the COVID-19 crisis would have been ideal to examine possible changes in mental health due to COVID.

Conclusion

The results of the present study shed a new light on the interactive interplay between the physical need for security from a Maslowian perspective and the basic psychological needs from an SDT perspective. Both felt insecurity and need-based experiences explained unique variance in citizens' mental health, with need frustration being a particularly strong predictor. Apparently, need frustration – which represents the 'dark side' of individuals' need-based experiences – plays a more prominent role in mental health during challenging and troubling times such as the COVID-19 crisis. In addition, some evidence for a sequential relationship was obtained, with some of the associations between felt insecurity and mental health problems being mediated by need-based experiences, and need frustration in particular. Overall, the present research has both practical and theoretical importance. Practically, observing that BPNT's need satisfaction matters above and beyond felt insecurity/safety in the prediction of well-being suggests that, even in destabilizing times, it remains critical to foster psychological need satisfaction. Theoretically, the study of felt physical insecurity and psychological needs provides a deeper insight in the interrelation between different types of needs and offers the possibility to test different key assumptions about the BPNT needs (i.e., their essential importance, universality, and pervasiveness) in a conservative fashion. In this way, the present study may serve as a point of reference for future longitudinal studies examining the complex and dynamic interplay between the need for security and BPNT's psychological needs.

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Footnote

1. One of the items to assess anxiety focused on worrying, which could increase the association between insecurity (of which worrying is also an essential component) and anxiety. We therefore repeated the hierarchical regression analysis with anxiety as an outcome, where we left out this item involving worrying. Results were highly similar to the original model, with all main effects of insecurity and need-based experiences being significant and none of the interaction terms being significant.

Table 1

Descriptives of and Correlations between the Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Insecurity	-														
2. Health	.72	-													
3. Financial	.67	.21	-												
4. Situational	.68	.44	.25	-											
5. Medication	.72	.39	.30	.33	-										
6. Need satisfaction	-.27	-.12	-.18	-.34	-.15	-									
7. Need frustration	.43	.24	.26	.47	.27	-.65	-								
8. Life satisfaction (T1)	-.33	-.18	-.23	-.36	-.18	.53	-.52	-							
9. Life satisfaction (T2)	-.30	-.17	-.19	-.35	-.15	.47	-.47	.64	-						
10. Sleep quality (T1)	-.30	-.23	-.19	-.26	-.18	.27	-.32	.30	.28	-					
11. Sleep quality (T2)	-.28	-.14	-.20	-.26	-.19	.30	-.37	.32	.36	.57	-				
12. Depressive symptoms (T1)	.40	.26	.24	.43	.21	-.57	.65	-.57	-.51	-.36	-.34	-			
13. Depressive symptoms (T2)	.37	.20	.25	.43	.19	-.50	.57	-.55	-.63	-.29	-.42	.75	-		
14. Anxiety symptoms (T1)	.58	.49	.27	.57	.35	-.47	.56	-.57	-.48	-.44	-.36	.66	.55	-	
15. Anxiety symptoms (T2)	.54	.41	.25	.53	.34	-.46	.56	-.54	-.61	-.38	-.47	.60	.70	.75	-
M	2.90	3.24	2.50	3.56	2.29	3.52	2.24	2.95	3.03	2.84	2.99	1.68	1.60	2.23	2.07
SD	0.70	1.02	1.17	0.82	1.01	0.55	0.65	0.96	0.92	0.73	0.66	0.60	0.55	0.78	0.80
Missing values (%)	12.20	12.20	12.20	12.20	12.20	12.20	12.20	10.90	0.60	3.40	0.00	10.90	0.60	10.90	0.60

Note. T = Timepoint. *N*(T1) = 5118. *N* (T2) = 835. All correlations were significant at the $p < .001$ level.

Table 2

Hierarchical Regression Analysis Predicting Life Satisfaction and Sleep Quality at T1 by Background Variables, Insecurity, Psychological Need Satisfaction and Need Frustration and Interactions

	Life satisfaction (T1)			Sleep quality (T1)		
	Step 1 β	Step 2 β	Step 3 β	Step 1 β	Step 2 β	Step 3 β
Background variables						
Age	.11***	-.07***	-.07***	.12***	.01	.01
Gender [1]	-.07***	-.02	-.02	-.10***	-.06***	-.06***
Marital status [2]	.16***	.09***	.09***	.04*	.00	.00
Number of children	.01	.02	.02	-.11***	-.10***	-.10***
Education (D1)	.05**	.01	.01	.06**	.02	.02
Education (D2)	.09***	.02	.02	.13***	.07***	.07***
Comorbidity [3]	-.02	.01	.01	-.03*	-.00	-.00
Number of crisis days	.03	.06***	.06***	-.02	-.02	-.02
Main predictors						
Insecurity		-.13***	-.13***		-.19***	-.19***
Need satisfaction (NS)		.32***	.32***		.11***	.11***
Need frustration (NF)		-.26***	-.26***		-.18***	-.18***
Interactions						
Insecurity x NS			.01			-.01
Insecurity x NF			.01			.00
R^2	.06	.36	.36	.03	.17	.17
ΔR^2	.06***	.31***	.00	.03***	.13***	.00

Note. T = Timepoint. D1 = High school education versus other educational levels. D2 = University education versus other educational levels. [1] Women vs. men. [2] Together versus alone. [3] One or more comorbid diagnoses versus none. *p < .05; **p < .01; ***p < .001.

Table 3

Hierarchical Regression Analysis Predicting Symptoms of Depression and Anxiety at T1 by Background Variables, Insecurity, Psychological Need Satisfaction and Need Frustration and Interactions

	Depressive symptoms (T1)			Anxiety symptoms (T1)		
	Step 1 β	Step 2 β	Step 3 β	Step 1 β	Step 2 β	Step 3 β
Background variables						
Age	-.22***	-.01	-.02	-.21***	-.03*	-.03*
Gender [1]	.11***	.05***	.06***	.18***	.11***	.11***
Marital status [2]	-.21***	-.13***	-.13***	-.02	.03**	.03**
Number of children	-.01	-.04*	-.03*	.02	-.00	.00
Education (D1)	-.10***	-.04**	-.04**	-.09***	-.02	-.02
Education (D2)	-.12***	-.05***	-.05***	-.10***	.01	.01
Comorbidity [3]	.06***	.02	.02*	.08***	.02	.02
Number of crisis days	.04*	.01	.01	-.06**	-.05***	-.05***
Main predictors						
Insecurity		.14***	.14***		.41***	.41***
Need satisfaction (NS)		-.24***	-.25***		-.18***	-.18***
Need frustration (NF)		.40***	.39***		.25***	.25***
Interactions						
Insecurity x NS			-.03*			-.03
Insecurity x NF			.06***			-.01
R^2	.13	.51	.52	.09	.49	.49
ΔR^2	.13***	.38***	.01***	.09***	.41***	.00

Note. T = Timepoint. D1 = High school education versus other educational levels. D2 = University education versus other educational levels.

[1] Women vs. men. [2] Together versus alone. [3] One or more comorbid diagnoses versus none. *$p < .05$; **$p < .01$; ***$p < .001$.

Table 4

Hierarchical Regression Analysis Predicting Life Satisfaction and Sleep Quality at T2 by Background Variables, Insecurity, Psychological Need Satisfaction and Need Frustration and Interactions

	Life satisfaction (T2)			Sleep quality (T2)		
	Step 1 β	Step 2 β	Step 3 β	Step 1 β	Step 2 β	Step 3 β
Background variables						
Age	.00	-.06	-.05	.04	-.03	-.03
Gender [1]	-.06*	-.05	-.05	-.01	.00	.00
Marital status [2]	.04	.03	.03	.01	-.01	-.01
Number of children	.03	.05	.05	.05	.05	.05
Education (D1)	.05	.03	.03	.09*	.07	.07
Education (D2)	.05	.03	.03	.06	.04	.04
Comorbidity [3]	-.05	-.05	-.05	-.00	-.00	-.01
Number of crisis days	-.02	-.01	-.01	-.01	-.01	-.01
Outcome at T1	.63***	.51***	.51***	.56***	.49***	.49***
Main predictors						
Insecurity		-.06	-.05		-.06	-.07*
Need satisfaction (NS)		.05	.06		.02	.01
Need frustration (NF)		-.15***	-.15**		-.17***	-.17***
Interactions						
Insecurity x NS			.05			-.04
Insecurity x NF			.04			-.04
R^2	.43	.45	.45	.32	.36	.36
ΔR^2	.43***	.03***	.00	.33***	.04***	.00

Note. T = Timepoint. D1 = High school education versus other educational levels. D2 = University education versus other educational levels. [1] Women vs. men. [2] Together versus alone. [3] One or more comorbid diagnoses versus none. *$p < .05$; **$p < .01$; ***$p < .001$.

Table 5

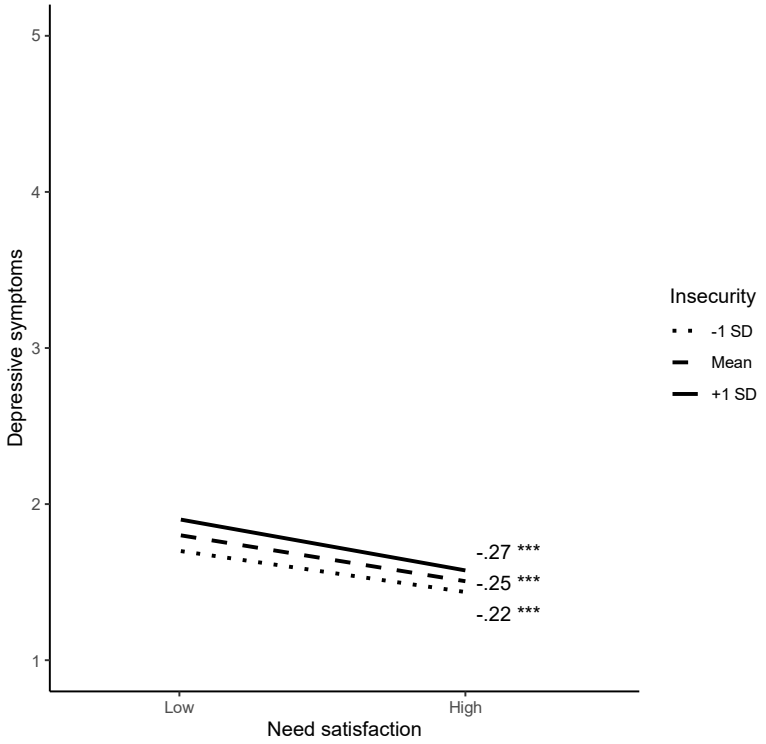
Hierarchical Regression Analysis Predicting Symptoms of Depression and Anxiety at T2 by Background Variables, Insecurity, Psychological Need Satisfaction and Need Frustration and Interactions

	Depressive symptoms (T2)			Anxiety symptoms (T2)		
	Step 1 β	Step 2 β	Step 3 β	Step 1 β	Step 2 β	Step 3 β
Background variables						
Age	-.01	.02	.02	-.03	.01	-.00
Gender [1]	.06*	.05*	.05*	.01	.02	.02
Marital status [2]	-.06*	-.07**	-.07**	-.04	-.01	-.01
Number of children	-.05	-.06	-.06	.00	-.01	-.01
Education (D1)	-.03	-.02	-.02	-.04	-.02	-.02
Education (D2)	-.03	-.01	-.01	-.02	.01	.01
Comorbidity [3]	.05*	.05*	.05*	.07**	.07**	.08**
Number of crisis days	.01	.01	.01	.00	-.01	-.00
Outcome at T1	.73***	.63***	.63***	.74***	.57***	.57***
Main predictors						
Insecurity		.06*	.06*		.12***	.13***
Need satisfaction (NS)		-.01	-.01		-.02	-.02
Need frustration (NF)		.11**	.11**		.17***	.15***
Interactions						
Insecurity x NS			-.00			-.02
Insecurity x NF			.01			.06
R^2	.59	.61	.60	.57	.60	.61
ΔR^2	.60***	.01***	.00	.58***	.03***	.01**

Note. T = Timepoint. D1 = High school education versus other educational levels. D2 = University education versus other educational levels. [1] Women vs. men. [2] Together versus alone. [3] One or more comorbid diagnoses versus none. *$p < .05$; **$p < .01$; ***$p < .001$.

Figure 1. Significant Interactions between Need-based Experiences and Insecurity on Depressive Symptoms.

Panel A



Panel B

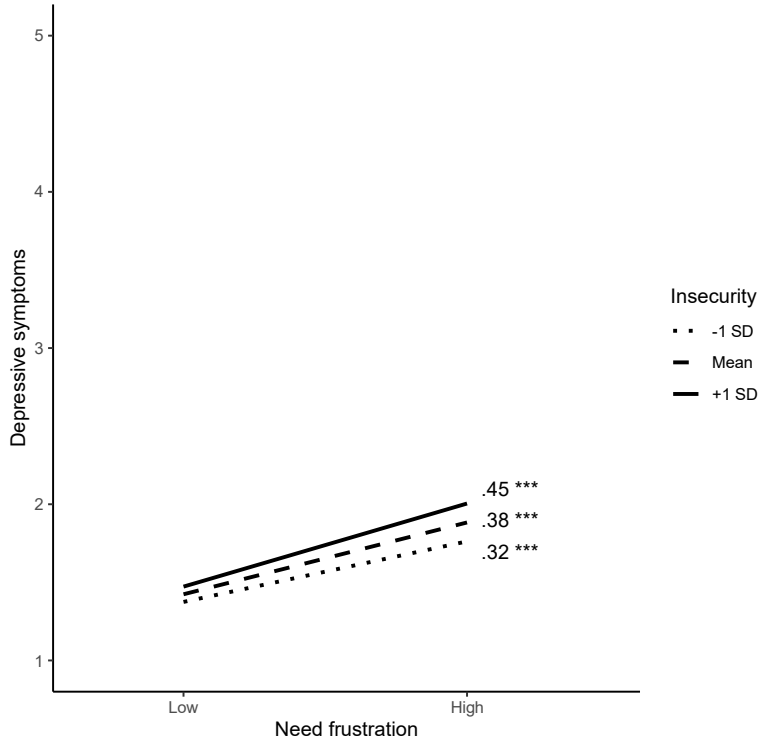
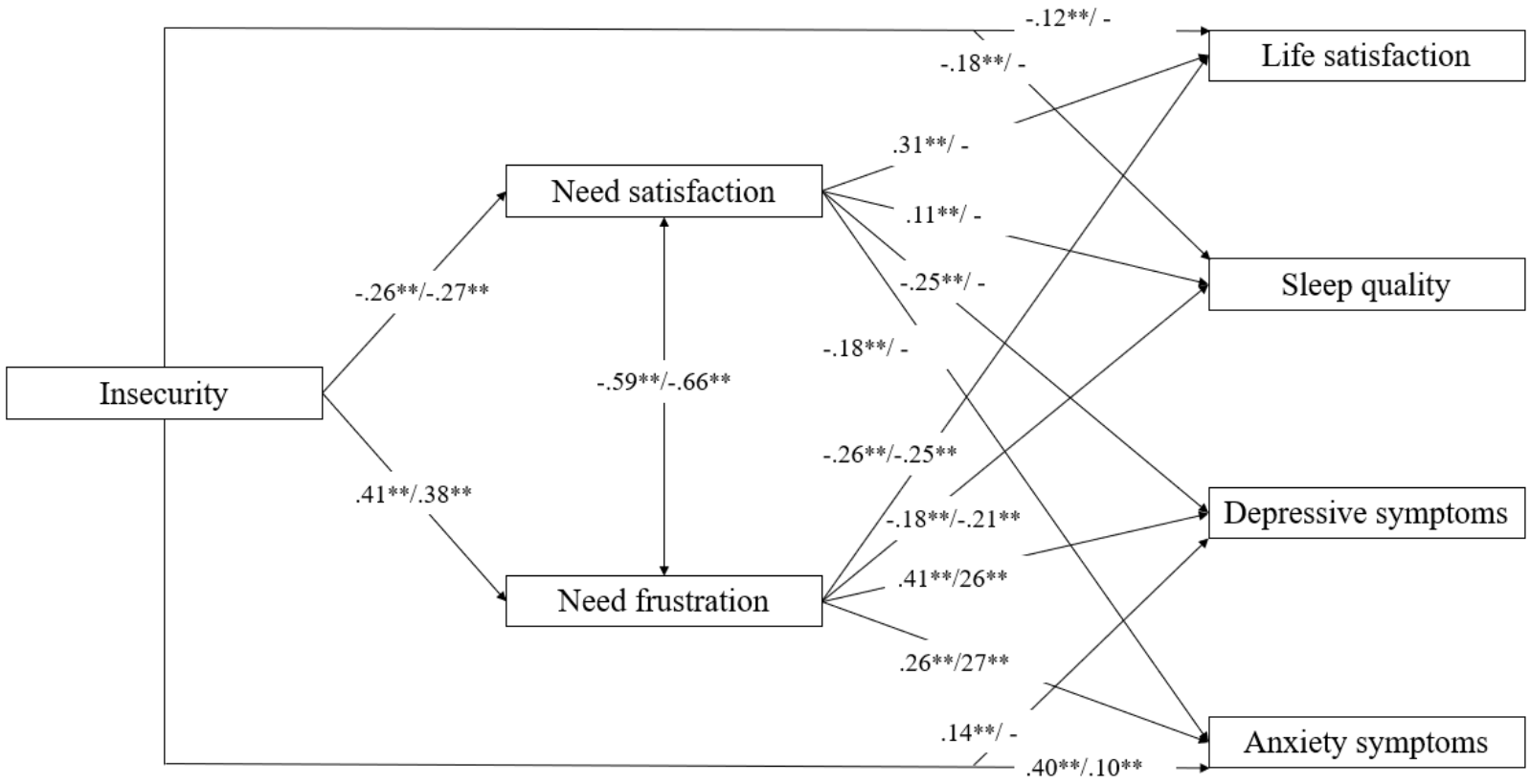


Figure 2. Structural Path Model Depicting the Relation between Insecurity, Need-based Experiences, and Outcomes.



Note. Coefficients appearing before and after the slash refer, respectively to the T1 and T2 model. For reasons of parsimony, correlations between the outcome variables are not displayed.

*$p < .05$; **$p < .01$.

Appendix: Effects of Domain-specific Insecurity

Unique and Interactive Role of Domain-specific Insecurity and Need-based Experiences. To gain more insight into the domain-specific effects of insecurity, we performed four additional hierarchical regression analyses, this time including the four domain-specific scores of insecurity (i.e., health, financial, situation, medication) instead of the total insecurity score as predictors of the four outcomes at T1. When entering insecurity and need-based experiences, result showed that insecurity about finance (β = -.07, $p < .001$) and the situation (β = -.11, $p < .001$) as well as need satisfaction (β = .31, $p < .001$) and need frustration (β = -.25, $p < .001$) related to a lower level of life satisfaction. Insecurity about health (β = -.02, $p = .13$) and medication (β = -.00, $p = .81$) was unrelated to life satisfaction. Both sleep quality (β ranging between -.12 and -.07, $p < .001$), depressive symptoms (β ranging between .04 and .11, $p < .001$) and anxiety symptoms (β ranging between .04 and .28, $p < .001$) were predicted by insecurity about health, finance, and the situation at large. Only anxiety symptoms were related to insecurity about medication (β = .05, $p < .001$). Similar to the models with the general score of insecurity, both need satisfaction and need frustration unique predicted all four outcomes in the expected direction. With regard to the interactions between the domain-specific scores of insecurity and need-based experiences, 6 out of the 32 tested interaction terms (ca. 19%) were significant with most of these involving situational insecurity (βs of the non-significant interaction terms ranged between -.03 and .04). Specifically, insecurity with respect to the situation interacted with need satisfaction in the prediction of life satisfaction (β = .05, $p = .01$), whereas insecurity with respect to the supply of medication interacted with need frustration in the prediction of life satisfaction (β = -.04, $p = .03$). Further, situational insecurity interacted with both need satisfaction (β = -.05, $p = .002$) and need frustration (β = .05, $p = .004$) in the prediction of depressive symptoms, whereas financial insecurity also interacted with need frustration in the prediction of depressive symptoms (β = .04, $p = .01$). Finally, situational insecurity interacted with need frustration in the prediction of anxiety symptoms (β = .05, p

= .003). All interactions indicated that the effects of both need satisfaction and need frustration were stronger for individuals experiencing a higher level of insecurity (within a specific domain), although the main effects of need-based experiences on the outcomes remained present across individuals differing in their level of insecurity.

We repeated these series of regression analyses in the subsample of participants who completed the follow-up assessment, this time including the T2 measures as outcomes while controlling for the outcome at T1. Results showed that insecurity about health and medication did not predict changes in the outcomes (β ranging between -.03 and .06). Financial insecurity predicted changes in sleep quality (β = -.08, p = .01) and depressive symptoms (β = .05, p = .03), whereas situational insecurity related to changes in anxiety symptoms (β = .08, p = .01). Changes in life satisfaction were not predicted by any domain of insecurity (β ranging between .05 and .01). Furthermore, need frustration related to all outcomes (life satisfaction: β = -.14, p = .001; sleep quality: β = -.17, p < .001; depressive symptoms: β = .11, p = .002; anxiety symptoms: β = .16, p < .001), whereas the effects of need satisfaction were non-significant (β ranging between -.01 and .05). In Step 3, across the four hierarchical regression analyses, only one interaction term was significant: health insecurity interacted with need satisfaction in the prediction of life satisfaction (β = .10, p < .05). We found that health insecurity related negatively to changes in life satisfaction among individuals scoring low on need satisfaction (β = -.24; t = -2.45; p = 0.01), but was unrelated to life satisfaction among individuals scoring average (β = -.05; t = -1.08; p = .28) or high (β = .12; t = 0.99; p = .32) on need satisfaction. Other interaction terms were not significant (β ranging between -.08 and .07).

The Mediating Role of Need-based Experiences. To gain more insight into the domain-specific effects of insecurity, in an additional path model we replaced the overall score for insecurity with the four domain-specific scores of insecurity as predictors of need-based experiences and the outcomes in our mediational model (all variables assessed at T1). As insecurity with respect to health was found to be unrelated to the need-based experiences and

medication insecurity was unrelated to need satisfaction, these paths were removed from the model. This model yielded a good fit (χ^2/df = 3.47; CFI = 1.00; SRMR = .01; RMSEA = .02). Results showed that all included sources of insecurity related negatively to need satisfaction (financial: β = -.10, $p < .001$; situational: β = -.28, $p < .001$) and positively to need frustration (β ranging between .09 and .35, ps < .001), with situational insecurity having the strongest effects. Relations between need-based experiences and outcomes were highly similar to the path model including the overall score of insecurity (when predicting T2 outcomes). Several direct effects were also significant. Specifically, insecurity with respect to health related to sleep quality (β = -.11, $p < .001$), depressive symptoms (β = .08, $p < .001$), and anxiety symptoms (β = .28, $p < .001$). Situational and financial insecurity also related directly to life satisfaction (β = -.11, $p < .001$; β = -.07, $p < .001$), sleep quality (β = -.07, $p < .001$; β = -.07, $p < .001$), depressive symptoms (β = .11, $p < .001$; β = .03, $p = .01$), and anxiety symptoms (β = .22, $p < .001$; β = .04, $p = .004$), respectively. Finally, insecurity with respect to medication related to anxiety symptoms (β = .05, $p < .001$). With respect to the correlations, the four domain-specific insecurity scores were significantly related to each other (β ranging between .21 and .44, ps < .001), as were all outcome variables (β ranging between -.37 and .44, ps < .001). Finally, all indirect effects were found to be significant.

In a second path model, we included the four domain-specific scores of insecurity (T1) in the prediction of need-based experiences (T1) and outcomes (T2), while again controlling for levels of the outcomes at T1. This model yielded a good fit (χ^2/df = 1.70; CFI = 1.00; SRMR = .02; RMSEA = .02). Results showed that the relations between the four scores of domain-specific insecurity and need-based experiences were highly similar to the previous model, whereas relations between need-based experiences and the outcomes were highly similar to the model with the global measure of insecurity. One direct effect was significant: insecurity with respect to health related to anxiety symptoms (β = .09, $p < .001$). Additionally, the four domain-specific insecurity scores were significantly related to each other (β ranging between .20 and .45,

*p*s < .001), as were all outcome variables (β ranging between -.44 and .56, *p*s < .001). Finally, all indirect effects were found to be significant, except for the relations from health and medication insecurity to sleep quality via need satisfaction.