

**Daily Ups and Downs in Adolescents' Depressive Symptoms: The Role of Daily Self-Criticism,
Dependency and Basic Psychological Needs**

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Abstract

Introduction. Although associations between Blatt's personality dimensions of self-criticism and dependency and adolescents' depressive symptoms are well-established, only few studies have examined associations between these variables at the level of daily, within-person fluctuations. Moreover, our understanding of the mechanisms underlying this personality vulnerability to depressive symptoms is limited. Therefore, we studied (a) daily fluctuations in both personality and depressive symptoms over a 7-day period and (b) the possible interplay between daily variations in personality vulnerability, need-based experiences (as conceptualized in Self-Determination Theory), and depressive symptoms. This interplay was examined in terms of both a mediational and a moderating role of the need-based experiences. **Methods.** Participants were 121 Belgian adolescents ($M_{\text{age}} = 15.81$; $SD_{\text{age}} = 1.50$; 52% male) who completed questionnaires tapping into daily self-criticism, dependency, need-based experiences, and depressive symptoms every evening during seven consecutive days. **Results & Conclusions.** Multilevel analysis revealed that self-criticism and dependency fluctuated substantially on a daily basis. These daily fluctuations in personality were related to daily fluctuations in depressive symptoms, with daily variation in need-based experiences mediating these associations. We found no evidence for interactions between personality and the need-based experiences. The findings underscore the importance of considering daily fluctuations in individuals' personality vulnerability and point to the explanatory role of need-based experiences in the relation between personality and depressive symptoms on a daily basis.

Key Words: Personality, Depression, Adolescence, Self-Determination Theory, Diary.

According to Blatt's theory of personality development, self-criticism and dependency reflect two personality dimensions that confer vulnerability to psychopathology in general and to depressive symptoms in particular (e.g., Blatt, Schaffer, Bers, & Quinlan, 1992; Coyne & Whiffen, 1995; Zuroff, Igreja, & Mongrain, 1990). Previous research has mainly conceptualized and assessed self-criticism and dependency as stable traits that differ between individuals (Zuroff, Mongrain, & Santor, 2004). Only recently, a handful of diary studies have begun to examine daily, within-person fluctuations in self-criticism and dependency. These studies suggested that there is considerable day-to-day variation in these personality dimensions (Boone et al., 2012; Stader & Hokanson, 1998; Zuroff, Sadikaj, Kelly, & Leybman, 2016), with individuals reporting more depressive symptoms on days when they display more dependency or self-criticism (Zuroff et al., 2016).

The present study aims to add to this new generation of studies by focusing on potential psychological processes in daily associations between personality (dependency and self-criticism) and depressive symptoms. Specifically, we examine the potential interplay between the two personality dimensions and adolescents' basic psychological needs for autonomy, relatedness and competence, as conceived in Self-Determination Theory (SDT; Ryan & Deci, 2017). We focused on these need-based experiences (a) because there are compelling theoretical and empirical arguments for associations between Blatt's personality dimensions and these experiences (Luyten & Blatt, 2016; Vandekerckhove, Brenning, et al., 2019), (b) because these need-based experiences are known to fluctuate substantially from day to day (Ryan, Bernstein, & Brown, 2010; Van der Kaap-Deeder, Vansteenkiste, Soenens, & Mabbe, 2017) and (c) because these experiences are implicated in individuals' vulnerability to negative affect and maladjustment more generally (Ryan, Deci, & Vansteenkiste, 2016; Vansteenkiste & Ryan, 2013). In doing so, we tested a mediation model in which satisfaction and frustration of the basic psychological needs explain the associations between personality and depressive symptoms on a daily basis. We also examined the interplay between these key constructs from the angle of moderation. That is, dependency and self-criticism may enhance adolescents' vulnerability for depressive symptoms on need-frustrating or low need satisfying days.

These research questions are examined in an adolescent sample because adolescents, and especially girls, show a heightened risk to develop depressive symptoms (Ge, Lorenz, Conger, Elder,

& Simons, 1994; Nolen-Hoeksema & Hilt, 2013). Moreover, adolescence is a developmental period characterized by profound developmental changes, as youngsters undergo important biological, psychological, and social transformations (Natsuaki, Biehl, & Ge, 2009). Indeed, adolescence is marked by greater variability in emotional ups and downs as compared to children and adults (Campbell et al., 2018; Maciejewski, van Lier, Branje, Meeus, & Koot, 2015). Therefore, it was deemed important to use a day-to-day approach to examine personality vulnerability to depressive symptoms in adolescents.

The Role of Self-criticism and Dependency in Vulnerability to Depressive Symptoms

Blatt's theory (2004, 2008) distinguishes between two major personality dimensions that render individuals vulnerable to psychopathology in general and to depressive symptoms in particular, namely self-criticism and dependency. *Self-criticism* involves an overly strong focus on achievement, often leading to physical or mental overexertion (Luyten & Fonagy, 2016). Self-critical individuals set unrealistically high standards and engage in harsh self-scrutiny. *Dependency* refers to a preoccupation with close relations and involves excessive longings to be nurtured and cared for. Highly dependent individuals are anxious about losing the love and care of significant others, while highly self-critical individuals primarily fear disapproval and criticism (Luyten & Blatt, 2011).

Ample research has demonstrated associations between self-criticism, dependency and depression (Blatt, 2004; Luyten & Blatt, 2013; Zuroff, Mongrain, & Santor, 2004). The relation between Blatt's personality dimensions and depressive symptoms has been confirmed in both adolescent and adult samples (Fichman, Koestner, & Zuroff, 1994; Kopala-Sibley, Klein, Perlman, & Kotov, 2017; Shahar, Blatt, Zuroff, Kuperminc, & Leadbeater, 2004) and in clinical and non-clinical populations (Luyten et al., 2007; Zuroff & Mongrain, 1987).

Most studies in this area have measured self-criticism and dependency as relatively stable personality features that distinguish individuals from each other (Cox & Enns, 2003; Zuroff, Igeja, & Mongrain, 1990). Indeed, most previous studies examining the associations between Blatt's personality dimensions and depressive symptoms relied on a single assessment of personality, tacitly assuming stability in these dimensions (Dunkley, Zuroff, & Blankstein, 2003; Zuroff, Koestner, & Powers, 1994). However, there is also emerging evidence for situational and short-term variation in

both self-criticism and dependency. First, a limited number of diary studies found evidence for day-to-day variation in self-criticism. Moreover, the daily ups and downs in self-criticism were associated with daily ups and downs in eating disorder symptoms (Boone et al., 2012) and negative affect (Zuroff et al., 2016). To the best of our knowledge, only one study to date examined daily fluctuations in dependency. Stader and Hokanson (1998) found that daily dependency covaried with daily depressive symptoms. Second, experimental research revealed that self-critical perfectionism, a concept akin to self-criticism, can be situationally induced, with this priming of self-criticism increasing risk for psychopathology temporarily (Boone, Soenens, Vansteenkiste, & Braet, 2012; Shafran, Lee, Payne, & Fairburn, 2006).

Findings demonstrating short-term and situational variability in Blatt's personality dimensions are consistent with contemporary views on personality (Fleeson, 2001; Fleeson, 2004; Funder, 2006; Mischel & Shoda, 1995) and, more specifically, with a conceptualization of personality development as a dynamic process in which stable, trait-like features interact with changeable contextual factors (Asendorpf & van Aken, 2003). Certainly in adolescence, when individuals undergo important and quickly evolving biological, social and cognitive transformations (Steinberg & Morris, 2001; Soenens, Vansteenkiste, & Beyers, 2019), there is evidence for short-term fluctuations in personality characteristics within one individual (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2009). According to Fleeson (2001), personality features may get activated and manifest to different degrees over differing occasions and contexts. This within-person variability manifests against the background of more stable individual differences in the mean level of personality, which denote the individuals' set point. This view is congruent with the state-trait model of personality vulnerability (Zuroff et al., 1999) stating that the structure and content of personality vulnerability is generally stable, but the accessibility varies with mood, social, and biological factors.

Theory and research thus increasingly underscore the dynamic nature of self-criticism and dependency and suggest that these personality dimensions entail both trait-like (or stable) and state-like (or changeable) features. Yet, it remains unclear whether daily variation in self-criticism and dependency relate uniquely to daily variation in adolescents' maladjustment and which mechanisms explain these within-person associations. Herein, we consider the role of adolescents' basic

psychological needs for autonomy, competence, and relatedness, because these needs are also dynamic in nature (Ryan et al., 2010) and have been shown to demonstrate theoretically plausible associations with Blatt's dimensions of personality vulnerability (Vandenkerckhove, Brenning et al., 2019).

Need-based Experiences and Adolescents' Depressive Symptoms

Self-Determination Theory (SDT, Ryan & Deci, 2017) states that every person has three basic psychological needs that are essential for optimal functioning and well-being. When satisfied, these needs would contribute to well-being and psychological growth. In contrast, frustration of these needs would render people vulnerable to maladjustment and psychopathology (Vansteenkiste & Ryan, 2013). The need for *autonomy* refers to a sense of inner psychological freedom and authenticity, the need for *relatedness* involves warm and close relationships with others and the need for *competence* refers to a sense of mastery. Frustration of the need for autonomy involves pressure to act, think or feel in a certain way, while relatedness frustration manifests in feelings of rejection and alienation, and competence frustration involves feelings of inferiority and being a failure.

SDT states that need frustration is not equal to a lack of need satisfaction (Ryan & Deci, 2017), implying that the two constructs do not necessarily fall along a single continuum. To illustrate, feeling a low connection with one's classmates (low relatedness satisfaction) is not the same as being actively rejected or bullied by one's classmates (high relatedness frustration). The association between need satisfaction and need frustration is also asymmetrical in nature: whereas low need satisfaction does not necessarily involve need frustration, need frustration by definition involves low need satisfaction (Vansteenkiste & Ryan, 2013). As such, although SDT assumes a negative association between need satisfaction and need frustration, both types of experiences are considered to be distinct and to have differential repercussions for individuals' psychosocial adjustment. Whereas need satisfaction would foster psychological growth and contribute to well-being (i.e., the bright pathway of the needs), need frustration would increase risk for maladjustment and even psychopathology (i.e., the dark pathway of the needs) (Haerens et al., 2015; Vansteenkiste & Ryan, 2013). Plenty of research has shown that need satisfaction is indeed particularly predictive of well-being while need frustration is uniquely predictive of ill-being (Bartholomew et al., 2011; Ryan et al., 2016). Consequently, need frustration would yield stronger associations with depressive symptoms compared to need satisfaction,

a hypothesis that received confirmation in several studies with adolescents (Bartholomew et al., 2011; Campbell et al., 2018; Chen et al., 2015). Research has generally confirmed that satisfaction of these needs is associated with higher well-being, while need frustration is associated with ill-being and even psychopathology (Ryan & Deci, 2017; Ryan, Deci, & Vansteenkiste, 2016). This dual path model in SDT, distinguishing between the bright and dark sides of the psychological needs, also received confirmation in several studies with adolescents (Bartholomew et al., 2011; Campbell et al., 2018; Chen et al., 2015).

Although between-person differences in need-based experiences historically received most attention, there is also increasing evidence for considerable variation in need satisfaction and need frustration from day to day in children (Van der Kaap-Deeder et al., 2017) and adults (Mabbe, Soenens, Vansteenkiste, van der Kaap-Deeder, & Mouratidis, 2018; Ryan et al., 2010). In adolescence, one diary study found evidence for day-to-day associations between need frustration and binge eating in a sample of female adolescents (Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013), whereas another diary study (Campbell et al., 2018) demonstrated an association between daily need frustration and poor sleep. The present study is among the first to examine daily associations in need-based experiences and depressive symptoms in adolescents. Most importantly, this study aims to examine for the first time the intervening role of daily psychological needs experiences in associations between daily dependency, self-criticism and depressive symptoms.

The Interplay between Personality Vulnerability, Need Frustration, and Depressive Symptoms

While previous research has revealed that Blatt's personality dimensions are linked to depressive symptoms (e.g., Blatt, Schaffer, Bers, & Quinlan, 1992) and that need-based experiences are related to depressive symptoms (Bartholomew et al., 2011), few studies to date have considered the interrelationship between Blatt's personality dimensions and the psychological needs. Theoretically, it can be argued that self-criticism and dependency relate to higher need frustration and, particularly in the case of self-criticism, to lower need satisfaction (Luyten & Blatt, 2016; Vandenkerckhove, Brenning et al., 2019).

High self-criticism may render adolescents vulnerable to competence frustration because of individuals' difficulties to be satisfied with their accomplishments and because of their harsh self-

scrutiny. By pressuring themselves to achieve excessively high goals (Blatt, 2004), adolescents high on self-criticism are also likely to experience frustration of the need for autonomy. Further, self-criticism could also affect the need for relatedness, as self-critical individuals typically keep others at a distance and engage in a cold, competitive, and aloof style of interaction with others.

Highly dependent individuals may sacrifice or even neglect their own preferences to please others, thereby frustrating their need for autonomy. Also, their doubts about their capacities to establish gratifying and durable relationships might frustrate their need for competence. Their strong fear of losing the love of significant others may elicit worry about the durability of their relations, while their accompanying claiming interpersonal style might elicit rejection, thereby resulting in frustration of the need for relatedness (Blatt, 2004). However, previous studies also revealed positive features of dependency in the interpersonal domain, including a tendency to seek and elicit social support (Shahar & Priel, 2003). Thus, with regard to the need for relatedness in particular dependency might be a *double edge-sword*, relating to both experiences of need satisfaction and need frustration.

A limited number of empirical studies confirmed these hypothesized associations between self-criticism, dependency, and need-based experiences. Two studies found self-critical perfectionism to predict an increase in psychological need frustration among adolescents (Boone, Vansteenkiste, Soenens, Van der Kaap-Deeder, & Verstuyf, 2014; Campbell et al., 2018). Using a more direct measure of Blatt's personality dimensions, a cross-sectional study by Vandekerckhove, Brenning, et al. (2019) demonstrated associations between both dependency and self-criticism and psychological need frustration. While self-criticism was additionally related to low need satisfaction, dependency was unrelated to need satisfaction. Using a follow-up design spanning three weekly assessments of need-based experiences, Vandekerckhove, Soenens, et al. (2019) demonstrated that self-criticism assessed at the onset of the study predicted more need frustration and lower need satisfaction across a 3-week period. Finally, a longitudinal study involving three measurement waves spaced 6 months apart examined within-person fluctuations in self-criticism, dependency, and need frustration (Vandekerckhove et al., 2020). The variation in self-criticism and dependency was related to corresponding variation in psychological need frustration. No study to date, however, examined

associations between Blatt's personality dimensions and the needs at the level of daily fluctuations, thereby measuring both dependency and self-criticism as well as the needs on a daily basis.

In examining the daily interplay between personality, the needs and depressive symptoms, we investigated both mediation and moderation models. Given that theory and research suggest that the personality dimensions elicit needs-based experiences and that needs-based experiences, in turn, affect adolescent outcomes, the mediation model assumes that daily self-criticism and dependency predict more need frustration (and, additionally, less need satisfaction in the case of self-criticism), which is, in turn, associated with more daily depressive symptoms. This possibility of mediation received support in the previously mentioned cross-sectional (Vandekerckhove, Brenning, et al., 2019) and longitudinal (Campbell et al., 2018; Vandekerckhove et al., 2020) studies. For instance, Campbell et al. (2018) found evidence for the mediating role of need frustration in the relation between self-critical perfectionism and depressive symptoms in adolescents across a 6-month period. However, it remains unclear whether these mediating processes also operate on a daily level.

In addition, we will also consider the possibility of a moderation model in which self-criticism and dependency may amplify adolescents' susceptibility to need-based experiences. Consistent with a diathesis-stress model (Zuckerman, 1999), this hypothesis implies that heightened daily self-criticism and/or dependency would exacerbate the effect of daily need frustration on daily depressive symptoms (and possibly also lead to desensitization to the positive consequences of need satisfaction). On days when adolescents display more self-criticism or dependency, they would be more sensitive to the emotional costs associated with need frustration. On those days, adolescents may display more dysfunctional responses to need frustrating events, including more negative appraisals of those events and more maladaptive ways of coping (Blatt & Zuroff, 1992; Mongrain, Vetteese, Shuster, & Kendal, 1998; Shahar & Priel, 2003). Confronted with need frustration, adolescents whose personality vulnerability is heightened in the day would thus be less resilient against and more susceptible to the risks associated with need frustration and low need satisfaction. Although this possibility of moderation is theoretically plausible, the few studies to date that examined this possibility did not find support for it (Vandekerckhove et al., 2020; Vandekerckhove, Soenens et al., 2019). None of these studies, however, examined the interactive interplay between Blatt's personality dimensions and need-

based experiences on a daily basis (instead focusing on stable interindividual differences or long-term change). Possibly, interactions between personality and need-based experiences operate on a short-term basis, leaving more room to observe moderation effects at the level of daily fluctuations.

The Present Study

The general aim of this study was to examine day-to-day associations between Blatt's personality dimensions and depressive symptoms and the role of need-based experiences in these daily associations. The following five research goals and associated hypotheses were investigated. First, as only a handful of studies have charted daily variation in self-criticism and dependency (Boone et al., 2012; Zuroff et al., 2016) and in need-based experiences (i.e., Campbell et al., 2018) in adolescent samples, a first goal was to further examine daily fluctuations in these personality dimensions and need-based experiences. On the basis of previous studies, we expected that a substantial amount of variance in personality and need-based experiences would be situated at the within-person level (i.e., the level of daily variation; Hypothesis 1).

The second goal of this study was to investigate daily associations between self-criticism, dependency and depressive symptoms. We hypothesized that daily fluctuations in self-criticism and dependency would go hand in hand with daily fluctuations in depressive symptoms (Hypothesis 2). Third, we examined associations between the two personality dimensions and need-based experiences. Based on previous research and theorizing (e.g., Shahar & Priel, 2003; Vandekerckhove, Brenning, et al., 2019), we hypothesized that self-criticism would relate positively to need frustration and negatively to need satisfaction at the level of daily variation. As dependency entails both positive and negative features, we only expected a positive association with need frustration but not necessarily a negative association with need satisfaction (Hypothesis 3).

Fourth, we examined day-to-day associations between the satisfaction and frustration of the three basic psychological needs and depressive symptoms. As SDT assumes that need frustration plays a particularly strong role in predicting maladaptive outcomes (Bartholomew et al., 2011; Vansteenkiste & Ryan, 2013), we hypothesized that daily need frustration in particular would be associated with daily depressive symptoms (Hypothesis 4).

The two final research goals concerned the interplay between personality vulnerability, need-based experiences and depressive symptoms, thereby considering the possibility of both mediation (research goal 5) and moderation (research goal 6). In terms of mediation, we hypothesized that mainly daily need frustration would play a mediating role in the association between self-criticism, dependency and depressive symptoms (Hypothesis 5). In terms of moderation, we examined the possibility that higher daily levels of self-criticism and dependency could exacerbate the relation between need frustration (or lack of need satisfaction) and depressive symptoms (Hypothesis 6).

Method

Participants and Procedure

Participants were 121 adolescents from the Dutch-speaking part of Belgium (Flanders). The sample was 52% male and participants had a mean age of 15.81 years (ranging from 12 to 18 years, $SD= 1.50$). All adolescents followed secondary education.

The participants were recruited as part of an undergraduate course in developmental psychology. In exchange for course credits, trained undergraduate students were asked to invite one adolescent between 12 and 18 years old (who was not a family member or close friend) to participate in this study. The training took the form of a 1-hour information session in which the first author explained how to approach potentially interested participants and how to collect the data. The students visited the participants at home and described the study requirements, including instructions to complete the booklet with daily paper-and-pencil questionnaires. They also mentioned that there were no right or wrong answers and that participants could leave an item unanswered if they were not sure. The booklet itself also included a clear set of instructions. During the home visit, participants completed the baseline assessment. Participants were instructed to fill out the diaries every evening for 7 consecutive days, starting on a Monday. They could choose to get daily reminders in the form of an e-mail or text message. In total, 81% of the participants fully completed the questionnaires for 7 consecutive days. There was no significant association between compliance on the one hand and gender, age, and depressive symptoms on the other hand. Participation in the study was voluntary and confidential treatment of the data was guaranteed. Informed consent was obtained from all participants

and their parents. The study was given ethical approval by the organizing university's institutional review board.

Measures

Self-Criticism and Dependency

Participants filled out 12 items from the Depressive Experiences Questionnaire for adolescents (DEQ-A; Blatt, Schaffer, Bers, & Quinlan, 1992). Because the original 66-item DEQ is too long for use in a diary study, we selected items from a short version of the DEQ, that is, the Reconstructed Depressive Experiences Questionnaire (RecDEQ; Bagby et al., 1994), which contains the psychometrically best performing items of the DEQ. From the 19 items in the RecDEQ we selected the items that were most suitable for a daily assessment. These items were adapted to a diary format by adding the stem 'Today' to all items. The questionnaire consisted of 6 items tapping into daily self-criticism (e.g., "Today, I tended to be very critical of myself") and 6 items tapping into dependency (e.g., "Today, I thought about the danger of losing someone who is close to me"). All items were rated on a scale ranging from 1 (*Totally disagree*) to 7 (*Totally agree*). Cronbach's alpha for self-criticism was .91 at the between-person level and .68 at the within-person level. Cronbach's alpha for dependency was .88 at the between-person level and .63 at the within-person level.

Need Satisfaction and Need Frustration

Participants were administered the Basic Psychological Need Satisfaction and Need Frustration Scale (BPNSFS; Chen et al., 2015) to tap into need-based experiences. We employed a shortened 12-item version that has already been used in previous diary studies (Brenning, Soenens, Mabbe, & Vansteenkiste, 2019; Van der Kaap-Deeder, Vansteenkiste, Soenens, & Mabbe, 2017). Satisfaction and frustration of each of three needs was assessed with 2 items: autonomy satisfaction (e.g. "Today I felt a sense of choice and freedom in the things I undertook") and autonomy frustration (e.g. "Most of the things I did today felt like I had to"), relatedness satisfaction (e.g. "Today I felt connected with people who care for me, and for whom I care") and relatedness frustration (e.g. "Today I felt excluded from the group I want to belong to"), and competence satisfaction (e.g. "Today I felt capable at what I did") and competence frustration (e.g. "Today I felt insecure about my abilities"). Items were rated on a 5-point rating scale ranging from 1 (*completely not true*) to 5 (*completely true*).

As the three needs are intercorrelated (see Table 2 in the supplementary materials) and as they are also theoretically assumed to mutually reinforce each other, we use the combined need scales in the main analyses. The six items tapping into need satisfaction and the six items tapping into need frustration were averaged into two separate scores. Cronbach's alpha for the composite scores of need satisfaction was .90 at the between-person level and .62 at the within-person level. For need frustration, Cronbach's alpha was .89 (between-person level) and .65 (within-person level).

Depressive Symptoms

Participants were administered an adapted version of the Center for Epidemiologic Studies – Depression Scale (CES-D; Radloff, 1977). A 6-item version was used in which items were adapted to the diary format (e.g., “Today I felt that everything I did was an effort”; Brenning et al., 2018). All items were rated on a scale from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). The scale had adequate reliability ($\alpha = .90$ at the between-person level and $\alpha = .70$ at the within-person level).

Plan of Analysis

As the data involved daily assessment during seven consecutive days (i.e., Level 1), nested within 121 adolescents (i.e., Level 2), a multilevel data-analytical approach is warranted. Mplus 7 (Muthèn & Muthèn, 2015) was used to test examine associations between the study variables at the within-person (daily) level, thereby controlling for interindividual differences at the between-person level. The total dataset contained 4.01% missing values. A non-significant Little's MCAR test ($\chi^2(380) = 391.23, p > .05$) suggested that the data were missing at random. Therefore, we used full information maximum likelihood (FIML) to estimate the missing values (Little & Rubin, 2002).

First, we examined day-to-day variation in all study variables (Hypothesis 1) by estimating intercepts-only models. These models yield intraclass correlations (ICC) indicating the variance at the between-person level. Second, we examined, at the level of within-person variance and controlling for between-person variance, associations between daily personality (i.e., self-criticism and dependency) and depressive symptoms (Hypothesis 2), followed by an investigation of associations between daily self-criticism and dependency and the need-based experiences (i.e. need satisfaction and need frustration) (Hypothesis 3). Next, we investigated the daily associations between the need-based experiences and depressive symptoms (Hypothesis 4). When associations at this level of within-person

variance reach significance, they indicate that a daily elevation in one variable (relative to individuals' average score across days) goes hand in hand with a daily elevation in another variable.

Further, we estimated a Structural Equation Model (SEM) in which composite scores for need satisfaction and need frustration were included as mediators in the daily associations between personality and depressive symptoms (Hypothesis 5). Again, variance at the between-person level in all variables was controlled for, resulting in a mediation model tested at the level of within-person (daily) variation. To evaluate the fit of these hypothesized mediation models, we relied on the Chi-square statistic (χ^2), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Standardized Root-Mean-square Residual (SRMR). An acceptable fit was indicated by CFI values of .90 or above, and RMSEA and SRMR values around .08 or below (Kline, 2005). Finally, we investigated the moderating role of personality in the relation between need-based experiences and depressive symptoms at the level of within-person (daily) variation (Hypothesis 6). Four separate moderation models were tested, with each model consisting of one dimension of personality (self-criticism or dependency) and one dimension of need-based experiences (need satisfaction or need frustration) and the corresponding interaction term.

Results

Preliminary Analyses

Descriptive Statistics and Correlations

An overview of the descriptive statistics and within-person (i.e., day-to-day) correlations between all study variables is shown in Table 1. Both daily dependency and daily self-criticism were correlated positively with daily need frustration and daily depressive symptoms, while being negatively correlated with daily need satisfaction. Whereas daily need frustration was related positively to depressive symptoms, daily need satisfaction was related negatively.

Background Variables

To examine the relation between the background variables (i.e., gender and age) and the study variables, a multilevel model was tested. We tested the effect of gender and age on the study variables at the between-person level, while controlling for the correlations between the variables at the within-person level. Gender was related significantly to each of the study variables, namely dependency ($b =$

.25 , $SE = .09$, $p < .01$), self-criticism ($b = .20$, $SE = .09$, $p < .05$), need satisfaction ($b = -.21$, $SE = .10$, $p < .05$), need frustration ($b = .21$, $SE = .09$, $p < .05$) and depressive symptoms ($b = .22$, $SE = .10$, $p < .05$). Compared to boys, girls reported higher dependency, higher self-criticism, lower need satisfaction, higher need frustration and more depressive symptoms. Age was significantly associated with self-criticism ($b = .33$, $SE = .08$, $p < .01$), need frustration ($b = .36$, $SE = .10$, $p < .01$) and depressive symptoms ($b = .24$, $SE = .09$, $p < .01$). With increasing age, adolescents reported more self-criticism, more need frustration and more depressive symptoms. Therefore, we decided to control for gender and age in the main analyses in the manuscript.

Primary Analyses

Hypothesis 1: Day-to-day Variability in the Study Variables

The intra-class correlations (ICC) represent the percentage of variance at the between-person level. The ICC values show that respectively 59% and 61% of the variance in dependency and self-criticism is situated at the level of between-person differences. Accordingly, 41% and 39% of the variance in dependency and self-criticism is situated at the level of within-person differences. While a part of these within-person differences represents daily variation, it should be noted that this part of the variance also contains measurement error. Still, these findings indicate that there is substantial within-person variability in dependency and self-criticism. For need satisfaction and need frustration, 50% and 39% respectively, of the variance reflected between-person differences. Finally, for depressive symptoms, 49% of the variance was situated at the level of between-person differences. Overall, these results suggest that there is significant variance at the within-person level (i.e., fluctuations from day-to-day across 7 days) in all assessed constructs, which justifies the use of a multilevel analytical approach.

Hypothesis 2: Associations between Daily Self-Criticism, Dependency and Depressive Symptoms

To examine within-person associations between personality and depressive symptoms, self-criticism and dependency were entered simultaneously as predictors of depressive symptoms (thereby controlling for their shared variance). Both personality dimensions displayed unique associations with depressive symptoms ($b = .32$, $SE = .05$, $p < .001$ for self-criticism and $b = .28$, $SE = .04$, $p < .001$ for dependency).

Hypothesis 3: Associations between Daily Self-Criticism, Dependency and Need-Based Experiences

When entered simultaneously in the prediction of need frustration, both self-criticism ($b = .48$, $SE = .03$, $p < .001$) and dependency ($b = .25$, $SE = .04$, $p < .001$) were associated uniquely with higher levels of need frustration. Moreover, self-criticism ($b = -.35$, $SE = .04$, $p < .001$) and dependency ($b = -.21$, $SE = .04$, $p < .001$) were also uniquely associated with lower need satisfaction. The findings demonstrate that higher daily levels of self-criticism and dependency go hand in hand with more need frustration and less need satisfaction on a daily basis.

Hypothesis 4: Associations between Daily Need-Based Experiences and Depressive Symptoms

In a next model, both need frustration and need satisfaction were entered simultaneously as predictors of depressive symptoms (thereby controlling for the variance shared between need satisfaction and need frustration). The model showed that both need satisfaction ($b = -.23$, $SE = .04$, $p < .001$) and need frustration ($b = .45$, $SE = .04$, $p < .001$) had unique associations with depressive symptoms. These findings suggest that adolescents report more depressive symptoms on days when they experience less need satisfaction and more need frustration.

Hypothesis 5: The Mediating Role of Need-Based Experiences

To examine whether daily need frustration and need satisfaction mediated the within-person associations between personality and depressive symptoms, we tested a fully saturated SEM model. As represented in Figure 1, this model included paths from dependency and self-criticism to need satisfaction and frustration, which, in turn, were allowed to predict depressive symptoms. The direct paths from dependency and self-criticism to depressive symptoms were also included. Correlations were allowed among the two predictor variables (i.e., self-criticism and dependency) and among the two mediators (i.e. need satisfaction and need frustration). The model had by definition a perfect fit ($CFI = 1$, $\chi^2(0) = 0$, $RMSEA = .00$ and $SRMR = .00$). We tested the mediation model using the model indirect command in Mplus. All four indirect effects from personality to depressive symptoms through need satisfaction and need frustration were significant. An overview of the effect sizes of the indirect effects can be found in Table 2. The ratio of the effect sizes indicates that the indirect effect from self-criticism on depressive symptoms through need-based experiences is larger than its direct effect ($ES_{indirect} / ES_{direct} = 2.38$). However, for dependency, the indirect effect on depression through need-based

experiences is smaller than the direct effect ($ES_{\text{indirect}} / ES_{\text{direct}} = .76$). This finding suggest that the basic psychological needs have an important role in explaining personality vulnerability to depression, especially for self-criticism. To test the robustness of the indirect effects, we compared the findings obtained with the Mplus indirect command with two alternative approaches, namely the bayesian analyses in Mplus (Muthén & Muthén, 1998-2010) and the prodclin program in R (MacKinnon, Fritz, Williams, & Lockwood, 2007). The three approaches yielded highly comparable results (see Table 1 in the supplementary materials).

Hypothesis 6: Self-Criticism and Dependency as Moderators

To examine whether the within-person (i.e., day-to-day) associations between need-based experiences and depressive symptoms depend on daily levels of self-criticism and dependency, interactions were tested. Models were tested separately for self-criticism and dependency and for need frustration and need satisfaction. None of the 4 tested interaction effects reached significance ($p > .05$). This means that daily self-criticism and dependency do not affect the strength of the association between daily need-based experiences and depressive symptoms. A moderation model seems to fit the data less well than a mediation sequence.

Ancillary Analyses

In addition to the main analyses, we performed a number of ancillary analyses. First, we examined whether the associations obtained at the within-person level (i.e., the level of daily variations) are obtained also at the between-person level. The results of a model including these associations also at the between-person level can be found in the supplementary materials and show that most of the associations obtained at the within-person level were replicated at the between-person level. Most importantly, both dependency and self-criticism related positively to need frustration also at the between-person level, with need frustration in turn relating positively to depressive symptoms.

Second, we examined whether between-person differences in personality would moderate within-person associations between personality, need-based experiences, and depressive symptoms. Such interactions would be indicative of trait x state interactions. One such interaction was significant, indicating that individuals scoring high on between-person-level self-criticism display a stronger

within-person association between state self-criticism and need frustration. Interactions between trait and state dependency were not significant. Details of these cross-over interactions can be found in the supplementary materials.

Third, whereas we used total scores for need satisfaction and need frustration in the main analysis, in an additional analysis we also used separate scores for the three needs. Because this diary study included only 2 items to measure satisfaction of each need and 2 items to measure frustration of each need, we examined the three needs separately by computing a composite score of need satisfaction and need frustration for each of the three needs. The results of a SEM model testing mediation with these three separate needs can be found in the supplementary materials. Overall, the results showed that each of the three needs played unique intervening roles in the associations of dependency and self-criticism with depressive symptoms at the within-person level. Whereas autonomy and competence played a particularly pronounced intervening role in effects of self-criticism, relatedness played a particularly pronounced role in effects of dependency. With these separate scores for the three needs, we also examined interactions between the personality dimensions and the needs in the prediction of depressive symptoms. Results showed evidence for three interactions. The negative association between autonomy satisfaction (versus frustration) and depressive symptoms was more pronounced at high levels of dependency, an effect that occurred both at the within- and between-person level. Further, the negative association between competence satisfaction (versus frustration) and depressive symptoms was more pronounced at high levels of dependency, an effect that occurred only at the between-person level. However, we should be cautious to interpret these results given that the reliabilities of the separate need scales were lower. Details of these additional analyses can again be found in the supplementary materials.

Discussion

This study aimed to examine the associations between self-criticism, dependency, and depressive symptoms on a daily basis. Although self-criticism and dependency are often depicted as relatively stable personality characteristics that differ mainly between individuals, research increasingly shows that self-criticism and dependency also fluctuate within individuals on a daily basis

(Zuroff et al., 2016). Thus, these personality dimensions would have both trait-like and state-like features that dynamically interact with daily events (Zuroff, Mongrain, & Santor, 2004). This study aimed to build on previous work by examining the interplay between daily, within-person variation in personality daily variation in need-based experiences in relation to adolescents' depressive symptoms. In doing so, a mediation model (in which need-based experiences explain associations between personality and depressive symptoms) and a moderation model (in which personality alters the associations between the need-based experiences and depressive symptoms) were tested.

Daily Fluctuations in Self-criticism, Dependency and Depressive symptoms

A first research question was whether the study variables fluctuate substantially on a day-to-day basis. The results indicated that there is indeed considerable day-to-day variation in all study variables. Even though adolescence is a developmental stage characterized by more pronounced oscillation in emotions from day to day (Maciejewski et al., 2015), research on daily fluctuations in self-criticism and dependency in adolescent samples is very scarce. The findings are consistent with a small body of research indicating that self-criticism fluctuates from day to day in youngsters (e.g., Boone, Soenens, Mouratidis, et al., 2012) and university students (e.g., Zuroff et al., 2016). Yet, this study is among the first to demonstrate daily variation in dependency (Stader and Hokanson, 1998).

The finding that self-criticism and dependency fluctuate within individuals from day to day is in line with previous work underscoring the distinction and complex interaction between trait-like and state-like features of personality (Fleeson, 2001). Compared to the personality dimensions, the psychological needs experiences and depressive symptoms were characterized by relatively more within-person variability. Previous diary studies similarly showed that psychological needs experiences are highly dynamic and vary substantially on a short-term (even daily) basis (e.g., Ryan et al., 2010; Verstuyf et al., 2013).

Associations Between the Personality Dimensions, the Needs, and Depressive Symptoms at the Daily Level

As expected, day-to-day fluctuations in self-criticism and dependency were significantly associated with day-to-day fluctuations in depressive symptoms. This finding implies that adolescents

experience, on average, more depressive symptoms on days when they adopt a more critical attitude towards themselves (i.e., high daily self-criticism) or on days when they fear losing the love of significant others (i.e., high daily dependency). These findings are consistent with a limited number of studies providing evidence for daily associations between self-criticism and depressive symptoms (Zuroff et al., 2016) and between dependency and depressive symptoms (Stader & Hokanson, 1998).

Second, we found evidence for unique associations between Blatt's personality dimensions and the need-based experiences on a daily basis. As hypothesized, high daily levels of self-criticism render individuals vulnerable to more daily need frustration and less need satisfaction. This finding is in line with previous research demonstrating that self-criticism not only confers risk to more ill-being but also to poorer well-being (Shahar & Priel, 2003). As dependency is often considered to be less maladaptive than self-criticism (Kopala-Sibley et al., 2017), we expected a significant association with need frustration but not necessarily with low need satisfaction. However, the present study revealed significant associations between dependency and both types of need-based experiences. Possibly, dependency and a lack of need satisfaction go hand in hand on the short term (i.e. at the level of daily within-person change), while the mixed pattern of both positive and negative features that characterizes dependency might weaken the association between dependency and need satisfaction on the longer term.

Next, results further revealed that daily need satisfaction and need frustration relate to day-to-day fluctuations in depressive symptoms. This finding is also consistent with previous work demonstrating that need-based experiences have important repercussions for individuals' daily well-being and ill-being (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Ryan et al., 2010; Van der Kaap-Deeder et al., 2017). The present study, however, is among the first to demonstrate the role of daily variation in needs-based experiences in adolescents' depressive symptoms. Contrary to previous (mainly cross-sectional and longitudinal) work that only found evidence for a unique link between need frustration and depressive symptoms (e.g., Bartholomew et al., 2011; Chen et al., 2015; Vandekerckhove et al., 2020), both daily need frustration and daily need satisfaction demonstrated unique associations with adolescents' depressive symptoms in the present study. These findings suggest that, especially at the level of daily fluctuations, also low need satisfaction renders adolescents

vulnerable to experience depressive symptoms. However, future studies should replicate and extend these findings by simultaneously testing adaptive outcomes (i.e., indicators of well-being) and depressive symptoms on a daily basis, thereby controlling also for shared variance between well-being and depressive symptoms.

Given that our findings demonstrated theoretically plausible associations between Blatt's personality dimensions and the psychological needs (Luyten & Blatt, 2016) and given that both the personality dimensions and the psychological needs experiences were related to depressive symptoms at the daily level, we proceeded by examining the interplay between personality and the needs-based experiences in adolescents' depressive symptoms.

Deeper Insights in the Interplay between Personality Vulnerability, Need-based Experiences and Depressive Symptoms

The interplay between daily personality vulnerability, need-based experiences and depressive symptoms was examined in two ways. First, we investigated whether need satisfaction and need frustration would mediate the personality-depressive symptoms association at the within-person level (i.e. from day-to-day). Self-criticism and dependency were both associated positively with need frustration and negatively with need satisfaction on a daily basis. Similar associations between the personality dimensions and need frustration were reported in previous cross-sectional (Vandekerckhove, Brenning et al., 2019) and longitudinal (Vandekerckhove et al., 2020) research among adolescents (Vandekerckhove et al., 2020). However, the negative association between daily dependency and need satisfaction is rather new, as dependency was not related to need satisfaction in these previous studies. Using longitudinal assessments with 6-month intervals, Vandekerckhove, et al. (2020) even found positive associations between dependency and satisfaction of the need for relatedness in particular. Presumably, on days during which one's vulnerability for dependency is awakened, one may be looking for immediate and clear signs of care and love from others, which leads one to make use of more maladaptive relational strategies (e.g., passive-aggressive communication, a claiming interpersonal style) that interfere with need satisfaction that day. Yet, in the long term, dependent individuals may possibly take more distance from their immediate responses, which allows them to more authentically rely on others for support. Indeed, it has been argued that

dependency is a mixed blessing that entails both negative and positive features (Casalin, Luyten, Besser, Wouters, & Vliegen, 2014), which may manifest differently across time. Although this reasoning is speculative at this moment, our data indeed seem to suggest that the negative features of dependency manifest more strongly on a short-term (daily) basis and that the positive features may manifest only across a longer period of time. Research including explicit assessments of these positive (e.g., social support seeking) and negative (e.g., passive aggression) features and including both short and longer time frames is needed to test these speculations.

We found evidence for a mediating role of daily need-based experiences in personality vulnerability to depressive symptoms. The finding that ups and downs in dependency and self-criticism were associated with ups and downs in depressive symptoms can be explained by the parallel daily variation in need frustration and need satisfaction. Although the present study is among the first to test this mediation model on a day-to-day basis, the results are in line with previous cross-sectional (Vandekerckhove, Brenning et al., 2019) and longitudinal (Vandekerckhove et al., 2020) work that is indicative of the mediating role of need-based experiences in the association between self-criticism, dependency and internalizing problems. Notably, these previous studies only found evidence for the mediating role of need frustration (and not need satisfaction). Yet, in the present study both daily need satisfaction and daily need frustration help to explain the association between personality and depressive symptoms. Future research is needed to shed a light on the processes underlying the association between personality and the needs. Based on Caspi and Roberts' (2001) model on personality development across the life span, at least three potential processes can play a role in the interplay between personality and the needs (see also Vandekerckhove et al., 2020). Both *perceptive mechanisms* (e.g., dependent individuals could be more sensitive to signs of rejection) and *evocative mechanisms* (e.g., self-critical individuals' hostile style might alienate others) might be involved in this association. Third, self-critical and dependent adolescents could also *actively generate* more need frustrating experiences, for example by setting unrealistically high standards and thereby increasing the risk of failure (self-criticism) or by choosing a dominant romantic partner who puts them in a submissive position (dependency).

Second, we tested a moderation model in which personality alters the effects of need satisfaction and need frustration on depressive symptoms on a daily basis. Based on a diathesis-stress model (Zuckerman, 1999), we hypothesized that heightened levels of dependency and self-criticism would enhance one's vulnerability for daily depressive symptoms on need-frustrating or low need satisfying days. However, no significant interactions were found. This lack of moderation is consistent with SDT's claim about the universally maladaptive role of psychological need frustration. According to SDT, because the three psychological needs represent universally important nutrients for mental health, need frustration increases risk for psychopathology among all adolescents (Vansteenkiste & Ryan, 2013). The current results indeed suggest that adolescents who experience need frustration (or lack of need satisfaction) pay an emotional cost, no matter their personality style (Ryan & Deci, 2017). Of course, this finding does not preclude the possibility that personality would to some extent affect the strength of the association between need frustration and depressive symptoms (an effect not observed in the current study) nor the possibility that personality plays a role in the manifestation of psychopathology associated with need frustration. Future research could indeed examine whether need frustration is related to different types of psychopathology among adolescents with distinct personality traits (e.g., more somatic complaints among highly dependent adolescents and more risk for obsessive-compulsive symptoms among highly self-critical adolescents; Luyten et al., 2007). This finding is also in line with previous longitudinal research that could not find evidence for interactions between Blatt's personality dimensions and SDT's need-based experiences (Vandenkerckhove et al., 2020). The present study confirms this lack of moderation at the level of daily fluctuations. Adolescents' personality seems to generate certain need-based experiences instead of affecting their sensitivity to the consequences of need-based experiences.

Limitations and Future Directions

There are several limitations to this study. First, we were unable to address causality or direction of effects. The multilevel analyses revealed day-to-day associations between the study variables yet did not test the temporal ordering of the variables. Consequently, it remains unclear whether daily levels of self-criticism and dependency affect daily levels of depressive symptoms, or the other way around. Similarly, self-criticism and dependency might impact the need-based

experiences or vice versa. Perhaps self-criticism and dependency represent (maladaptive) coping responses to experiences of need frustration encountered during the day. Experimental research is needed to establish causal pathways between the two personality dimensions and depressive symptoms, for example by experimentally manipulating state-levels of self-criticism or dependency (see Boone, Soenens, Vansteenkiste & Braet, 2012). Also cross-lagged longitudinal studies with large samples could be useful to provide more insight in the direction of effects. Next, all measures relied on adolescent self-report and, therefore, results can be biased due to shared method variance. Certainly for the assessment of depressive symptoms, it would be useful to obtain both self-report and parent report in future studies (Klein, Dougherty, & Olin, 2005). Next, the use of a non-clinical sample makes it difficult to generalize the findings to adolescents with clinical scores on depressive symptoms. Therefore, the present findings should be replicated in clinical samples.

Further, the present study included only one intervening variable (i.e., need-based experiences). Future research could examine the role of other potential moderating or mediating variables. For example, emotion regulation might also function as a mediator in the associations between personality and depressive symptoms. One could expect that self-critical individuals would use more deactivating emotion regulation strategies, while dependent individuals would use more hyperactivating strategies (Blatt, 2008). Deactivation and hyperactivation are both associated with a heightened risk to depressive symptoms (Brenning, Soenens, Braet, & Bosmans, 2012) and thus could play a role in explaining personality vulnerability to depressive symptoms. Objective stressors or life events (e.g., failure on a test, a conflict with a friend) could also interact with personality in the prediction of depressive symptoms in adolescents. In accordance with diathesis-stress models (Zuckerman, 1999), dependent individuals would be particularly sensitive to the negative consequences of social stressors, whereas self-critical individuals would be more sensitive to both achievement-related and social stressors (Shahar & Priel, 2003). Future studies should examine the interplay between personality and both objective stressors and subjective inner experiences (e.g. need satisfaction and frustration). Moreover, only one outcome variable was examined in the present study, namely depressive symptoms. Future work could examine the role of personality and the basic needs in the development of internalizing problems more generally and even in the development of

externalizing problems, two types of psychopathology with increasing prevalence during adolescence (Fergusson, Horwood, Ridder, & Beautrais, 2005; Zahn-Waxler, Klimes-Dougan, & Slattery, 2000).

The present study was among the first to reveal day-to-day fluctuations in self-criticism and dependency in adolescents. Future diary studies could build on this work by examining the interplay between trait and state levels in self-criticism and dependency in greater detail (Fleeson, 2001). For example, future research could explore under which circumstances general trait levels of the two personality dimensions manifest in state levels of self-criticism and dependency in particular situations. As the environment directly affects state level manifestations (Boone et al., 2012), contextual factors could play an important role in this association (Jackson & Hill, 2019). Future research could also provide more insight in the association between dependency and the basic psychological needs by investigating different types of dependency, as suggested by Pincus and Gurtman (1995). Finally, it could be interesting for future research to explore whether experiences of need frustration can activate individuals' personality vulnerability. We would expect that latent trait-levels of self-criticism and dependency could be activated (and thus manifested in increases in daily state-levels of self-criticism and dependency) on days when adolescents' basic needs are frustrated. These personality vulnerabilities may get awakened to compensate for the experienced need frustration and may, paradoxically, further increase need frustration (Vansteenkiste & Ryan, 2013).

Based on the findings of the present study, a number of clinical implications can be suggested. As the study points to self-criticism and dependency as vulnerability factors for depressive symptoms, highly self-critical and dependent individuals might be targeted as at-risk youth in prevention programs in order to foster their resilience (Wilksch, Durbridge, & Wade, 2008). Clinical interventions can also focus on reducing self-criticism and dependency in clients, for instance through Acceptance and Commitment Therapy (ACT; Hayes et al., 2006) or through Compassion-Focused therapy (Gilbert, 2009), thereby indirectly decreasing their vulnerability to psychopathology (Egan, Wade, Shafran, & Antony, 2014). Next, clinicians can take the basic psychological needs into account in their work with adolescents, for example by raising awareness on need frustrating experiences (Ryan & Deci, 2008), by encouraging adolescents to pro-actively seek and create optimal conditions

for need satisfaction (i.e., need-crafting; Laporte et al., 2021), and by learning adolescents how to deal effectively with experiences of need frustration (Roth, Vansteenkiste, & Ryan, 2019).

Conclusion

This study showed that both dependency and self-criticism fluctuate from day to day in adolescents. Moreover, these daily fluctuations in the two personality dimensions go hand in hand with daily fluctuations in depressive symptoms. On days that adolescents engage more in harsh self-scrutiny and are more worried about interpersonal abandonment, they also report more depressive symptoms. Findings indicated that daily need-based experiences (i.e., satisfaction and frustration of the needs for autonomy, relatedness and competence) play an explanatory role in this daily association between self-criticism, dependency and depressive symptoms. We mainly obtained evidence for the notion that daily personality vulnerability contributes to more need frustration and less need satisfaction, with these need-based experiences in turn relating to elevated depressive symptoms in the day. We did not find evidence that personality affects adolescents' sensitivity to needs-based experiences.

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