Summary
Longitudinal Changes In State Attachment Insecurity As a Function of Interpersonal Experiences: An Examination in Terms of the Affect Regulation Model Based on Mentalization

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According to attachment theory (Bowlby, 1969/1982), mental representations consist of people's views of themselves (as worthy of love or not) and others (as likely to provide care and support or not). Once shaped in early childhood, IWMs are thought to remain relatively stable across time and situations as reflected in one's attachment style (e.g., Ainsworth et al., 1978; Shaver & Hazan, 1987). There has been an evolution in attachment theory, leading to a shift from Bowlby's formulation of working models to 'the level of representation' suggested by Main. Bowlby tended to see IWMs as internalizations of external reality in a direct and unmediated way whereas Main (1985) introduced the idea that they were representations of external reality, moving attachment theory closer to object relations. Thus, the reoperationalization of IWMs as mental representations allowed attachment theory to comprehend greater human complexity and subjectivity (Jurist, 2005; Fonagy & Campbell, 2015; Main et al., 1985). Developmental research, however, provides some challenges for attachment theory, pointing to limitations for traditional assumptions linking early life to later developmental outcomes (Fonagy & Campbell, 2015; Luyten et al., 2020). Accordingly, while some attachment theorists and researchers conceptualize attachment styles as relatively stable (trait-like) (Fraley, 2002; Fraley et al., 2011), others claim that people's attachment styles can change across time and context despite moderate stability (Davila et al., 1997; Davila & Sargent, 2003; Lewis, 1997). Thus, a couple of longitudinal studies have revealed some people's attachment style shifts from infancy to adolescence under unstable conditions such as changes in caregiving quality and maternal sensitive support as well as negative life events (Beijersbergen et al., 2012;

Waters et al., 2000).

When evaluating the change in attachment patterns, a useful way to address change is to conceptualize attachment in two ways: trait and state (Fraley et al., 2011; Gillath et al., 2009). In this view, the person has a stable attachment trait underlying short-term changes of attachment over time and context, meaning how secure or insecure one feels in a given context can fluctuate.

One of the main focuses of studies addressing change in attachment styles is what causes the change. Life stress model, in accordance with Bowlby's view (1973), proposes change is possible under some challenging environment conditions especially when those conditions are perceived as loss or gain in interpersonal relationships (Cobb & Davila, 2009; Davila & Cobb, 2003; Kirkpatrick & Hazan, 1994). Researchers suggested an alternative idea which is called the individual-difference model: some people might have some vulnerability factors (e.g. parental or personal psychopathology, personality pathology) which lead them to instability in attachment, as such individuals have developed unclear models of self and others (Davila et al., 1997). From this point of view, the (lack of) clarity in models of self and others can be considered as a part of mentalizing.

Mentalization refers to the capacity of the individual to understand and interpret one's own and others' mental states such as emotions, thoughts, intentions, and beliefs (Fonagy et al., 1990; Fonagy & Target, 1997; Fonagy et al., 2002). The development of this capacity is rooted in early caregiving environment and caregiver's function of affective mirroring, which enables the child to find a representation of his/her mind in the mind of the caregiver, to understand his/her mental states and to regulate himself/herself in affective arousal (Fonagy et

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al., 2002). Accordingly, affect regulation process in the early years constitutes a basis of mentalization, and subsequently mentalization produces a new kind of affect regulation (Jurist, 2010). Jurist (2005) developed a new model on emotion regulation by incorporating mentalization into the emotion regulation and called it the theory of mentalized affectivity.

Specifically, the concept of mentalized affectivity consists of three dimensions: identifying, processing and expressing (Jurist, 2005). Identifying goes beyond naming or distinguishing affects with its part of understanding the meanings of these affects in one's history (Greenberg et al., 2017) Secondly, processing refers to making some changes in intensity or duration of emotions. Lastly, expressing refers to expressing affective states outwardly or inwardly (Jurist, 2005). According to Jurist (2005), mentalized affectivity enables one to create new meaning by reflecting on one's affective experience in the most challenging cases. In this regard, mentalized affectivity may have a crucial role in changes of state attachment insecurity through interpersonal life experiences in which it creates new meanings.

Although earlier formulations focused on the role of dyadic attachment in development of mentalizing, recent views of mentalizing have moved to a broader social-evolutionary communicative model (Luyten et al., 2020). From this point, if attachment figure is conceptualized as a source of information in early life and if a specific attachment style is taken as communicative strategy which is promoted by early environment, it is not surprising to expect that environmental factors may affect functioning of attachment system in contrast to earlier formulations of attachment (Luyten et al., 2020). In parallel with this, we aimed to explore whether the changes in the state attachment insecurity in response to interpersonal experiences would be predicted by mentalization and mentalized affectivity.

To our knowledge, the role of mentalizing in changes in attachment insecurity over time has not been investigated yet although empirically supported that improvement in mentalization is a key mechanism of change in therapeutic processes (Bateman & Fonagy, 2004; Levy et al., 2006). In the current study, we focused on three questions on change in state attachment insecurity: (1) does people's state attachment insecurity vary over time ? (2) do positive and negative interpersonal experiences predict the change over time? (3) do mentalization and mentalized affectivity predict the effects of interpersonal experiences on change in state attachment insecurity?

Method

Participants and Procedure

Participants were recruited from the City College of New York via university flyers and participant pool (SONA system). The sample of the first part of longitudinal study consisted of 148 undergraduates. Although 148 college students initially consented to participate and provided data of the first week, 57 of them completed all parts of the study across five weeks.

Seventy eight percent of the sample was female, averaged 20.16 (SD = 1.79) years of age. Ethnicities of participants were diverse (15% African American, 38% Hispanic, 22% Asian American, 10% Mexican American, 15% indicated other). Participants reported their family income as ranged from low to medium-high (41% low, 45% medium, 14% medium-high). Sixty two percent described themselves as single while the others reported to have a romantic relationship in different styles (29% dating, 4% long distance romantic relationship, 4% engaged or married). Their romantic relationship length averaged 11 months (SD = 30.63). Ninety-six percent reported not to have received a psychiatric diagnosis or treatment in the previous six months. In addition, 3 participants stated someone in their family or one of their relatives passed away due to COVID-19 while 5 participants reported someone in their family, one of their relatives or friends to be tested positive for COVID-19.

After participants were recruited through the SONA system for the initial assessment, they were mailed for 4 weeks, each spaced 1-week apart, to complete subsequent assessments. They were also asked to specify a nickname in the initial session so that we could match their all responses across weeks. The initial session took approximately 40 minutes to complete while subsequent sessions took approximately 10 minutes. Participants who took part in the study have been granted 2 SONA credits. Those who provided fully on-time data qualified for the lottery in which they would get a chance to win a $100 Amazon gift card at the end of the study.

Measures

Attachment insecurity. To measure state attachment insecurity, the SAAM was used, which is a self reported measure developed by Gillath et al. (2009). The SAAM includes three subscales: secure, avoidance and anxiety. The internal consistency coefficients for the avoidance, anxiety and secure were 0.83, 0.84 and 0.87 respectively. The test-retest reliability coefficients of the subscales ranged from 0.51 to 0.59. Participants were instructed to think about how they feel "in the moment" about their close relationship in SAAM. Thus, SAAM allowed us to evaluate overall attachment security covering all relationships.

Interpersonal life experiences. Participants were given a list consisting positive (e.g. "being appreciated", "receiving a gift") and negative (e.g. "being separated", "getting into an argument") interpersonal experiences and asked to indicate how often they have experienced each event in the previous week. The list was created by selecting items specific to the relationship of the lists used in the previous studies (e.g. Davila & Sargent, 2003; Zang, 2009). Considering the context of the COVID-19 pandemic, participants were also asked an open-ended question to indicate if they have experienced any other major life event not included in the list.

Evaluation of interpersonal life experiences. After the interpersonal life experiences checklist, participants were instructed to rate interpersonal loss and gain perceptions related to negative and positive events. The items of loss perceptions were created from Davila and Sargent's (2003) study while the items of gain perceptions were adapted from loss perception items. Participants rated items on a 7-point scale.

Mentalization. It was assessed with the 8-item RFQ-8. It is a short form of self reported measure developed by Fonagy et al. (2016). RFQ-8 consists of two subscales scored the same items differently: certainty about mental states and uncertainty about mental states. The internal consistency for the scale ranged between 0.77 and 0.65 in the clinical sample and between 0.67 and 0.63 in the non-clinical sample. Test-retest reliability was 0.84 for the uncertainty about mental states and 0.75 for the certainty about mental states.

Emotion regulation. Emotion regulation was assessed with the 60 items MAS. It is a self reported measure developed by Greenberg et al. (2017) based on theory of mentalized affectivity that combines mentalization and emotion regulation (Jurist, 2005). The MAS includes three subscales: identifying, processing and expressing. The items in MAS are rated on a 7-point Likert scale. The internal consistency coefficients for the identifying, processing and expressing were 0.93, 0.90 and 0.88 respectively.

Data Analysis Strategy

Multilevel modeling (hierarchical linear modeling, HLM) was used to examine within-subject associations, specifically to analyze the trajectory of change in state attachment security over time. HLM allows to model longitudinal data collected on same subjects over multiple time points by examining data in a single model described at two levels: within-subject and between-subject (Raudenbush & Bryk, 2002). Within-subject differences are described in the level-1 model while between-subject differences are described in the level-2. In accordance

with the hypotheses of the study, three models were created and tested. Model 1 examined the within subject trajectories of state attachment insecurity (anxiety and avoidance) over time. Model 2 examined whether subjects' attachment trajectories changed as a function of weekly interpersonal experiences. Model 3 examined whether subjects' attachment trajectories changed as a function of weekly interpersonal experiences by taking into account the effects of trait-like variables (mentalized affectivity and mentalization). In Model 2, co-varying relationships between weekly state attachment security and weekly interpersonal experiences were examined at level 1. In model 3, whether individual differences in trait-like characteristics (mentalized affectivity and mentalization) would predict within-subject trajectory were tested at level 2. In Level 1, Y_{it} represents an outcome score (state attachment security) for individual i at time t, π_{0i} is the intercept of the trajectory for individual i at time 0 (the initial score of state attachment security), π_{1i} is the slope of the trajectory for individual i (the rate of change in state attachment over time) and ε_{it} is the error term for individual i. In level 2, π_{0i} and π_{1i} are calculated and β_{01}, β_{11} are coefficients of Z variables (mentalized affectivity, mentalization).

Results

Analysis 1 (Model 1): State attachment anxiety and avoidance change over time. To examine the trajectory of attachment fluctuation over 5 weeks at the within-person level, HLM (Raudenbush & Bryk, 2002) was conducted. The results showed that the time variables (time, time squared, and time cubed, respectively) for avoidance and anxiety were not significant (for avoidance $\beta10 = 0.45$, $t(56) = 1.44$, $p = 0.16$; $\beta20 = 0.35$, $t(56) = 1.63$, $p = 0.11$; $\beta30 = -0.21$, $t(56) = -1.29$, $p = 0.21$; for anxiety $\beta10 = -0.12$, $t(56) = -0.28$, $p = 0.78$; $\beta20 = 0.16$, $t(56) = 0.70$, $p = 0.49$; $\beta30 = -0.29$, $t(56) = -0.36$, $p = 0.18$). The fact that the square and cube of time variables were not significant indicates a linear change in attachment anxiety and avoidance.

Analysis 2 (Model 2): Change in state attachment insecurity in response to interpersonal experiences and perceptions of interpersonal loss and gain

HLM results showed weekly frequency of negative interpersonal experiences and perception of interpersonal loss significantly predicted weekly levels of attachment anxiety over five weeks at Level-1. Accordingly, the increase in the frequency of negative interpersonal experiences and in loss perception over the five weeks predicted the increase in attachment anxiety. As for avoidance, the weekly frequency of positive inter-

personal experiences and perception of interpersonal loss significantly predicted weekly levels of attachment avoidance at Level-1. Accordingly, the increase in the frequency of positive interpersonal experiences predicted decrease in avoidance and increase in loss perception predicted the increase in attachment avoidance.

Analysis 3 (Model 3): The role of mentalized affect and mentalization in the change of state attachment insecurity in response to interpersonal experiences and perceptions of interpersonal loss and gain

When mentalized affect and mentalization dimensions are included in the model at level 2, certainty predicted the effects of negative experiences and loss perception on change in attachment anxiety over time. As for avoidance, certainty predicted the effect of loss perceptions on change in attachment avoidance for five weeks. Also, expressing predicted the effect of gain perception on change in attachment avoidance, suggesting that the participants with higher levels of expressing showed a decrease in attachment avoidance in response to interpersonal gain perception.

Discussion

We focused on three issues related to change in state attachment insecurity over time. The first focused on the trajectory of state attachment insecurity over time. The second was related to whether interpersonal experiences and perception of the interpersonal experiences would predict change in state attachment insecurity over time. The third was on determining the predictor role of mentalized affectivity and mentalization for the relationship between weekly interpersonal experiences and weekly attachment insecurity over time.

Firstly, we found that the levels of avoidance and anxiety showed a linear change over five weeks. In the literature, the studies revealed mixed findings about linear change in attachment security over time (Davila & Sargent, 2003; Zhang, 2009). These mixed findings may be related to context and duration in which the studies were conducted. For instance, Davila and Sargent (2003) pointed out that unexpected linear change of security in a positive direction might reflect a general increase in positivity towards the end of the semester. In the current study, we collected data during the first phase of COVID-19 pandemic. Also, some of participants experienced actual losses or traumas (loss or being infected of loved ones) due to COVID-19. Research showed that general public had lower well being, higher levels of anxiety and depression compared to before the pandemic, while COVID-19 patients revealed high levels of post-traumatic stress and depressive symptoms (Vin-

degaard & Benros, 2020). From an attachment theory framework, the attachment system can be activated not only by separation from an attachment figure, but also by threatful situations such as illness and hunger (Bowbly, 1969).

Unlike previous studies, we assessed change in state attachment security with the SAAM, designed to capture temporary changes in attachment security instead of the Experiences in Close Relationships (the ECR), designed to ask about one's sense of identity rather than one's feelings at a given time. However, the differences in the structure of the SAAM and the ECR may lead to different constructs of attachment security. Some questions motivate inquiry on implications of change of working models: do people integrate their fluctuations in state attachment into their working models over time? These require examining longitudinal relations between the state and trait attachment trajectories.

The predictors of the trajectory of state attachment over time

Similar to previous results (Davila & Sargent, 2003; Zhang, 2009), the present study found the co-varying relationship between attachment insecurity and interpersonal experiences, and attachment insecurity and the meanings to experiences (i.e. loss or gain). Also, the impacts of interpersonal experiences and meanings of these experiences on change differed depending on the levels of mentalized affectivity and mentalization. These findings supported the individual-difference model (Davila & Cobb, 2003).

Specifically, our results suggested state attachment anxiety changes in response to negative interpersonal experiences and loss perception regarding these negative experiences, whereas state attachment avoidance changes in response to positive interpersonal experiences and loss perception. One explanation of this finding may lie in attachment-related strategies model (Mikulincer et al., 2003; Shaver & Mikulincer, 2002). According to this, anxiously attached individuals tend to use hyperactivating strategies, which are characterized by monitoring of threats in social world and signs of attachment-figure unavailability and rejection. Thus, the greater number of negative interpersonal experiences may intensify the use of these strategies. These results suggest that people's level of attachment anxiety is more susceptible to negative interpersonal experiences at any given time compared to attachment avoidance.

Regarding attachment avoidance, avoidantly attached individuals, in contrast, tend to use deactivating strategies, which are characterized by maximization of cognitive, emotional and physical distance from others and inhibition of relationship-related thoughts (Mi-

kulincer et al., 2003; Shaver & Mikulincer, 2002). Individuals' attachment avoidance scores change less with negative interpersonal experiences; thus, it appears to be less susceptible to the effects of negative interpersonal experiences, consistent with previous findings (Zhang, 2009). However, current results suggested that attachment avoidance level was affected by the frequency of positive interpersonal experiences. This finding indicated that positive interpersonal experiences might be a protective factor in reducing attachment avoidance. In addition, the findings showed that weekly attachment avoidance was affected by the individual's subjective perceptions of loss associated with negative events. Although the frequency of weekly negative interpersonal experiences did not predict weekly attachment avoidance, the perception of loss that the person attributes to those events might inhibit the suppression strategies used by avoidant people.

The role of mentalization and mentalized affect in change in attachment insecurity in response to weekly interpersonal experiences

In terms of the dimensions of mentalized affectivity and mentalization, we found that change in state attachment anxiety in response to negative interpersonal experiences and loss perception was associated with certainty.

High scores on certainty dimension of the RFQ reflect hypermentalizing, namely excessive certainty about mental states. Rather, a genuine mentalizing stance is characterized by some certainty about mental states of self and others, with the awareness that mental states are ultimately opaque (Fonagy et al., 2016). Therefore, some agreement on subscale of certainty reflects adaptive levels of certainty (Fonagy et al., 2016). When the means and standard deviations of the sample in the study are examined, the scores of participants with higher certainty was found to indicate some degree of certainty. In this respect, the findings showed that the mentalization could play a buffering role in the change of attachment anxiety in response to negative interpersonal experiences over time.

As for attachment avoidance, certainty also predicted the change in attachment avoidance related to the perception of positive interpersonal gain. In this context, it is thought that the mentalization not only plays a buffering role against the increase in attachment anxiety due to negative interpersonal experiences, but may also play a functional role in the decrease in avoidance in response to positive interpersonal gain. Accordingly, having greater certainty about one's own and others' mental states, such as how comfortable one will feel about being close or how much one can trust others, may be reducing

avoidant attachment patterns by perceiving a gain from positive experiences.

Finally, individuals with higher levels of expressing showed a decrease in their attachment avoidance scores over five weeks as their perceived loss from negative interpersonal experiences increased. According to the findings, the perception of loss due to weekly negative interpersonal experiences increased in individuals' attachment avoidance over time; however, if expressing emotions is high, it causes a decrease over time. Accordingly, although individuals with avoidant attachment tend to use defensive strategies that prevent the processing of psychological distress, mentalized affectivity and mentalization can lead individuals to identify and mentalize the meanings of positive experiences in relationships and to express their perceptions of loss in negative experiences, leading to a shift towards secure attachment.

In conclusion, in this study, it was found that the relationship between weekly interpersonal experiences and the change in weekly attachment may differ according to mentalized affectivity and mentalization levels. This research indicated that mentalization and the ability to regulate emotions based on mentalization can provide a change towards secure attachment over time by allowing adaptive responses to challenging or positive conditions. In other words, the components of mentalized affectivity and mentalizing may open up the channel for encoding of knowledge from both negative and positive experiences. Emotion regulation model based on mentalizing enhances attachment security through mentalizing information from positive and negative experiences in the relationships.

Limitations and future directions

There are some limitations that are crucial when interpreting the results. Given that the study focused on state attachment security, it is difficult to determine whether change in state levels security would be related to long term change in working models of attachment. Relatedly, the current study observed the participants only for five weeks which is a limited number to draw conclusions of long-term change in attachment. Future research needs to be directed in exploring how variation in state levels of attachment security can be integrated with trait-like working models and designed enough to provide more detail about the association between state and trait attachment.

Building on previous research regarding the association between life experiences and the trajectories of attachment security over time (Davila & Sargent, 2003; Simpson & Rholes, 2004; Zhang, 2009), we suggested that the pattern of the asssociation between them would

be explained by specific cognitive and emotional mechanisms, namely mentalized affectivity and mentalization. Our findings show that the source of attachment change does not directly have to be life experiences or significance of them; people's cognitive and emotional construals that affect the meanings they assign to life experiences, are also important predictors of their trajectory of attachment security. The current study supports the assumption that the mentalized affectivity and mentalization may promote change towards security over time, enabling people to review the meanings and regulate emotions induced by events they experience in relationships. To this end, the present research provides contributions for psychological interventions, suggesting that mentalization and mentalized affectivity should be taken into consideration to enhance attachment security.