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Adolescents as active managers of their own psychological needs: The role of psychological need crafting in adolescents' mental health

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ABSTRACT

Introduction: Satisfaction of adolescents' basic psychological needs for autonomy, competence, and relatedness contributes to their well-being. Socialization figures (e.g., parents) can assist adolescents in getting these needs met. In addition, adolescents can engage in need crafting, thereby proactively managing their behavior towards improved need satisfaction. This research aimed to develop a need crafting measure and to examine the role of need crafting in adolescents' need-based experiences and mental health.

Method: A cross-sectional study in 233 Flemish students (Study 1; M_{age} = 16.6, 58.4% female) addressed the psychometric properties of a need crafting measure and its associations with relevant constructs. Using a three-wave longitudinal study in 436 Flemish students (Study 2; M_{age} = 16.33, 66,0% female), we investigated the role of need crafting in adolescents' mental health and the intervening role of need-based experiences.

Results: In Study 1, a CFA yielded evidence for the psychometric quality of the need crafting measure. Need crafting was related in meaningful ways with different validation constructs and with adolescents' need-based experiences. Study 2 showed that need crafting was related to adolescents' mental health, both at the level of inter-individual differences and at the level of intra-individual change. Need-based experiences accounted partly for the mental health benefits associated with need crafting, with the effects remaining significant after controlling for perceived maternal need-support.

Conclusion: The findings provide initial evidence for the importance of adolescents' need crafting in mental health. Future research needs to further examine factors that determine adolescents' ability to manage their own psychological needs.

1. Introduction

Adolescence is a developmental period marked by both vulnerabilities and opportunities. Adolescents are at greater risk for psychological difficulties compared to younger children and adults (Dekovic et al., 2004; Zahn-Waxler et al., 2000), with this vulnerability increasing during the last decennium (Keyes et al., 2019). Yet, this risk perspective on adolescents tells only half the story. As they grow older, adolescents also display increasing capacities for self-expression and psychosocial growth (Laursen & Collins, 2009; Steinberg, 2014). Adolescents seek out their own pathway in life, develop more mature relations and a more authentic identity,

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and increasingly take responsibility for their behavior, thereby steering their life into a personally meaningful direction (Kroger & Marcia, 2011).

To understand both adolescents' vulnerability for psychopathology and their capacity for psychosocial growth, it has been argued on the basis of Self-Determination Theory (SDT, Ryan & Deci, 2017; Vansteenkiste et al., 2020) that it is important to consider the role of the basic psychological needs for autonomy, competence, and relatedness. Whereas the satisfaction of these psychological needs is conducive to adolescents' psychosocial adjustment and to a better resolution of important developmental tasks (e.g., Luyckx, et al., 2009; Skhirtladze et al., 2019; Véronneau et al., 2005), the frustration of these needs increases the risk for both internalizing and externalizing problems (Rodríguez-Meirinhos et al., 2020; Van Petegem et al., 2015). Research has shown convincingly that socialization figures, such as parents (e.g. Soenens et al., 2017), teachers (Jang et al., 2016), and peers (Ratelle et al., 2013) play a role in the support and satisfaction of these psychological needs. However, the question whether and how adolescents themselves can contribute actively to their own need-based experiences has received far less attention (Legault et al., 2017; Sheldon et al., 2010; Weinstein et al., 2016). To examine the active contribution of adolescents to their own development, the current research introduces the notion of *need crafting,* which involves the proactive self-management of need-based experiences. The aim of the present set of two studies is to develop a well-validated and reliable measure for this new concept and to examine its associations with adolescents' need-based experiences and mental health.

1.1. Basic psychological needs as nutrients of well-being

Self-Determination Theory (SDT, Deci & Ryan, 2000; Ryan & Deci, 2017) is a broad theory on human motivation and psychosocial development, which posits the basic psychological needs for autonomy, relatedness and competence as universal and essential ingredients for healthy psychological and social development (Vansteenkiste et al., 2020). Autonomy denotes the extent to which adolescents experience a sense of psychological freedom in their thoughts, actions, and feelings. When satisfied, adolescents fully endorse their actions and choices, which are experienced as authentic and self-expressive. The need for relatedness involves experiences of reciprocity in interpersonal relationships. When satisfied, adolescents express care and concern towards friends, parents, and siblings, while also feeling cared for and loved by them. Finally, the need for competence refers to a sense of mastery and personal efficacy in developing one's potential and skills. When satisfied, adolescents feel skilled to meet challenges in life and capable to attain desired goals. Need frustration involves more than the mere absence of need satisfaction as the needs get more actively blocked and obstructed when frustrated (Bartholomew et al., 2011; Ryan et al., 2016; Vansteenkiste & Ryan, 2013). When frustrated, people experience pressure to think, feel, and act (autonomy frustration), loneliness (relatedness frustration), and failure (competence frustration).

A rapidly growing body of research in diverse life domains, age groups, and cultures has now shown convincingly that the satisfaction of these basic psychological needs is of utmost importance for individuals' psychosocial adjustment and well-being (Ryan & Deci, 2017; Vansteenkiste et al., 2020). This is also the case for adolescents, who report more positive affect, life satisfaction (Rodríguez-Meirinhos et al., 2020), and vitality (Cordeiro et al., 2016) when their needs are satisfied. Testifying to the robust role of need satisfaction, these salutary effects also emerged when using observer ratings of adjustment (Ahmad et al., 2013) and were found to remain stable over time (Véronneau et al., 2005). Whereas psychological need satisfaction is growth-conducive, the frustration of these very same needs forestalls adolescents' development and increases their risk for psychopathology, including negative affect (Milyavskaya et al., 2009) and depressive symptoms (Bartholomew et al., 2011; Vandenkerckhove et al., 2020).

Experiences of need satisfaction can be fostered through a complex interplay between contextual and individual-level sources of influence (Ryan et al., 2019). Most research to date focused on the role of contextual influences and on the role of proximal socialization figures such as parents and teachers in particular. Yet, adolescents are not just passive recipients of contextual need support. They can also proactively steer their own lives, thereby contributing to their own need satisfaction and possibly uplifting their own functioning (Vansteenkiste & Ryan, 2013). Although the idea that people have a natural inclination to seek and create environments that contribute to their own need satisfaction and growth is fully consistent with SDT's organismic-dialectical perspective (Deci & Ryan, 2002; Deci & Vansteenkiste, 2004), this idea is, rather surprisingly, underexplored (Sheldon, 2011).

1.2. Need Crafting

Congruent with SDT's assumptions regarding the proactive nature of human beings, it is important to investigate the possibility of a proactive side of need-based functioning. To this end, we coin a new concept and term, that is, the notion of *need crafting*. Similar to the concept of *job-crafting* (i.e. employees' self-initiated changes to align their jobs with their own preferences and interests; Tims & Bakker, 2010; Wrzesniewski & Dutton, 2001), need crafting involves individuals' attempts to create optimal conditions for psychological need satisfaction to occur (see de Bloom et al., 2020). Need crafting entails both awareness of one's personal sources of psychological need satisfaction and a tendency to act upon this awareness. Adolescents high on need crafting have high levels of awareness and self-knowledge regarding the activities, contexts, and relational partners that are need-conducive to them. Equipped with this self-knowledge (i.e., the awareness component of need-crafting), they are also capable to make need-congruent choices (i.e. the action component). Such choices (a) allow for a better realization of their personal interests, values, and preferences (i.e., autonomy need crafting), (b) are conducive to their skill development and emerging sense of mastery (i.e., competence need crafting), and (c) better guarantee the development of relationships characterized by genuine, reciprocal care and intimacy (i.e., relatedness need crafting).

Adolescents with the capacity for need crafting are expected to experience greater need satisfaction and reduced need frustration, with these experiences, in turn, contributing to their well-being and protecting against ill-being. Although research on individuals'

active contribution to their own need satisfaction and associated well-being is quite scarce, some preliminary evidence is available. First, the job crafting literature has shown that job crafting predicts positive job-related outcomes, including job satisfaction, engagement, and performance (Rudolph et al., 2017; Tims et al., 2012). Second, in a few experimental studies individuals were encouraged to actively search for and engage in need satisfying activities. Sheldon et al. (2010) found that young adults instructed to set goals that increase the satisfaction of a specific psychological need reported increased happiness during 6 months, if at least they displayed persistent efforts to meet these goals. Weinstein et al. (2016) reported that experimental instructions encouraging Syrian refugees to engage in need satisfying activities during one week decreased participants' need frustration and distress at the end of that week, despite their stressful life-circumstances. Third, a correlational study by Legault et al. (2017) distinguished between *assisted* autonomy, which is fostered by an autonomy-supportive environment, and *asserted autonomy*, which involves individuals' more pro-active attempts to claim their autonomy. Asserted autonomy, which is directly relevant to the concept of need crafting, related positively to adults' well-being above and beyond the role of assisted autonomy. Although indirect evidence has begun to demonstrate the importance of individuals' active contribution to their own need-based experiences, more systematic research is needed, particularly in adolescence.

2. The present research

As research on the pro-active side of adolescents' need-based functioning is scarce, the present research aims to examine the concept of need crafting and its role in adolescents' well-being. We conducted a cross-sectional and a longitudinal study to examine two primary aims. First, we aimed to develop a self-report measure of need crafting and to examine its internal structure and construct validity (Study 1). Second, we aimed to examine associations between need crafting, need-based experiences (both Study 1 and 2), and adolescents' mental health (Study 2). We hypothesized that need crafting would relate positively to need satisfaction (and negatively to need frustration) and to subsequent well-being. We also tested whether these associations hold when taking into account the role of need-supportive parenting (Study 2). This is important because any observed positive effects of need crafting may be spurious, that is, due to the fact that adolescents high in need crafting find themselves in a need-supportive home environment.

We deliberately focused on the role of need crafting during adolescence. Although the topic of need crafting is relevant for multiple age groups, adolescence is a particularly relevant developmental period to investigate this concept for two reasons. First, as a potential source of resilience during this challenging developmental period, need crafting may represent an important target for prevention and intervention. Second, adolescence is a developmental period marked by increased agency and active contribution to one's own life (Ludeke et al., 2013; Soenens et al., 2019). Instead of being rather passive recipients of contextual influences, adolescents actively seek out and self-select them into particular environments and they respond in particular ways to their interaction partners, thereby eliciting further behaviors from these partners in a reciprocal fashion (Kuczynski, 2003). As such, adolescence is ideally suited as a developmental period to start a systematic investigation of the concept of need crafting.

3. Study 1

The broader goal of Study 1, that is, developing and validating a measure of need crafting, was broken down into three specific aims. First, we aimed to investigate the internal structure of the new scale. Similar to measures of need-based experiences, such as the BPNSNF (Chen et al., 2015), we expected to find evidence for a hierarchical structure with three specific need crafting factors (autonomy, competence, and relatedness) loading on a general factor. Congruent with the dual component conceptualization of need crafting, involving an awareness component and an action component, each of the two modelled components were represented within each of the need-specific factors (see Fig. 1). We anticipated to find evidence for a hierarchical structure, with individual items loading on the first-order components of awareness and action within each need and with these two components in turn loading on the need-specific factors (i.e., autonomy, competence, and relatedness) which served as second-order factors. Finally, these second-order factors would load on the overarching need crafting construct (Hypothesis 1).

Second, we sought to provide evidence for the construct validity of the need crafting scale by investigating its associations with four variables in its nomological network, that is, mindfulness, proactive personality, agentic engagement, and asserted autonomy. Each of these concepts was expected to yield a significant, yet modest relation with need crafting (Hypothesis 2). Mindfulness, which includes an open and receptive attention for one's thoughts and feelings (Brown & Ryan, 2013), shares with need crafting an open awareness to one's inner experiences (Campbell et al., 2015). Need crafting shares a decisive and action-oriented approach with pro-activity, that is, the tendency to seek out opportunities and act on them by showing initiative, taking action, and being perseverant (Bateman & Crant, 1993). Furthermore, we expected both agentic engagement, which denotes adolescents' constructive contribution into the flow of teacher instruction at school (for example by informing the teacher what they (dis)like in class; Reeve & Tseng, 2011) and asserted autonomy (Legault et al., 2017) to relate positively to need crafting because both orientations have in common a pro-active and agentic attitude.

Third, this cross-sectional study offered a first opportunity to test the substantive hypothesis that need crafting is associated with need-based experiences (i.e. high need satisfaction and low need frustration; Hypothesis 3).

3.1. Method

3.1.1. Participants and procedure

Participants were adolescents in the 10th, 11th and 12th grade. They were contacted via two secondary schools in Flanders, the

Dutch-speaking part of Belgium. Informed consent was obtained from both the parents and the adolescents. Ethical approval for this study was granted by the organizing university's Institutional Review Board (IRB). Participation was voluntary and confidentiality was guaranteed. Of the 254 adolescents contacted, 234 adolescents agreed to take part and filled out a battery of questionnaires during a class period and in the presence of a research assistant or master's thesis student who provided some information on the questionnaire format and items. Due to missing data, one student was removed from the dataset. The final sample contained 233 students (41.6% boys, M_{age} = *16.6 years;* SD_{age} = 1.14; $range_{age}$ = 15–20 years*)*. Of all students, 17.2% followed an academic track, 39.5% a technical track and 42.1% a vocational track. In total, 60.9% of the adolescents came from an intact two-parent family.

3.1.2. Measures

Participants filled out a battery of questionnaires measuring need crafting, need-based experiences, mindfulness, agentic engagement, pro-activity and asserted autonomy. All scales showed a good internal consistency (see Table 1). Participants were asked to fill out the questionnaires taking into account their experiences during the past month.

Need Crafting. Need crafting was assessed through a set of 30 items (i.e., 10 items per need). Participants first read a short explanation of each need (based on Sheldon et al., 2010) to facilitate a good understanding and familiarity with the notion of the needs. Participants then provided examples of need satisfying activities in their lives and of people in their close surroundings. Next, they completed 10 items per need, with six items per need measuring the awareness component and with four items measuring the action component. To ensure direct comparability of need crafting scores between the three needs, the item structure of these ten items was kept constant across the three needs. For instance, for each of the needs, one of the awareness items started with the phrase "It is clear to me …". Similar, one of the action items started with the phrase "As much as possible, I try to do things …". Items were rated on a 5-point likert scale ranging between 1 (*completely not true*) and 5 (*completely true*). The entire questionnaire is shown in Table 2.

Need-Based Experiences. Need satisfaction and frustration were assessed through the 12-item short version of the BPNSNF-scale for children (BPNSNF; Chen et al., 2015; Van der Kaap-Deeder et al., 2015). There were two items for satisfaction and two for frustration of each of the three needs. Items were scored on a 5-point Likert scale, ranging from 1 (*completely not true*) to 5 (*completely true*). A sample item for need satisfaction (6 items) was "*During the past month, I felt free to choose which activities I did*". A sample item for need frustration (6 items) was *"During the past month, I often had doubts about whether I'm good at things"*.

Mindfulness. Participants completed the 15-item Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2009). All items were reverse-scored. An example item is "*I snack without being aware that I'm eating*". Items were rated on a 6-point Likert scale, ranging from 1 (*almost always)* to 6 (*almost never*).

Agentic Engagement. To assess agentic engagement, we used the five-item Agentic Engagement Scale (AES; Reeve, 2013). Participants scored items on a 5-point Likert scale, ranging from 1 (completely not true) to 5 (completely true). An example item reads *"I tell the teacher what I like and what I don't like"*.

Proactive Personality. The Proactive Personality Scale (PPS; Bateman & Crant, 2013) was used to measure proactive personality. The 17 items (e.g. "*I am constantly on the lookout for new ways to improve my life"*) were scored on a 7-point Likert scale, ranging from 1 (completely not true) to 7 (completely true).

Asserted Autonomy. Asserted autonomy is measured with 4 items developed by Legault et al. (2017). An example item is "*I always search for ways to express who I am.".* Participants scored the items on a 5-point Likert scale, ranging from 1 (*completely not true)* to 5 (*completely true*).

3.2. Results

3.2.1. Plan of analysis

Prior to testing the internal structure of the need crafting scale using a confirmatory approach, we explored the psychometric quality of the items using Principal Components Analysis (PCA) within each of the three need-specific scales in SPSS Statistics 25. All items with a factor loading below 0.40 on at least one of the subscales were removed from the final item set (Netemeyer et al., 2003). Using the remaining items, we then examined the hypothesized internal structure of the need crafting scale using Confirmatory Factor Analysis (CFA) in Mplus 7.4. We directly tested the fit of our hypothesized hierarchical model (see Fig. 1) and compared the fit of this

Table 1
Descriptive statistics, internal consistencies and correlations (study 1).

	M	*SD*	*α*	1	1a	1b	1c	2	3	4	5	6
1. Need crafting	3.66	.57	.86									
1a. Autonomy crafting	3.67	.74	.81	.84***								
1b. Relatedness crafting	3.80	.72	.73	.77***	.44***							
1c. Competence crafting	3.49	.64	.73	.78***	.56***	.36***						
2. Need satisfaction	3.68	.70	.77	.53***	.42***	.46***	.39***					
3. Need frustration	2.59	.80	.73	-.52***	-.48***	-.41***	-.35***	-.53***				
4. Mindfulness	3.67	.82	.84	.24***	.25***	.12	.22***	.21**	-.45***			
5. Agentic engagement	2.86	.90	.73	.22**	.17*	.19**	.19**	.29***	-.17*	.09		
6. Proactive personality	4.40	.93	.87	.20**	.09	.15*	.26***	.40***	-.09	-.13*	.33***	
7. Asserted autonomy	3.46	.88	.81	.26***	.14*	.27**	.18**	.33***	-.04	-.07	.38***	.54***

Note *** p < .001,** p < .01,* p < .05.

Table 2
Items from the need crafting measure and factor loadings (study 1).

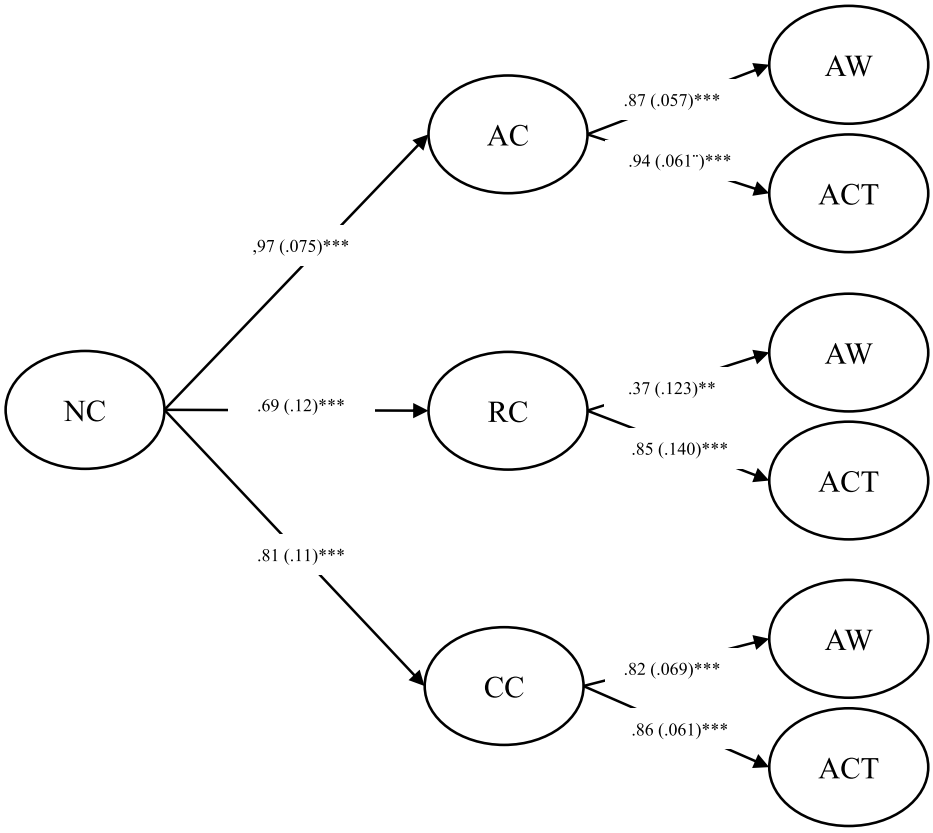
	Item	Component	Item-loading[a]	Item-loading[b]
1	I know well …	awareness	(C) .71	(C) .48
	… which activities I am good at. (C)		(A) .75	(A) .67
	… which activities I really want to do. (A)		(R) .63	(R) .58
	… which people really care about me. (R)			
2	It is clear to me …	awareness	(C) .78	(C) .63
	… in which activities I can use my capacities effectively. (C)		(A) .75	(A) .69
	… in which activities I can be myself. (A)		(R) .69	(R) .55
	… which people love me, and which people I love. (R)			
3	I often consider …	awareness	(C) .48	(C) .35
	… how I can still learn from things I do. (C)		(A) .34	(A) .25
	… whether I do thinks because I really want to or because I have to. (A)		(R) .33	(R) .20
	… whether I feel cared for and supported by the people around me. (R)			
4r	It is unclear to me …	awareness	(C) .30	(C) .23
	… during which activities I can use my capacities. (C)		(A) .09	(A) .12
	… which activities I chose deliberately or which activities I do because they are obliged. (A)		(R) .40	(R) .30
	… whether people around me sincerely care about me. (R)			
5	It is clear to me …	awareness	(C) .28	(C) .16
	… which activities do not fit with my capacities. (C)		(A) .33	(A) .28
	… in which activities I cannot be myself. (A)		(R) .46	(R) .33
	… which people do not love me, and which people I do not love. (R)			
6	As much as possible, I try to do things …	action	(C) .75	(C) .57
	… I am good at. (C)		(A) .77	(A) .67
	… that I really want to do rather than things that have to be done. (A)		(R) .63	(R) .40
	… together with people who truly care about me. (R)			
7	Even …	action	(C) .54	(C) .39
	… when I do not succeed in certain things, I still try to learn from them. (C)		(A) .73	(A) .68
	… in periods in which I feel more pressure, I still make time for activities in which I can be myself. (A)		(R) .61	(R) .37
	… when I feel lonely, I still try to contact people who care for me. (R)			
8	I deliberately choose …	action	(C) .60	(C) .45
	… activities I am good at. (C)		(A) .73	(A) .64
	… to engage in activities I really want to do. (A)		(R) .64	(R) .30
	… to spend time with people who support me and who provide me with warmth. (R)			
9r	Sometimes, I seem to forget to … do the things I am good at. (C)	action	(C) .41	(C) .31
	… do the things that I really want to do. (A)		(A) .55	(A) .48
	… to contact the people I care about the most. (R)		(R) .44	(R) .31
10r	I do not know well …	awareness	(C) .56	(C) .53
	… which activities I am good at. (C)		(A) 59	(A) .50
	… which activities I really want to do. (A)		(R) .70	(R) .57
	… which people really cares about me. (R)			

Note. (A) Item of autonomy crafting; (R) item of relatedness crafting; (C) item of competence crafting; r = reversed scored item; item-loading.
[a] = item-loading PCA need-specific scale; item-loading.
[b] = item-loading PCA total scale. Items in italics (3, 4, and 5) were not retained in the final scale and were not used in Study 2.

model with an alternative model in which all 21 items loaded on a single factor (i.e., need crafting). Based on Hu and Bentler (1999), we used the root-mean-square error of approximation (RMSEA) and the standardized root-mean-square residual (SRMR) to evaluate the goodness of fit of our models. The combination of a RMSEA value below 0.06 and a SRMR value below 0.09 indicates a good model fit. Also, we used the comparative fit index (CFI) with values of 0.90 or higher indicating a good fit (Kline, 2015). Based on Tabachnick and Fidell (2007) we also used the relative chi-square (χ^2/df), with values below 2.0 indicating a good fit. Construct validity and predictive validity were tested by investigating whether identified scales and subscales meaningfully correlated with validation measures.

3.2.2. Primary analyses

Hypothesis 1. Internal Structure. Results of three PCAs (one for each need) revealed that three items (i.e. item 3, 4r and 5) had low loadings (<.40) in at least one of the three sets of analyses. Table 2 presents the factor loadings of all items for the need-specific analyses. with their factor loading. Therefore, this set of nine items was removed from the final set, which was reduced to 21 items (i.e. 7 items for each need). In a next step, these 21 items were used as input for a CFA, thereby comparing our hypothesized hierarchical model with a non-hierarchical model in which all 21 items loaded on a single factor (i.e., need crafting). The hypothesized model (see Fig. 1), χ^2/df = 2.06, RMSEA = .07, SRMR = .08 and CFI = .86) was clearly favoured over the one-factor model (χ^2/df = 4.27, RMSEA = .12, SRMR = .10 and CFI = .56), as also indicated by a significantly different chi-square statistic (χ^2 = 436.96, df = 9, p < .001). Although the fit of our initially hypothesized model already approached the criteria of a good fit, a better fit could be obtained by adding error-correlations between the two reverse-scored items within each subscale. The final fit indices were: χ^2/df = 1.52, RMSEA = .05, SRMR = .07 and CFI = .93.



Note. NC = need crafting; AC = autonomy crafting; RC = relatedness crafting; CC = competence crafting; AW = awareness; ACT = action

Fig. 1. Confirmatory factor analysis with standerdizsed coeffiecients.

Given that the CFA analyses pointed to a hierarchical structure, we computed both an overall scale score (reflecting overall need crafting) and separate scale scores for each of the three needs. Cronbach's alphas were .86 for overall need crafting, 0.73 for competence crafting, 0.81 for autonomy crafting, and 0.73 for relatedness crafting. There were moderate positive correlations between the three need crafting subscales (see Table 1). At the first-order level of the hierarchical model, our findings also supported the distinction between the awareness and action components (see Fig. 1). Because this distinction was not central to our hypotheses in this first and initial examination of the need crafting construct, we did not include this distinction in the main analyses.[1]

Hypothesis 2. Construct Validity. Correlations between the need crafting (sub)scale scores and the construct validation measures can be found in Table 1. The composite score for need crafting was positively and significantly related to mindfulness, proactive personality, asserted autonomy, and agentic engagement, with the correlations being in the small range (r = .20 to .26).[1,2]

Hypothesis 3. Associations with Need-Based Experiences. As can be seen in Table 1, the need crafting (sub)scale scores were related positively to need satisfaction and negatively to need frustration.[1,3]

[1] In the supplemental materials, we added a set of partial correlations investigating the unique relations of the subcomponents, awareness and action taking, of need crafting with individual characteristics and mental health outcomes (See Online Supplemental Analyses).

[2] Additionally, we explored the relations of need crafting with personality traits (Big Five Personality Traits, self-criticism and dependency) (see Online Supplemental Analyses).

[3] In an additional analysis, we computed partial correlations indicating that need-congruent correlations (e.g. autonomy crafting with autonomy satisfaction) were somewhat stronger compared to need-incongruent correlations (e.g. relatedness crafting with competence satisfaction) (see Online Supplemental Analyses).

3.3. Brief discussion

The findings of Study 1 showed that the newly developed scale for need crafting has adequate psychometric properties. The hypothesized higher-order structure, with each need crafting factor being represented by an awareness and an action component, yielded a good fit and the composite scale and the need-specific subscales were sufficiently reliable. Although need crafting correlated in theoretically predicted ways with different construct validation measures, the size of these correlations was modest, suggesting that the concept of need crafting is sufficiently distinct. Finally, Study 1 shed a first light on the potential role of need crafting in need-based experiences as it was found to relate positively to need satisfaction and negatively to need frustration.

4. Study 2

The overall goal of Study 2 was to investigate longitudinal associations between need crafting, need-based experiences, and adolescents' mental health. Similar to across-time fluctuations documented in need-based experiences (van der Kaap-Deeder et al., 2017), we assumed that adolescents' capacity for need crafting may also change from time to time, with adolescents being better able to attend actively to their needs in some periods than in other periods. Thus, need crafting efforts may not only differ between individuals, but also vary within adolescents, an issue that we sought to examine by separating between-person inter-individual differences and variations in within-person change across time. Next, we aimed to examine associations between need crafting, need-based experiences, and well-being at both levels of analysis. When significant, associations at the between-person level indicate that adolescents who engage in more need crafting compared to their peers, also experience comparatively more need satisfaction and higher well-being. Associations at the within-person level indicate that temporary changes in need crafting go hand in hand with corresponding changes in need satisfaction and subsequent well-being. A demonstration that need crafting varies within persons sheds light on the dynamic nature of need crafting and its potential for prevention and intervention.

The central hypothesis in Study 2 was that need crafting would relate to better mental health (Hypothesis 1) through its associations with greater need satisfaction and lower need frustration (Hypothesis 2). Thus, need-based experiences were assumed to play an intervening role between need crafting and adolescents' mental health, both at the between-person level and at the within-person level. Importantly, in testing this hypothesis, we investigated whether the associations would hold over and above the role of maternal need-supportive parenting (Hypothesis 3). If need crafting represents a critical and unique resource of need satisfaction, it should be related to need-based experiences even when taking into account the degree of contextual need support.

4.1. Method

4.1.1. Participants and procedure

A three-wave longitudinal study was conducted. Time 1 (T1) data were gathered in 2019 during the last week of February, Time 2 (T2) data during the last week of March 2019, and Time 3 (T3) data during the first week of June 2019. Participants were again in 10–12th grade and the recruitment procedure was identical to the procedure used in Study 1.

Each assessment was organized during a class hour and supervised by a master's thesis student. At T1, initially 489 adolescents participated. Of these participants, 53 did not provide reliable responses (i.e., many missing values and systematic response patterns) and were removed from the dataset. Of the remaining participants, 398 students participated again at T2 (81% retention rate) and 344 adolescents participated again at T3 (70% retention rate). Little's (1988) missing completely at random (MCAR) test turned out to be non-significant ($\chi^2(248) = 241$; $p = .62$), indicating that missing data could be estimated reliably.

The mean age of the participants was 16.33 years ($SD_{age} = 1.14$; $range_{age} = 14–21$) and the sample was 66% female. Of the participants, 61.9% came from an intact two-parent family. Regarding educational level, 64.7% followed an academic track, 11.0% a vocational track and 24.1% and technical track. 93.3% of the participants were born in Belgium.

4.1.2. Measures

A similar battery of questionnaires was filled out at each measurement wave. One exception is the parenting measure which was only assessed at baseline. Further, we asked participants to answer the questions regarding the past week at T2 and T3, while they were asked to fill out the battery at T1 regarding the past month, similar to Study 1. Cronbach's alphas of the scales are presented in Table 3.

Need Crafting. Participants completed the need crafting scale developed in Study 1. A CFA on the 21 items confirmed the proposed hierarchical structure obtained in Study 1, with acceptable fit indices at each wave (RMSEA = 0.05; SRMR = 0.06; CFI = 0.92; χ^2/df = 2.07 at T1, RMSEA = 0.05; SRMR = 0.06; CFI = 0.91; χ^2/df = 2.00 at T2; RMSEA = 0.06; SRMR = 0.07; CFI = 0.89; χ^2/df = 2.35 at T3). The composite score for need crafting was used in all analyses.

Need-Based Experiences. As in Study 1, participants completed the 12-item BPNSNF (Chen et al., 2015; Van der Kaap-Deeder et al., 2015). Adolescents were asked to fill out the items regarding two highly relevant life-domains, that is, school and leisure time. We created a composite score by taking the mean of both domain-specific scores, an approach which was justified by the substantial positive correlations between the domain-specific scores for need satisfaction ($r = 0.44$, $p < .01$) and need frustration ($r = 0.61$, $p < .01$).

Well-being. Well-being was measured using the Satisfaction with Life Scale (SWLS: Diener et al., 1985) and the positive affect subscale of the Positive and Negative Affect Scale (PANAS: Watson et al., 1988). The SWLS (e.g., "*In most ways, my life is close to my ideal*") consisted of 5 items, scored on a 7-point Likert scale, ranging from 1 (*completely disagree*) to 7 (*completely agree*). The positive affect scale of the PANAS included 10 emotions (e.g., enthusiastic) scored on a 5-point Likert scale, ranging from 1 (*experienced very*

Table 3
Descriptive statistics, internal consistencies and correlations at the two levels of analysis (study 2).

	M_{T1}	M_{T2}	M_{T3}	SD_{T1}	SD_{T2}	SD_{T3}	α	Between-Person Level					Within-Person Level				
								1	2	3	4	5	1	2	3	4	5
1. Need crafting	3.56	3.54	3.59	.55	.54	.58	.85–.89										
2. Need satisfaction	3.57	3.53	3.54	.61	.57	.58	.79–.83	.66***					.28***				
3. Need frustration	2.58	2.59	2.57	.73	.70	.69	.81–.83	-.56***	-.60***				-.15**	-.29***			
4. Well-being	3.43	3.47	3.41	.78	.78	.75	.88–.88	.61***	.72***	-.56***			-.31***	.37***	-.12**		
5. Ill-being	2.01	1.87	1.98	.66	.61	.63	.91–.92	-.60***	-.63***	.75***	-.71***		-.27***	-.33**	.34***	-.42***	
6. Need-supportive parenting	3.81			.76			.93	.36***	.42***	-.40***	.40***	-.40***					

Note *** $p < .001$,** $p < .01$,* $p < .05$.

little or not at all) to 5 (*experienced very often*). To create an overall score for well-being, both measures were standardized and averaged into a single score.

Ill-being. To tap into adolescents' ill-being, participants completed the Center for Epidemiological Studies Depression Scale (CES-D: Radloff, 1977) and the negative affect subscale of the PANAS (Watson et al., 1988). We used a 12-item version of the CES-D (Roberts & Sobhan, 1992) with items (e.g., "*I felt that everything I did was an effort")* being scored on a 4-point Likert scale going from 0 (*Rarely or None of the time*) to 3 (*Most or all of the time*). The negative affect scale of the PANAS included 10 feelings (e.g. irritable), scored on a 5-point Likert scale, ranging from 1 (*experienced very little or not at all*) to 5 (*experienced very often*). To create an overall score for ill-being, these two measures were standardized and averaged into a single score.

Perceived Maternal Need-Supportive Parenting. A combination of three scales was used to measure perceived maternal need-supportive parenting, that is, the 7-item autonomy-support scale from the Perceptions of Parents Scale (POPS: Grolnick et al., 1991; Brenning et al., 2015; e.g. "M*y mother takes my point of view into account"*), the 8-item Psychological Control Scale – Youth Self-Report (PCS-YSR; Barber, 1996; Mabbe et al., 2016; e.g. "*My mother is less friendly with me if I do not see things her way"*), and the 7-item scale for responsiveness from the Child Report of Parent Behavior Inventory (CRPBI; Schaefer, 1965; Soenens et al., 2007; e.g. "*My mother smiles at me very often"*). Consistent with previous research (e.g., Miklikowska et al., 2011), a composite score for need-supportive parenting was created by reverse scoring the items for psychological control and by taking the mean of the scales for autonomy-support, responsiveness, and (reverse scored) psychological control.

4.2. Results

4.2.1. Plan of analysis

The main hypotheses were examined using multilevel modelling in Mplus 7.4. Multilevel SEM has become an established method to analyse data that are hierarchically structured (Preacher et al., 2010). In the multilevel structural equation modelling analyses, the measurement occasions (T1-T3) at the within-person level were nested within adolescents, which represent the between-person level. The within-person variables were person-mean centred, whereas the between-person variables were grand-mean centred. First, we built a random intercepts-only model to examine whether multilevel modelling was appropriate. These random intercept-only models allow for an estimation of intra class correlations (ICCs), which reflect the between-person variation. Second, to examine Hypothesis 1, we conducted a two-level structural equation model (SEM) including the direct associations between need crafting (independent variable) and well-being and ill-being (outcomes). Next, to test the intervening role of need-based experiences (Hypothesis 2), a mediation SEM model was estimated including indirect paths from need crafting via need satisfaction and need frustration to both outcomes. Finally, to shed light on the unique importance of need crafting (Hypothesis 3), we included perceived maternal need-supportive parenting as an additional predictor at the between-person level. Model fit was evaluated in a similar way as Study 1, using the RMSEA, SRMR, CFI and χ^2/df as fit-indices.

4.2.2. Preliminary analyses

Background Characteristics. To examine the associations between the background variables (gender, age, type of education, and family situation) and the study variables, a multivariate analysis of covariance (MANCOVA) was conducted with gender, education, and family structure (intact versus non-intact) as fixed factors, with the continuous background variable (i.e. age) as a covariate, and with study variables as dependent variables. There was no overall multivariate effect for age (Wilks's $\lambda = 0.93$, $F(16,278) = 1.23$, $p = .24$). There were overall multivariate effects for family structure (Wilks's $\lambda = 0.90$, $F(16,278) = 1.99$, $p < .05$), gender (Wilks's $\lambda = 0.88$, $F(16,278) = 2.40$, $p < .01$), and type of education (Wilks's $\lambda = 0.82$, $F(32,556) = 1.77$, $p < .01$). Follow up analyses showed that type of education ($F(2,436) = 4.89$, $p < .01$), gender ($F(1,436) = 6.73$, $p < .05$) and family structure ($F(1,436) = 7.76$, $p < .01$) related to perceived maternal need-supportive parenting. Adolescents following an academic track reported the highest levels of need-supportive parenting ($M = 3.93$, $SD = 0.66$) compared to adolescents' following a technical ($M = 3.53$, $SD = 0.93$) and vocational track ($M = 3.68$, $SD = 0.95$). Also, girls ($M = 3.80$, $SD = 0.83$) and adolescents living in a non-intact family ($M = 3.61$, $SD = 0.92$) reported less need-supportive parenting compared to boys ($M = 3.83$, $SD = 0.69$) and adolescents living in an intact family ($M = 3.93$, $SD = 0.67$). Next, results revealed that there was also a significant effect of gender on ill-being at T1 and T3 (T1: $F(1,436) = 5.45$, $p < .05$; T3: ($F(1,436) = 5.53$, $p < .05$), with girls reporting more ill-being (T1: $M = 2.16$, $SD = 0.65$; T3: $M = 2.08$, $SD = 0.62$), compared to boys (T1: $M = 1.72$, $SD = 0.57$; T3: $M = 1.76$, $SD = 0.57$). Further, family structure had significant effects on well-being (T1: $F(1,436) = 4.16$, $p < .05$; T2: ($F(1,436) = 9.61$, $p < .01$; T3: ($F(1,436) = 4.77$, $p < .05$) and need frustration at T1 ($F(1,436) = 4.43$, $p < .05$), with adolescents living in an intact family experiencing more well-being (T1: $M = 3.57$, $SD = 0.76$; T2: $M = 3.60$, $SD = 0.72$; T3: $M = 3.55$, $SD = 0.71$) and less need frustration (T1: $M = 2.51$; $SD = 0.70$), compared to adolescents living in a non-intact family (well-being: T1: $M = 3.19$, $SD = 0.75$; T2: $M = 3.24$, $SD = 0.82$; T3: $M = 3.17$, $SD = 0.75$; need frustration: T1: $M = 2.69$; $SD = 0.76$). We decided to control for the effects of type of education, gender, and family structure in the main analyses.

Variance Decomposition. We calculated intra class correlations (ICCs) to examine whether multilevel modelling was appropriate. The ICC reflects the percentage of variance located at the between-person level. For all variables, the majority of the variance was situated at the between-person level, with the variance varying between 50% and 75%. Specifically, ICCs were 0.65 for need crafting, 0.62 and 0.59 for need satisfaction and frustration, respectively, and 0.63 and 0.75 for well-being and ill-being, respectively. These percentages imply that substantial parts of the variance are also situated at the within-person level, although variance at this level also includes error variance. Given the substantial variation in these key constructs at the within-person level (above 0.05, Preacher et al., 2010), the data were deemed suitable for multilevel SEM modelling.

Correlations. Table 3 contains the correlations between measured variables at both the between-person level and the within-

person level. Although the pattern of correlates for need crafting was similar across both levels, the size of the correlations was of a greater magnitude at the between-person level. Need crafting related positively with need satisfaction and well-being and negatively with need frustration and ill-being at the two levels of analysis. At the between-person level, a positive correlation between need crafting and need-supportive parenting was observed.

4.2.3. Primary analyses

Hypothesis 1. Need Crafting and Mental Health. A first model examined the direct associations between need crafting, well-being and ill-being at both levels of analysis, with the two outcomes being allowed to correlate. Results of this (fully-saturated) direct effects model revealed a significant positive association between need crafting and well-being at both levels of analysis ($b = .76$, $SE = .049$, $p < .001$ at the between-person level and $b = .43$, $SE = .062$, $p < .001$ at the within-person level) and a significant negative association with ill-being ($b = -.65$, $SE = .047$, $p < .001$ at the between-person level and $b = -.24$, $SE = .037$, $p < .001$ at the within-person level).

Hypothesis 2. The Intervening Role of Need Satisfaction and Need Frustration. The second aim was to test the intervening role of the need-based experiences in associations between need crafting and the outcomes[4,5]. The results of this fully-saturated multilevel-mediation SEM model (Fig. 2 and Table 4) indicated that need crafting was positively related to need satisfaction, which in turn was positively related to well-being and negatively related to ill-being. Furthermore, need crafting was related negatively to need frustration. In turn, need frustration was positively related to ill-being at both levels of analysis and negatively related to well-being at the between-person level only. The direct associations between adolescents' need crafting and the mental health outcomes (beyond need-based experiences) remained significant at both the between- and within-person level.

The indirect associations between need crafting and well-being via need satisfaction at both levels and via need frustration at the between-person level were significant. Also, the indirect associations between need crafting and ill-being via need frustration and via need satisfaction were significant.

Hypothesis 3. Controlling for Need-Supportive Parenting. To examine the unique role of need crafting, we included need-supportive parenting as an additional predictor at the between-person level. Although results of this (fully-saturated) model showed that need-supportive parenting was related positively to need satisfaction ($b = .15$, $SE = .027$, $p < .001$) and negatively to need frustration ($b = -.19$, $SE = .037$, $p < .001$), need crafting still showed significant relations with both need satisfaction ($b = .59$, $SE = .041$, $p < .001$) and need frustration ($b = -.59$, $SE = .057$, $p < .001$). All other observed direct and indirect associations via need-based experiences remained significant. These findings suggest that need crafting is associated with adolescents' mental health even when taking into account need-supportive parenting.

4.3. Brief discussion

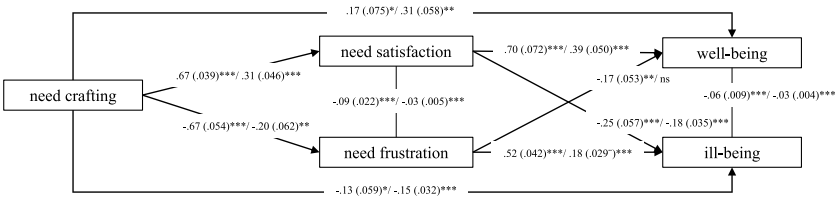
Results of Study 2 revealed that both inter-individual and intra-individual differences in need crafting relate to adolescents' mental health. The findings at the between-person level suggest that, even after controlling for between-person differences in perceived maternal need-supportive parenting, adolescents who engage in more need crafting than their peers experience comparatively higher well-being and lower ill-being. The within-person results suggest that deviations of adolescents' need crafting at a given time point from their average (i.e., changes), went hand in hand with corresponding deviations (i.e., changes) from adolescents' average level of well-being and ill-being. Further, at both levels of analysis, need-based experiences accounted partly for the mental health benefits associated with need crafting, with need satisfaction relating positively to well-being and negatively to ill-being, and with need frustration relating positively to ill-being.

5. General discussion

Although adolescence is often portrayed as a period of vulnerability for psychological problems (Dekovic et al., 2004; Zahn-Waxler et al., 2000), it has become increasingly clear that adolescence is also a period full of opportunities for psychosocial growth. With adolescents displaying increasing independence and steering their own development (Steinberg, 2014), it is important to examine how this increasing agency manifests in terms of need-based experiences. From a Self-Determination Theory perspective, one form of proactive functioning, coined as need crafting, involves adolescents' tendency to seek out and maximize opportunities for need satisfaction. Rather than being solely dependent on supportive environments to get their basic psychological needs (i.e. autonomy, relatedness and competence) met (e.g., Jang et al., 2016; Ratelle et al., 2013; Soenens et al., 2017), adolescents can contribute actively to their own mental health by crafting their experiences of need satisfaction (de Bloom et al., 2020). The present pair of studies sought to develop a measure for need crafting and to examine the dynamic associations between need crafting and adolescents' mental health.

[4] We also tested two additional models in which we included domain-specific mediators (need-based experiences measured in school and leisure time) and outcomes (vitality and stress measured in school and in leisure time) (see Online Supplemental Analyses).

[5] Additionally, we estimated 3 models in which we included each time one of the three need-crafting subscales (i.e. autonomy crafting, relatedness crafting and competence crafting) and a composite score for the satisfaction (versus frustration) of the congruent need (see Online Supplemental Analyses).



Note. Coefficients shown are unstandardized path coefficients with standard errors reported between brackets. ; Between-person level results are reported before the slash (/). Within-person level results are reported after the slash (/). ; *** p <.001.** p <.01.* p < .05

Fig. 2. Multilevel SEM medition model (study 2).

Table 4
Indirect effects from the multiple-mediator model (study 2).

	Between-person level		Within-person level	
Outcome Intervening variable	Well-being b (SE)	Ill-being b (SE)	Well-being b (SE)	Ill-being b (SE)
Need satisfaction	.47 (.053)***	-.17 (.039)***	.12 (.023)***	-.05 (.013)***
Need frustration	.11 (.036)**	-.35 (.038)***	.00 (.008)	-.04 (.012)**

Note. Coefficients shown are unstandardized coefficients (b) with standard errors (SE) reported between brackets.; ***$p < .001$,**$p < .01$,*$p < .05$.

5.1. Validity of a new measure for need crafting

Results of CFAs in both studies provided evidence for the hypothesized hierarchical structure in need crafting. The lowest level comprised items tapping into adolescents' (1) awareness, that is, their receptivity for opportunities to get their basic psychological needs met, and (2) an action tendency, that is, their inclination to act upon this awareness. These two factors were then found to load onto three need-specific factors (i.e., autonomy, competence, relatedness), with all three separate indicators loading onto a higher-order construct of total need crafting. Consistent with our expectations, both the overall scale and the subscales showed adequate reliability.

As hypothesized, need crafting was associated positively with various validation measures, including adolescents' degree of mindfulness (Brown & Ryan, 2003), their proactive personality (Bateman & Crant, 1993), and their levels of asserted autonomy (Legault et al., 2017) and agentic engagement (Reeve, 2013). Although these correlations provide initial evidence for the construct validity of need crafting, it should be noted that the correlations obtained were in the small range. This finding indicates that need crafting shares some features with these variables from its nomological network but still remains distinct from them. As such, although these different variables were used in the service of providing evidence for the construct validity of the newly developed need crafting measure, future research could also treat them in a more substantive way as antecedents of need crafting.

Further, the pattern of correlations between need crafting and the validation measures was similar across the three needs. Given that asserted autonomy and agentic engagement are primary relevant to the need for autonomy, these findings were somewhat surprising, as we expected these constructs to correlate most strongly with autonomy crafting. Although unexpected, these findings are consistent with the observation that satisfactions of the three needs often co-occur and reinforce each other in mutually reciprocal ways (Ryan & Deci, 2017). As a consequence, it is difficult to separate the effects of the different individual needs. Pro-active attempts to increase autonomy probably affect the needs for competence and relatedness as well, because activities in which people can be fully authentic and volitional (such as hobbies) are often activities that people feel they are good at and activities typically carried out with loved ones. This strong co-occurrence may explain (at least partly) why the need-specific subscales of need crafting correlate similar to each need.

5.2. The role of need crafting in need-based experiences and mental health

A key aim of the present study was to investigate whether need crafting would relate to better mental health. Are adolescents' attempts to organize their lives around increasing opportunities for need satisfaction by being aware and selective of the context, activities, and partners that are potentially need-conducive related to greater need satisfaction and higher psychological well-being? Although, the current design does not allow us to make any causal claims, findings in both Study 1 and 2 confirm that adolescents engaging more in need crafting also experience greater need satisfaction and less need frustration compared to peers who invest less effort in need crafting.

Interestingly, results of Study 2, which involved repeated assessments of need crafting over time, revealed that need crafting does not only vary between adolescents, but also comes with fluctuations in adolescents' own functioning. In addition to individual differences between adolescents, with the one adolescent having generally more need crafting skills than the other, need crafting is also

characterized by substantial ups and downs. These findings are consistent with evidence that need-based experiences themselves fluctuate quite a bit on a short-term (Ryan et al., 2010) and long-term (Vandenkerckove et al., 2020) basis and with the more general observation that adolescence is generally a period of volatility in experiences and behaviors (Laursen & Collins, 2009; Soenens et al., 2019). These findings also raise the question whether fluctuations in need crafting are related to fluctuations in adolescents' mental health.

The results of a multi-level model revealed that associations of need crafting with both well-being and ill-being were not only significant at the between-person level, but also at the within-person level. This finding implies that, to the extent adolescents increase their use of need crafting compared to their usual level of need crafting, they experience elevated levels of well-being and lowered levels of ill-being compared to their usual level. Of course, need crafting needs to be energized itself and, presumably, adolescents go through periods where they engage in more or less attempts to craft their own need satisfaction. This is an interesting finding in its own right because it suggests that need crafting is susceptible to change. As such, it may have applied value as a workable target for intervention and prevention.

Importantly, need crafting was related to adolescents' mental health through its association with adolescents' need-based experiences. Evidence for the hypothesized mediational model was obtained at both the between-person and within-person level. Adolescents' need crafting was related to more well-being and less ill-being through the experience of need satisfaction and need frustration at both levels. Most likely, the associations between need crafting, need satisfaction, and well-being are reciprocal in nature. Whereas need crafting may contribute to more need satisfying experiences and corresponding mental health, adolescents who experience more need satisfaction and well-being probably have more energy available to engage in further need crafting behaviors. Also, their previous need satisfying experiences could inform them and, hence, increase their awareness about the degree to which activities and people are need-conducive. Presumably, there are constant feedback loops between adolescents' need-based experiences and their (reduced) efforts to gain more need satisfaction.

Two sets of additional findings are worth mentioning. First, even after controlling for the intervening role of adolescents' need-based experiences, need crafting continued to yield direct associations with both well-being and ill-being, suggesting that alternative mediational mechanisms may play a role. Alternatively, the remaining direct associations may also be indicative of a recursive path from adolescents' mental health to need crafting. As mentioned before, it is likely that adolescents who are generally more satisfied with their lives may have more energy available to engage in need crafting. Conversely, adolescents suffering from ill-being may not have the energy, courage, or confidence to engage in need crafting.

Second, the findings indicated little differentiation in the roles of need satisfaction and need frustration as indicators of mental health. Both need satisfaction and need frustration were related to both well-being and ill-being at the two levels of analysis (except for the pathway from need crafting to well-being through need frustration at within-person level). Yet, congruent to the dual-pathway model of the needs, the pathways to well-being (respectively ill-being) via need satisfaction (respectively need frustration) were somewhat stronger (Vansteenkiste & Ryan, 2013).

In a final set of analyses we examined whether the associations of need crafting would be robust and remain significant even when including perceived maternal need-supportive parenting as an additional predictor. Need crafting continued to be related to well-being and ill-being through adolescents' need-based experiences, even after controlling for perceived maternal need-supportive parenting. This finding suggests that need crafting is a unique source of need-based experiences, even after taking into account the need-fostering role of the environment.

Future research would do well to examine the interplay between need-supportive environments and need crafting in greater detail. Possibly, a need-supportive home environment fosters greater need crafting in adolescents. The capacity for need crafting presumably needs to be developed and strengthened throughout childhood, with autonomy-supportive parenting playing a particularly important role (Soenens et al., 2018). Congruent with the dual-component view on need crafting, parents may foster both or one of both components of need crafting through specific autonomy-supportive practices (Marbell-Pierre, Grolnick, Stewart, & Raftery-Helmer, 2019). To foster awareness, it may be particularly important for parents to shown an active and sincere interest in their child's perspective and, later on (during adolescence), to teach children to consult their personal values, interests, and preferences when making decisions. By *fostering such inner-directed valuing processes*, parents encourage adolescents to be aware and to explore broadly their own values and needs, so they can make authentic decisions instead of decisions oriented through social pressure (Assor, 2012; Assor et al., 2020). To foster adolescents' capacities for action-taking, it may be particularly important for parents to create room for initiative and to provide plenty of opportunity for independent decision-making. In addition, parents can engage in *intrinsic value demonstration* to encourage adolescents to choose valuable and need satisfying activities. By behaving themselves in ways that reflect their own values and by appearing satisfied and vital while engaging in the activity, their functioning serves as a template for their children how to act (Yu et al., 2015). In addition to the possibility that need-supportive environments contribute to need crafting, future research would do well to examine the interactive interplay between contextual need support and need crafting. One possibility is that need crafting acts as a buffer against the detrimental effects of need thwarting contexts. Legault et al. (2017) provided some preliminary evidence for this buffering hypothesis, showing that individuals experiencing low contextual autonomy support reported more self-asserted autonomy. Possibly, need crafting gains importance when people do not receive much need support from the environment.

5.3. Conceptual reflections and suggestions for future research

Although the present work provides an important initial step in conceptualizing and measuring the concept of need crafting, more research is needed to deepen this construct and to unravel its role in adolescent development.

A first conceptual suggestion for future research is to make a clearer distinction between individuals' tendency to approach need satisfying experiences and their tendency to avoid need frustrating experiences. Congruent with SDT's dual-pathway model distinguishing between need satisfaction and need frustration (Deci & Ryan, 2000; Rodríguez-Meirinhos et al., 2020), it seems likely that need crafting entails both an approach side (i.e. seeking need satisfaction) and an avoidance side (i.e. minimizing need frustration). As the presence of need frustration is more than an absence of need satisfaction (Vansteenkiste & Ryan, 2013), measuring the avoidance side of need crafting may lead to a more comprehensive assessment. Such a more encompassing measure of need crafting would include items reflecting awareness of both need satisfying and need frustrating activities and people as well as items reflecting the tendency to both approach activities that satisfy the needs and avoid activities that would thwart one's needs. Future research could investigate how both sides are interrelated and whether they have unique value in predicting diverse mental health outcomes.

A second conceptual suggestion for future research is to further explore the distinction between the awareness and action component of need crafting. Because the present research was the first study on need crafting, we deliberately chose to focus on need crafting as an overall construct. Yet, future research could investigate the unique role of both and, through person-centred analyses (e.g., cluster analysis or latent profile analysis), examine whether adolescents who are capable of combining both components report higher well-being compared to adolescents who score high on one component but not the other. Although preliminary results (see the Online Supplementary Materials) of the present study suggest that both components are associated independently with adolescents' need-based experiences and mental health, further research (using more targeted statistical approaches) is necessary to gain more insight in the interplay between both components as they relate to adolescents' mental health.

A third avenue for future research is to examine inter-individual differences in the importance of crafting of each of the three specific needs. Although from an SDT perspective all three needs are essential and individuals are naturally inclined to pursue satisfaction of each of the three needs (Deci & Ryan, 2000; Sheldon & Gunz, 2009), there could be some variability in people's efforts to prioritize the one above the other need during their need crafting efforts. These inter-individual differences may depend on factors such as personality, context, and age. For instance, adolescents scoring high on self-critical perfectionism may have reduced capacities for need crafting specifically in the domains of autonomy and competence whereas adolescents with a more dependent personality orientation experience relatively more difficulties crafting their need for relatedness (Luyten & Blatt, 2016). In terms of age-related differences, the need for autonomy may gain prominence in adolescence because identity development is a central developmental task in this age period (Kroger & Marcia, 2011). During middle childhood, when industry represents a key developmental task (Erikson, 1968), the crafting of the need for competence may become particularly salient. Although there may be inter-individual differences in the relative salience and importance of the three needs in individuals' crafting efforts, we assume that – ultimately - these efforts ideally target each of the three needs. An excessive and unbalanced focus on one of the needs, at the expense of the other needs (e.g., because of need sacrificing; Holding et al., 2020), is likely detrimental for adolescents' mental health (Emery et al., 2015; Sheldon & Niemiec, 2006).

A final conceptual question to be addressed in future research is whether need crafting is a response to unmet or even frustrated psychological needs. As highlighted by Sheldon and Gunz (2009), but also emphasized within SDT (Vansteenkiste et al., 2020), the basic psychological needs do not only provide experiential input for mental health, they also serve to instigate action to aimed at restoring need deficits. Need crafting can be considered as potential response to need deficits aimed at ameliorating one's need-based experiences. However, we would like to note two important nuances.

First, not all need deficits may elicit individuals' engagement in need crafting. People may particularly likely to engage in need crafting when they encounter relatively mild and short episodes of low need satisfaction or heightened need frustration. Such episodes can increase need valuation (Van Assche et al., 2018), such that people temporarily become more aware of the importance they attach to a need. Increased need valuation may then lead to an active search for need satisfying activities, contexts, and events (i.e., need crafting). However, when people face more severe need frustration, they are more likely to experience an increased need desire, meaning that they experience a sharp deficit and a strong craving for more need satisfaction (Van Assche et al., 2018). In contrast to need valuation, need desire may elicit compensatory attempts to restore happiness (Deci & Ryan, 2000). Instead of taking the time to become aware of one's needs in a particular situation and to find creative ways to attain more need satisfaction, people driven by need desire would seek a 'quick fix' to experience more happiness. They could for instance engage in self-medication (e.g. alcohol abuse) or resort to hedonic escapism (e.g., excessive gaming). Such compensatory behaviors may lead to short-lived increases in happiness but (in contrast to need crafting) do not contribute to enduring need satisfaction (Deci & Ryan, 2000). When people encounter more chronic need frustration, they may even come to devalue their psychological needs altogether. Then they no longer even attempt to increase their own happiness and they become passive, apathetic, and desensitized to new opportunities for need satisfaction (Ryan & Deci, 2017; Vanhalst et al., 2015; Vansteenkiste & Ryan, 2013).

Second, people do not only engage in need crafting when they experience a deficit in need satisfaction. SDT does not conceptualize psychological need satisfaction in terms of a homeostatic principle, where people would seek need satisfaction only when they are confronted with a deficit (Vansteenkiste et al., 2020). Instead, SDT views people as active organisms who constantly and proactively seek new opportunities for need satisfaction (Ryan & Deci, 2017). Even when they already experience high levels of need satisfaction, people would continue to engage in a proactive search for more need satisfaction. A history of need satisfaction is even likely to increase individuals' need valuation as well as their sensitivity to new satisfying events (Moller et al., 2010). As such, need crafting can become part of a positive spiral where need satisfying events from one's past elicit more current need crafting efforts, more new need satisfying events along with a greater susceptibility to the benefits of such events.

6. Limitations

This work is an initial step in conceptualizing and measuring adolescents' pro-active contribution to their own basic psychological needs. The findings are consistent with the notion that need crafting can promote need satisfaction and well-being. Instead of being rather passive recipients of contextual influences, adolescents can contribute pro-actively to their own basic psychological needs and mental health. Despite these promising findings, the present work has also several limitations. First, our findings were based on correlational designs, which precludes any causal claims. Even our longitudinal data were not ideal to examine the direction of effects in associations between need crafting, need satisfaction, and mental health because the intervals between the waves were relatively short and because participants were already in a given school context at the first wave. A more appropriate time to examine the direction of effects would have been if T1 was to occur at the beginning of the year, and especially if during T1 participants enter a new school, class, or social context. It is very likely that need crafting not only affects adolescents' need-based experiences, but that adolescents' need-based experiences also shape adolescents' need crafting efforts. Adolescents who feel more vital and satisfied may have more energy and mental space available to engage in need crafting. Thus, need satisfying experiences may strengthen adolescents' motivation to engage in more need crafting efforts and to obtain even more need satisfying experiences. More intensive longitudinal designs and experimental designs could shed further light on the proposed causal link between need crafting and adolescents' need-based experiences.[6]

Second, because adolescence is subject to fast changes and transitions in several domains (e.g. physiological development, social environments) (e.g. Crone & Dahl, 2012), we used relatively short time intervals (1-month and 2-months interval) in our longitudinal study. Yet, this choice precludes the possibility to investigate the benefits of adolescents' need crafting efforts in the longer term. Longitudinal studies using time intervals of at least 1 year could address this aim and furthermore, could be useful to identify developmental patterns of need crafting during adolescence.

Third, in this first phase of the conceptualization of need crafting, we used only quantitative data. In a next phase, it is important to examine what need crafting looks like in everyday life. Using qualitative data, we can expand our knowledge about how adolescents engage in need crafting in their daily life.

Fourth, although we examined whether need crafting would still be related to need-based experiences after taking into account the role of maternal need-supportive parenting, future research can control for additional contextual sources of influence, such as fathers, teachers, and peers. Furthermore, participants reported on perceived maternal need-supportive parenting only at the first wave, which allowed for an analysis of the role of parenting at the between-person level. A diary design including daily measurements of need crafting and need-supportive parenting could shed light on the complex interplay between parenting and need crafting. It is possible that on days parents use more need-supportive parenting, adolescents are encouraged to explore more their own needs and to engage more in need-satisfying activities. Alternatively, it is also possible that on days adolescents experience less need-supportive parenting, adolescents try to compensate for this lack by engaging more in need-satisfying activities.

7. Conclusion

Consistent with research demonstrating adolescents' increasing agency in life and with SDT's organismic assumptions about human nature, our findings suggest that adolescents can contribute proactively to their own need-based experiences and mental health. Adolescents who engage in need-crafting, thereby seeking opportunities for need satisfying activities, events, and relationships, appear to actually experience more need satisfaction and less need frustration, with these experiences, in turn, relating positively to mental health. Need crafting was found to be a dynamic construct characterized by substantial fluctuations over time. To the extent that future longitudinal and experimental research establishes a causal role of need crafting in adolescents' mental health, intervention-based studies could target this capacity in order to strengthen adolescents' resilience. A few experimental studies with (young) adults have yielded promising results (Sheldon et al., 2010; Weinstein et al., 2016), but no intervention research to date investigated whether need crafting can be trained among adolescents and whether doing so strengthens adolescents' potential for psychosocial growth.

Declaration of competing interest

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

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[6] We tested a set of Random Intercept Cross-Lagged Panel Models to investigate the direction of effects in the associations between need crafting and both adolescents' need-based experiences and mental health (see Online Supplemental Analyses).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.adolescence.2021.02.004.

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