

University of Groningen

On the nature and origin of self-esteem

de Ruiter, Naomi Michelle Praise

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

2015

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

de Ruiter, N. M. P. (2015). *On the nature and origin of self-esteem: A complex dynamic systems perspective of nested self-esteem phenomena*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

CHAPTER 6
Conclusion and Discussion

In this final chapter I aim to summarize the theoretical formulations and empirical findings of this thesis, and to review and integrate the implications that they have. I begin by providing an overview of the context that gave rise to the questions posed in this thesis, and the global aim of the thesis (6.1). Next, I summarize the findings from Chapter 2, 3, 4, and 5 separately (6.2). This is followed by an integration of the chapters, where I focus on the theoretical and methodological developments that emerged from the thesis as a whole (6.3). Afterwards, I discuss the implications that the theoretical formulations and empirical findings have for future self-esteem research (6.4). Finally, I address the limitations of the thesis (6.5) and I provide some concluding remarks (6.6).

6.1 Research Motivation and Context

Self-esteem is one of the most investigated topics in personality and social psychology, with most studies focusing on self-esteem as a predictor variable, an outcome variable, or a mediating variable (Brown & Marshall, 2001). However, “compared to the tidal wave of empirical studies, the analytic concept of self-esteem is relatively undeveloped” (Scheff & Fearon, 2004, p. 79). Indeed, since the development of self-esteem questionnaires such as the Rosenberg Self-Esteem Scale (Rosenberg, 1979), the empirical and theoretical approach to self-esteem has remained quite stable.

Self-esteem has long been seen as the favorable or unfavorable view that people have of themselves, with deviations from this view occurring in our daily lives in response to experiences that we have (Kernis, Cornell, Sun, Berry, & Harlow, 1993). As a “view”, self-esteem is commonly seen as a cognitive construct, which is connected to motivational (Kernis, 2003) and affective (Brown, 1998) processes. The emphasis in empirical research thus continues to be the *cognitive* nature of self-esteem, which is reflected in questionnaire items such as “I take a positive attitude toward myself” (Rosenberg, 1979).

The aim of this thesis was to focus on the foundation of self-esteem, and to dig deeper than the positivity or negativity of the cognitive view that people have of themselves, both in general and in response to daily experiences. I wanted to know what the nature and origin are of what lies *beneath* the view that individuals can have of themselves. I therefore aimed to unveil the underlying processes that give rise to, and that characterize, the experience of self-esteem – both as a momentary experience (i.e. *state self-esteem*) and as a recurring and continuous experience (i.e. *trait self-esteem*).

For this aim, I utilized complex dynamic systems principles in order to develop a theoretical model that describes the nature and origin of the patterns that underlie the state and trait experience of self-esteem. A complex dynamic systems perspective is one that examines how simple elements interact across time, and how this interaction creates a higher-order emergent property that cannot be characterized by the characteristics of the elements alone (Thelen & Smith, 1994). From this perspective, I reasoned that self-esteem can be seen as an emergent property that is created across time by the interactions between self-experiential elements that occur in the present moment, such as emotions regarding the self or autonomous behavior. I argued that trait self-esteem is an emergent property that is self-maintaining across time, and that state self-esteem is a fleeting emergent property, where the two develop across different time scales. My primary aim was to develop a model that outlines and elaborates on the abovementioned notions. My secondary aim was to test pivotal cruxes of the theoretical model, in order to provide a proof of existence of the underlying nature of self-esteem as proposed in this thesis.

In order to empirically examine the underlying nature of self-esteem, it was necessary to focus on the phenomenology of self-esteem as individuals experience it in the here-and-now. This involved two methodological adaptations to the study of self-esteem. Firstly, from the perspective that self-esteem is an *emergent* property – where emergence occurs across time, the role of *time* must be considered. It was therefore necessary to capture the

dynamic nature of self-esteem. Moreover, both state self-esteem and trait self-esteem (irrespective of the time scale across which they develop) are experienced in the present moment. As I was interested in the nature of the experience of self-esteem, the time span across which self-esteem needed to be considered was across seconds and minutes, i.e. real-time.

Secondly, it was necessary to adopt a more holistic empirical approach to self-esteem than has traditionally been done. Traditional self-esteem research focuses predominantly on the cognitive characteristic of self-esteem, stemming from the goal of studying the 'view' that individuals have of themselves. In order to study what underlies individuals' views of themselves, it was necessary to focus on the emotional-behavioral characteristics of self-esteem that have been theorized as important, yet not empirically considered (Brown & Marshall, 2001; Scheff & Fearon, 2004).

The present thesis incorporated these two methodological adaptations by focusing on moment-to-moment emotional-behavioral self-experiences that could be observed during dyadic interaction. Dyadic interaction was chosen as the context because it allows for the organic elicitation of emotional-behavioral self-experiences (Gable et al., 2012; Koerner & Fitzpatrick, 2006), and because such interaction plays a vital role in the way that self-esteem emerges into a structured state (Fogel, 1993; Tangney & Fischer, 1995).

Adolescence was chosen as the developmental context for studying the phenomenology of self-esteem, given that it is a period in which self-esteem has traditionally been found to demonstrate relatively high variability and developmental change (Robins & Trzesniewski, 2005; Trzesniewski et al., 2003). As a result, the parent-child relationship was chosen for the dyadic context, given that parents play an important role in adolescents' self-esteem (Bulanda & Majumdar, 2008). The empirical studies in this thesis are based on observational data gained by means of video-recordings of the parent-child dyads, which were subsequently coded in a time-serial manner, using the coding scheme in the Appendix of this thesis.

6.2 Summary of Findings

In **Chapter 2**, the Self-Organizing Self-Esteem (SOSE) model is presented. The model suggests that self-esteem is a self-organizing phenomenon that exists on various levels of complexity, resulting from development across various time scales. The model discriminates between three levels of self-esteem: the macro level, the meso level, and the micro level. We suggested that trait self-esteem (traditionally seen as the stable view of the self) is the macro-level construct of self-esteem, while state self-esteem (commonly seen as the context dependent and fluctuating view of the self) is the meso-level construct of self-esteem.

Based on complex dynamic systems principles, we suggested that both state self-esteem and trait self-esteem depend on processes of self-organization, such that they are both higher-order emergent constructs of self-esteem, separate from (yet intertwined with) each other. We suggested that state self-esteem, at any given moment, self-organizes out of a real-time network of self-related experiences on the micro level, and that trait self-esteem

self-organizes out of the iterative development of state self-esteem at the macro level. We described how both of these processes occur due to self-amplifying feedback loops. We also suggested, however, that the meso-level and macro-level of self-esteem are highly interconnected, where their relationship is bi-directional and continuous.

The model suggests that the macro level of self-esteem can be conceptualized as a landscape of attractor states, which were referred to as *trait self-esteem attractor states*. We posited that each trait self-esteem attractor state results in a unique constraint on future state self-esteem iterations by means of self-reinforcing feedback loops. Each trait self-esteem attractor provides a potential direction for state self-esteem development, such that state self-esteem is pulled toward the various potential directions of self-experience in real time.

Because state self-esteem is repeatedly drawn toward a small number of trait self-esteem attractor states, the individual experiences a continuity of self-esteem across time, and more specifically, the continuity of various qualities of self-esteem. From this perspective, trait self-esteem attractor states make trait self-esteem self-maintaining. This self-maintenance of trait self-esteem is experienced through the bi-directional relationship that trait self-esteem attractor states have with state self-esteem variability. As long as an individual's self-esteem system includes strong trait self-esteem attractor states, the individual will experience continuity of self-esteem. However, just as trait self-esteem attractor states have a propensity to change across the long term, so too does the quality of trait self-esteem that is self-maintained.

In this chapter, we described how the SOSE model corresponds with an *emergent-causality approach* (Coan, 2010; Schmittmann et al., 2011). From this perspective causality is primarily bottom-up, where concrete experiences interact with each other to form a coherent network, which then gives way to the emergence of a higher-order psychological construct. This relates to the SOSE model, where concrete emotional-behavioral self-experiences interact to form a network that emerges into state self-esteem, and where state self-esteem develops iteratively to form patterns that emerge as trait self-esteem. We described that this approach is not usually adopted in psychological research. Instead, a *generative-causality approach* is most commonly adopted, albeit implicitly. In this approach, the phenomenon being studied is approached as a latent trait that resides within the individual and is not directly observable. The latent trait is assumed to generate concrete experiences and actions in a unidirectional and top-down manner (Borsboom et al., 2003; Coan, 2010).

The generative-causality approach can be observed in mainstream self-esteem research, where trait self-esteem is most commonly seen as a latent variable that generates experiences of the self, in combination with the current context. State self-esteem is indeed commonly approached as a reflection of a latent trait self-esteem variable, plus contextual error. This conceptualization is demonstrated in the common 'baseline' and 'barometer' approach to self-esteem (Rosenberg, 1979), where trait self-esteem is seen as a stable baseline level, around which state self-esteem fluctuates in response to the environment. This conceptualization is also demonstrated in the common empirical approach to state self-

esteem, where repeated measures of state self-esteem are primarily used in order to say something about the central tendencies of trait self-esteem (i.e., mean and standard deviation; Kernis, 1993).

We showed how, aside from studying central tendencies of trait self-esteem, research that adopts a generative-causality approach focuses on factors that cause between-individual differences and long-term development of trait self-esteem. We argued that, due to the generative-causality approach adopted, traditional research is inherently less equipped to study the *intrinsic dynamics* of self-esteem, at both the trait self-esteem level and the state self-esteem level. Intrinsic dynamics are internally generated patterns of change (Vallacher, Van Geert, & Nowak, 2015). We suggested that, in order to study the dynamics of self-esteem that are intrinsically generated, an emergent-causality approach is necessary. The SOSE model is the first explicit application of an emergent-causality approach to self-esteem, where complex dynamic systems principles made it possible to expand on this model and incorporate a conceptualization of the temporal nature of self-esteem.

In **Chapter 3**, the first crux of the SOSE model is tested. The temporal structure of state self-esteem was investigated as it occurs from moment to moment in the context of dyadic interaction. This was done in order to investigate whether state self-esteem demonstrates characteristics in accordance with the ‘baseline’ and ‘barometer’ theory of self-esteem, as is traditionally assumed. We described how, from this traditional perspective, state self-esteem would be expected to fluctuate in response to the environment. Therefore, each state self-experience would be expected to be *intrinsically* independent from the previous, with any causal dependence stemming from an extrinsic dependence between environmental events. The intrinsic variability would thus resemble random temporal variability, according to the traditional perspective. Alternatively, we expected – in accordance with the SOSE model – that state self-esteem would develop iteratively, giving way to structured (rather than random) variability that stems from the intrinsic dynamics of state self-esteem.

State self-esteem time series were created for 13 adolescents, based on their emotional and behavioral self-directed expressions during parent-child interactions. State self-esteem was operationalized as the average valence of the various self-experiences that occurred at each second, where this valence changed from moment-to-moment based on the moment-to-moment changes in the concurrent self-experiences expressed. Each state self-esteem time series was studied using detrended fluctuation analysis (DFA), which analyzes the fluctuation of dynamics across time and quantifies the degree of randomness in the time series. We found that all of the time series demonstrated a form of structured variability called *pink noise*. This kind of variability indicates that there are long-range correlations in the time series, such that there is historicity (or ‘memory’).

The presence of long-range memory indicates that state self-esteem fluctuations are a function of intrinsic dynamics, rather than simply responses to the immediate environment. Furthermore, we found that the temporal variability demonstrated in the state self-esteem time series was significantly less random than surrogate random time series. Finally,

we also showed that the structure of variability was related to adolescents' self-report autonomy levels, albeit insignificantly, indicating that this kind of structured variability is likely related to advantageous developmental factors. Aside from validating an important premise of our SOSE model – regarding the iterative nature of state self-esteem – this study is the first to examine the temporal *structure* (rather than magnitude) of state self-esteem from moment-to-moment as a contextualized process.

In **Chapter 4**, the moment-to-moment trait-state relationship proposed in the SOSE model is empirically tested. In doing so, we investigated the real-time phenomenology of trait self-esteem, which the SOSE model suggest is the real-time constraint that trait self-esteem attractors have on state self-esteem variability, resulting in continuity of trait self-esteem properties across the time span of one interaction (i.e., the self-maintained characteristic of trait self-esteem).

Based on the SOSE model, we expected that trait self-esteem attractors would result in multiple real-time constraints on state self-esteem, such that the real-time expression of each trait self-esteem attractor would correspond with the simultaneous restriction of state self-esteem variability within a limited valence range. We argued that the level of constraint is indicative of the strength of the trait self-esteem attractors, where more constraint indicates higher strength. In order to test whether this argument is valid, we tested whether the stronger trait self-esteem attractors demonstrated a key characteristic of strong attractors, compared to the weaker trait self-esteem attractors. The key characteristic that we tested was the moment-to-moment influence that the immediate context (i.e., external events) had on state self-esteem variability. From a complex dynamic systems perspective, this external influence can result in *perturbations*, being any influence that results in a change in the systems behavior. From a complex dynamic systems perspective, perturbations from external influences have less effect on strong attractor states (due to self-reinforcing feedback loops) compared to weak attractor states. Therefore, we expected that adolescents with relatively strong trait self-esteem attractors should also demonstrate relatively smaller effects of perturbations on their state self-esteem variability.

In this study, the micro-level of self-esteem was operationalized as the valence of the adolescents' moment-to-moment self-experiences (as in Chapter 3), and the meso-level of self-esteem (i.e. state self-esteem) was operationalized as the average valence of the various self-experiences that occurred at each second (as in Chapter 3). Additionally, the macro-level of self-esteem (i.e. trait self-esteem) was operationalized as the self-organization of temporal structure, captured with Kohonen's Self-organizing Maps (SOM). This technique revealed the emergence of each individual's two strongest trait self-esteem attractors, characterized as a distinct recurring network of self-experiences. The SOM maintains the temporal structure of these networks, thereby revealing the moment-to-moment transitions that occurred between them across the entire dyadic interaction. Using the SOM, we thus obtained entirely new higher-order time series for each individual, consisting only of the transitions between trait self-esteem attractor states.

We operationalized the *strength* of the adolescents' trait self-esteem attractors as the level of constraint from trait self-esteem attractor states on state self-esteem variability. This was done using State Space Grid (SSG) analyses. This technique allowed us to track variability at the macro level (transitions from one trait self-esteem attractor to another) and the simultaneous variability at the meso level (changes in state self-esteem valence) for each individual separately based on the two separate time series. Next, we operationalized *external perturbations* as significant moment-to-moment changes in the parental emotional-behavioral interaction style during the interaction. The *effect* of these perturbations on the adolescents' state self-esteem was operationalized as the level of influence that these changes had on the adolescents' moment-to-moment state self-esteem variability. Changes in these parental emotional-behavioral interaction styles were captured using the SOM, and the level of correspondence with adolescent state self-esteem variability was measured using SSGs.

We tested whether stronger adolescent trait self-esteem attractors corresponded with smaller effects of perturbations due to changes in the parents' interaction styles. Based on a Monte Carlo analysis of individual differences, we showed that adolescents who had relatively stronger trait self-esteem attractor states (where individuals were differentiated based on a median split), were also those that were less perturbed by their parent, and vice versa for individuals with relatively weaker trait self-esteem attractor states. These results validated our SOSE-model conceptualization of trait self-esteem as consisting of attractor states, as well as our proposition that these attractor states are experienced through the real-time constraint that they have on state self-esteem variability.

In **Chapter 5**, we applied the conceptual ideas stemming from the SOSE model regarding the nature of self-esteem to the traditional distinction between implicit and explicit self-esteem. The concept of self-esteem has traditionally been seen as a reflective construct, i.e., explicit self-esteem, where the idea that self-esteem may also be implicit was introduced relatively recently (Greenwald & Banaji, 1995). The introduction of implicit self-esteem into self-esteem literature, however, has been mostly atheoretical, where implicit self-esteem research "largely has been a methodological, empirically driven enterprise" (Fazio & Olson, 2003, p.301). In this chapter, we aimed to develop a theoretical conceptualization of the distinction between implicit and explicit self-esteem based on our SOSE model. As the SOSE model distinguishes between trait self-esteem processes and state self-esteem processes, the chapter therefore integrated this trait-state distinction with the classic implicit-explicit distinction.

Based on the SOSE-model propositions, we suggested that a qualitative distinction between implicit and explicit self-esteem is different at the trait level and the state level. At the state level, state self-esteem emerges as implicit if the lower-order network consists of emotional-behavioral self-experiences, while explicit state self-esteem emerges if this network includes self-directed cognitions. We reasoned that such self-directed cognitions makes state self-esteem explicit due to the shift in attention that they cause, where con-

scious attention is directed at the emotional-behavioral self-experiences, making the individual reflect upon them.

As the SOSE model suggests that state self-esteem develops iteratively from moment-to-moment, we suggested that each new iteration has the potential to be explicit or implicit, depending on the lower-order network at each moment. Therefore, implicit and explicit self-esteem form one state self-esteem process, which changes in its quality (i.e. implicit or explicit) from moment-to-moment depending on the presence or absence of self-directed cognitions. In this way, our perspective of implicit and explicit *state* self-esteem is similar to the commonly held theoretical perspective that the two are part of one construct (Gawronski & Bodenhausen, 2007; Olson & Fazio, 2009), although our perspective expands on the temporal nature of this construct, and explicitly refers to *state* self-esteem.

Next, we suggested that – based on the SOSE model of trait self-esteem – implicit and explicit *trait* self-esteem can be conceptualized as separate trait self-esteem attractors. *Implicit* trait self-esteem attractors are the result of long-term iterative development of *implicit* state self-esteem, while *explicit* trait self-esteem attractors emerge out of the long-term iterative development of *explicit* state self-esteem. Moreover, just as individuals can potentially develop distinct trait self-esteem attractors that correspond to a distinct valence range (see Chapter 2), individuals may also develop multiple implicit and multiple explicit trait self-esteem attractors. In this way, our perspective of implicit and explicit *trait* self-esteem resembles the commonly held theoretical perspective that the two are separate constructs (Bosson, Swann, & Penebaker, 2000; Greenwald & Banaji, 1995; Strack & Deutsch, 2004), although our perspective is that these constructs emerge across time out of lower-order input and remain dynamic by nature.

In social cognition literature, it remains heavily debated whether implicit and explicit cognitions (including self-esteem) are *one* versus *separate* constructs (for reviews, see Evans, 2008; Frankish, 2010). Because our SOSE model integrates trait and state self-esteem processes, we argued that the conceptualization suggested in this chapter can integrate the two perspectives of the implicit-explicit relationship (as one versus separate constructs). We showed that implicit and explicit *trait* self-esteem can be conceptualized as separate constructs, while implicit and explicit *state* self-esteem can be conceptualized as part of one process. Moreover, because the SOSE model integrates state and trait dynamics, it can also integrate the two opposing perspectives held in social cognition literature.

Specifically, the separate trait self-esteem attractors all have their own constraint on state self-esteem, such that an implicit trait self-esteem attractor increases the likelihood that state self-esteem will emerge as implicit, and vice versa for an explicit trait self-esteem attractor. Moreover, we suggested that, once state self-esteem emerges as implicit versus explicit at any given moment, this will trigger – and thus reinforce – the corresponding attractor state. In this way, we showed that implicit and explicit trait self-esteem has a bi-directional relationship with implicit and explicit state self-esteem. This chapter thus contributes to existing literature regarding implicit-explicit self-esteem by grounding the distinction in the SOSE theory, thereby accounting for the temporal nature of implicit and

explicit self-esteem, making a distinction between processes at the trait level and at the state level, and integrating the two dominant perspectives of implicit-explicit self-esteem.

6.3 Integration and Emerging Developments

Self-esteem, like other psychological “trait-like” concepts – such as personality and intelligence – are commonly approached as being relatively stable qualities that reside within the individual (i.e., as *latent*; Cramer, Sluis, Noordhof, & Wichers, 2012; Van der Maas et al., 2006). These trait-like constructs are assumed to be the primary cause of momentary “state-like” expressions of the underlying construct, where the immediate context results in a momentary deviation between the latent trait level and the manifested state level (Borsboom, Mellenbergh, & Van Heerden, 2003). This common approach emphasizes the inter-individual differences (Van Geert, 2014), and does so by focusing on the association between the trait and external variables (either based on the prediction of the trait or the predictive-value of the trait).

In the current thesis, it is suggested that, while such research is of course valuable, as it sets the groundwork for understanding the relationships between variables at the level of the population, psychological research should – and can – *also* aim to understand the *intrinsic dynamics* of a trait-like construct itself by approaching it as a self-organizing construct that emerges out of lower-order interactions. Extant theoretical and empirical research regarding self-esteem, however, does not readily encourage this kind of research, due to the fundamental theoretical approach adopted. This thesis provides the first steps in empirically showing that the nested system of self-esteem (including self-experiences, state self-esteem, and trait self-esteem) *does* demonstrate meaningful intrinsic dynamics, and that these can be empirically studied in order to understand how trait-like constructs (i.e. trait self-esteem) emerge and can be characterized.

Firstly, we showed that moment-to-moment emotional-behavioral self-experiences produce a state self-esteem *process* (Chapter 3). I emphasize ‘process’ here, because we found that state self-esteem is a continual process of causal interaction, such that the process itself is the foundation for causality (Chakravarty, 2005; Dowe, 2000, 2010; Salmon, 1998a, 1998b). Indeed, we showed that state self-esteem is not a sequence of discrete states, each of which generated by trait self-esteem with moment-to-moment deviations in response to environmental stimuli (as is commonly assumed). Instead, the findings demonstrated that each state self-esteem experience gives way to the next state self-esteem experience – making it a continuous process. We therefore showed that state self-esteem is intrinsically dynamic, resulting in iterative development that produces long-range memory.

If state self-esteem is not passively generated by trait self-esteem, what then characterizes the relationship between state self-esteem and trait self-esteem? This thesis shows that this relationship is characterized as actively bi-directional – again, creating intrinsic dynamics (Chapter 4). Moreover, at any given moment, state self-esteem is not ‘generated’, but *constrained*, by trait self-esteem. While state self-esteem thus develops iteratively out of its own intrinsic dynamics, the direction of this development (for example, in the positive direction or in the explicit direction) is influenced by the potential that trait self-esteem

provides. Moreover, we showed that trait self-esteem need not be seen as one ‘baseline level’, but as consisting of multiple experiential equilibria (called *attractor states*). While state self-esteem moves toward these experiential equilibria from moment-to-moment, each time that an equilibrium is reached, it is also reinforced.

6.3.1 Theoretical developments

These findings encourage important theoretical developments regarding how we think about the nature and the origin of state and trait self-esteem. First, while little theoretical attention has been paid to the nature of state self-esteem development, the findings in this thesis contradict the traditional conceptualization of state self-esteem itself. This thesis develops the idea that state self-esteem is its own process, with its own intrinsic dynamics, rather than contextually-based deviations. Second, the theoretical formulations and empirical findings in this thesis develop the idea that trait self-esteem is a multi-stable emergent structure that is dynamic. Third, the relationship between trait self-esteem and state self-esteem is commonly seen as top-down, where trait self-esteem causes state self-esteem. The theoretical formulations and empirical findings in this thesis demonstrate that this relationship is likely more complex than this commonly assumed, and that the relationship can be characterized as being bi-directional, between nested self-esteem constructs. Furthermore, this relationship can be conceptualized as being dynamic and active both in real-time and across the long-term.

Finally, – and in response to my general question posed at the beginning of this thesis – the findings from this thesis help explain what the nature and origin of the underlying processes of self-esteem are. This thesis suggests that the nature of self-esteem is that of an emergent property. The time span across which this developmental emergence occurs determines the exact nature of the emergent property. As such, the nature of state self-esteem is that of an emergent property that is fleeting from moment-to-moment. The nature of trait self-esteem, on the other hand, is that of an emergent property that is self-maintaining across time. The trait self-esteem property is more specifically characterized by the equilibrium points, or attractor states, that the individual experiences through the recurring pull that these points have on current and future iterations of state self-esteem; where the strength of this pull depends on the strength – i.e., width and depth – of the attractor states that make up the trait self-esteem attractor landscape.

Regarding the origin of self-esteem, both of these emergent properties (i.e., trait and state self-esteem) originate from the self-experiential elements that occur in real-time (i.e. the present moment), and more specifically, the continuous interactions between these elements that result in the self-organizational process across the nested levels (from self-experiences, to state self-esteem, to trait self-esteem). From this perspective, the experience of self-esteem is the result of the intrinsic dynamics between the nested constructs of self-esteem. Given that this nested system is always dynamically evolving, so too is an individual’s experience of self-esteem. While the historicity of self-maintained self-esteem provides individuals with experiential continuity, the nature of this continuity – as positive or negative, or as implicit or explicit – will continue to change in the future. Rather than being

a direct cause of some external influence, however, these changes will come about through the moment-to-moment variability of how individuals experience themselves in the present moment. While an individual can of course reflect on his or her continuity of self-esteem – resulting in a view of oneself as positive or negative – this reflection is not the foundation of one’s experience of oneself as positive or negative. The foundation of the positivity or negativity of how individuals experience themselves, i.e., of self-esteem, consists of the processes and dynamics that give rise to the emergent properties of self-esteem.

The self-maintenance that is provided by trait self-esteem attractor states does not only refer to self-maintenance across the long term, but also to self-maintenance in the current moment (as demonstrated in Chapter 4). A trait self-esteem attractor state that is strong (i.e., deep and wide) both increases the likelihood that lower-order constructs will move toward that attractor state, and decreases the degrees of freedom of lower-order variability once the lower-order construct has done so, thereby increasing the amount of energy that is needed for external events to perturb the current state of the lower-order construct. Trait self-esteem attractor states therefore result in self-maintenance in real-time by pulling lower-order constructs (i.e., state self-esteem) toward the equilibrium point provided by the corresponding trait self-esteem attractor. In Chapter 4, we suggested that this real-time self-maintenance is the basis of the real-time phenomenology of trait self-esteem.

Aside from the intrinsic value of developing a conceptualization of the real-time phenomenology of trait self-esteem that can be tested (as was done in Chapter 4), this conceptualization of the phenomenology of trait self-esteem provides additional explanation for the traditional conceptualization that positive self-esteem is a ‘need’, and that it is advantageous to ‘enhance’ self-esteem (Baumeister, Tice, & Hutton, 1989; Brown, 1998; Robins et al., 2002). Specifically, it is commonly found that positive self-esteem is advantageous because it acts as a ‘buffer’ for emotional and cognitive processes against negative experiences (Baccus et al., 2004; Dijksterhuis, 2004; Greenwald & Farnham, 2000). This thesis provides information regarding what this buffer is exactly, and how it works.

Extant research has not explicitly revealed how positive self-esteem acts as a buffer, although the common assumption is that the mechanism is related to increased cognitive resources (Cast & Burke, 2002). In contrast, the SOSE model can explain the buffering effect by suggesting that the ‘pull’ of trait self-esteem attractors increases the amount of energy needed for external forces to sway state self-esteem from its current position. If individuals have positive trait self-esteem attractors, their state self-esteem will be pulled toward a position of positivity. The stronger the positive trait self-esteem attractor, the less likely it is that state self-esteem will be perturbed from its positive equilibrium. The SOSE model therefore outlines the mechanisms that are responsible for the buffering effect that has commonly been found (Greenberg et al., 1992).

6.3.2 Methodological developments

The empirical studies in this thesis demonstrate that a methodological shift is necessary in order to study the intrinsic dynamics of the nested structure of self-esteem. This thesis shows that, alongside self-esteem questionnaires, it can also be advantageous to

adopt new approaches to data, as well as new statistical analyses. While self-report data is advantageous when the goal is to determine the valence of individuals' view that they have of themselves, this empirical approach to self-esteem is not without its disadvantages.

Firstly, self-report methods in which individuals are asked to communicate their subjective thoughts and feeling about themselves as positive or negative will always be subject to self-protective mechanisms such as impression management (Buhrmester et al., 2010; Greenwald & Banaji, 1995; Van Halen, 2002). Secondly, these methods emphasize the cognitive element of self-evaluation at the expense of the emotional and behavioral element (Peters & Slovic, 2007; Scheff & Fearon, 2004). Thirdly, these methods are not conducive for studying the intrinsic dynamics of self-esteem. The reasons for this differ depending on whether the aim is to measure state self-esteem dynamics or trait self-esteem dynamics.

For state self-esteem, self-report measures are adapted by asking the participant to report on his/her self-thoughts or feeling *at the present moment* (e.g., Fortes, Delignières, & Ninot, 2004; Oosterwegel, Field, Hart, & Anderson, 2001). This results in a relatively intrusive measurement of the state self-esteem process, which may be problematic. Specifically, each time that a participant is asked to report on his or her self-worth at the current moment, he or she must introduce a cognitive component into the current network of self-experiences (see Chapter 5). The state self-esteem process that is studied thus adopts a new quality (i.e. state self-esteem becomes explicit), not because it organically emerged that way in the current context, but because of the measurement itself (Van Orden et al., 2010). In this way, the measurement resembles a real-time external perturbation (Hollenstein et al., 2013). Perturbations result in a re-organization of the current emotional-behavioral-cognitive system (Granic & Patterson, 2006). As such, each repeated measurement of state self-esteem will be temporally discrete, rather than part of one continuous process of state self-esteem. Therefore, unless the research aim is to study the moment-to-moment effect of the perturbation, it is not ideal to rely on self-report techniques when studying state self-esteem as a *real-time* process.

Regarding trait self-esteem, the standardized nature of self-report measures is problematic. This is because – from a SOSE model perspective – trait self-esteem is more than a score, which is how it is measured using questionnaires. A questionnaire cannot measure an idiosyncratic network of self-experiences that demonstrates temporal recurrence across time. This thesis shows that the dynamic characteristics of trait self-esteem are not so much *measured*, as they are *analyzed*. The use of Self-Organizing Maps in this thesis illustrates one possible way of analyzing – and thereby capturing – the emergence of this nature of trait self-esteem. The thesis therefore further develops earlier attempts to capture properties of self that take the form of attractor states (see, for example, Vallacher & Nowak, 2000). It advances previous work by capturing *multiple* idiosyncratic attractor states within individuals (rather than one fixed-point attractor), and doing so based on *multivariate data* (i.e. multiple forms of lower-order input, rather than one input that varies in valence – as is done in the mouse paradigm used by Vallacher and Nowak).

Finally, while self-report measures can be adapted in order to measure a trait versus state aspect of an individual's self-view, the nested and dynamic relationship between the two – at any given moment – cannot be mapped using questionnaires. This thesis shows that researchers can profit by choosing theoretically grounded forms of data. For instance, if the goal is to map the emergence of higher-order constructs like trait self-esteem based on the interactions between lower-order constructs like state self-esteem or self-experiences (as was the case in the present thesis), then the data must consist of these lower-order ingredients. Not only does this thesis demonstrate a novel approach to self-esteem data itself, but it also illustrates the use of time-series analyses for the purpose of mapping and quantifying the temporal dynamics between nested levels of constructs such as self-esteem (although it by no means provides an exhaustive demonstration, see DiDonato, England, Martin, & Amazeen, 2013; Kunnen, 2012 for methods that have not - as yet - been applied to self-esteem, but which provide the possibility to do so).

6.4. Future Research

The current thesis is inductive by nature, where the general goal was primarily theory-oriented. As such, the theoretical formulations and empirical findings from this thesis pave the way for future studies that can incorporate the theoretical and methodological developments that emerged from this thesis. Below I discuss two such areas of research. The first is based on the developments that arose from Part I of this thesis, and the second is based on the developments that arose from Part II.

6.4.1 Implications of Part I for future research

The current thesis focused on the fundamental nature of self-esteem, where the aim was to test the real-time dynamic nature of the nested constructs of self-esteem. For instance, in Chapter 4 we captured existing trait self-esteem attractor states (using Kohonen's Self-Organizing Maps) and showed that they are indeed interconnected with state self-esteem dynamics. Presumably, however, these recurring networks of self-experiences are *recurring* (i.e. demonstrating continuity) because they developed into attractor states across the long term. Having provided a proof of existence of the nature of these attractor states in real-time with the current thesis, future research is needed in order to examine how development emerges across the long term. This development may involve either changes to existing trait self-esteem attractor states (in their depth and width) or it may involve the emergence of new trait self-esteem attractor states. Either way, development of trait self-esteem attractor states will involve the restructuring of the trait self-esteem system (or, referring back to Chapter 2, to structural changes in the attractor landscape).

As of yet, trait self-esteem development has been studied in terms of its continuous (and often linear) development across the long term (e.g., Birkeland et al., 2012; Block & Robins, 1993; Erol & Orth, 2011; Orth et al., 2010; Reijntjes et al., 2011; Robins & Trzesniewski, 2005; Zimmerman et al., 1997). While long-term development does often occur slowly and continuously, it can also be characterized by non-linear and abrupt change (Van Dijk & van Geert, 2007). This kind of developmental change is preceded by a high level of short-term variability (Bassano & Van Geert, 2007; Lichtwarck-Aschoff,

Hasselmann, Cox, Pepler, & Granic, 2012; Van der Maas & Molenaar, 1992). During this period of short-term variability, patterns that characterize existing attractor states are broken (Lichtwarck-Aschoff, Hasselmann, Cox, Pepler, & Granic, 2012). This short-term variability is not only seen across events (e.g. from week to week), but it is also observed within events (e.g. across real-time) (Granic et al., 2003). During such a period, real-time behavior (where I refer to 'behavior' in the broadest sense of the word) is not restrained by top-down self-reinforcing feedback loops. It is during real-time that the individual is thus 'free' to explore novel behavior and new selves, as it were (Kroger, 2000; Lichtwarck-Aschoff, Van Geert, Bosma, & Kunnen, 2008). With the introduction of novel self-experiences at the lowest level, development is reinitiated and a process of re-organization can occur. This then makes it possible for qualitatively new high-order self-esteem constructs (i.e. new trait self-esteem attractors) to develop through self-amplifying feedback loops. Alongside extant studies regarding the slow developmental change that occurs across the long term, the SOSE model thus provides a framework for studying how non-linear spurts of development occur at the level of trait self-esteem based on micro-level variability of self-experiences.

Regarding adolescents specifically, studies show that long-term development of the parent-child relationship is characterized by a destabilization period (Granic et al., 2003), defined as a period of heightened real-time variability during which patterns are re-organized (Thelen & Smith, 1994). Such a period is advantageous as it allows the parent-child system to grow and to change by exploring new socio-emotional behavior during real-time interactions, given the new demands that arise during adolescence (Lichtwarck-Aschoff et al., 2012). What is not known, however, is whether a similar pattern of destabilization occurs *within* the adolescent with regard to patterns of real-time emotional-behavioral self-experiences.

Future research would therefore profit by studying, firstly, whether there is in fact a period of intra-individual destabilization of adolescents' self-esteem. It is likely that this is the case, given that adolescents are faced with the task of increasing their sense of autonomy while maintaining a sense of relatedness with parents – requiring a re-organization of patterns (Allen et al., 1994), as well as forming a self-determined identity (Erikson, 1968; Lichtwarck-Aschoff et al., 2008). Just as it is advantageous for the parent-child relationship to go through a destabilization period during adolescence, it is also likely that the occurrence of a destabilization period for self-esteem is also advantageous for adolescents, as it allows the adolescent to explore new experiences of the self. Future research is necessary, not only to determine whether such a destabilization period occurs in self-esteem during adolescence, but also to understand *how* such a period occurs based on the re-organization of trait self-esteem attractor states, and what the *function* of this period may be for adolescents' self-esteem development.

Next, in order to understand how self-esteem change happens across adolescence, it is helpful to investigate how such change is imbedded within inter-personal development (Fogel, 1993). As described above, studies have shown that a destabilization period of parent-child interactions is central to adolescents' intra-individual development (Granic et al.,

2007; Hollenstein, Granic, Stoolmiller, & Snyder, 2004; Lichtwarck-Aschoff et al., 2012; Smits et al., 2010). However, research has yet to investigate how the destabilization of parent-child interactions is coupled with the (hypothesized) destabilization of the adolescents' self-esteem, and what the characteristics of this coupling are. For example, does this coupling occur simultaneously, or sequentially – such that the destabilization of the parent-child dyad happens before that of the child's self-esteem or vice versa? This is yet another possible area for research, which would shed light on how self-experiential development during adolescence is imbedded in the development of the parent-child relationship.

6.4.2 Implications of Part II for future research

The SOSE model describes how an explicit (i.e. reflective) experience of state self-esteem is explained by the inclusion of a self-directed cognitive component (that has a positive truth value) into the momentary lower-order network of self-experiential components (Chapter 5). Due to the interactions between components, where the cognitive component is accommodated into the network, the positivity and negativity of the emotional and behavioral self-experiential components become salient to the individual as a result of the attention that is directed at them. State self-esteem – as the momentary positivity or negativity of self-worth – will thus emerge as a reflective experience. This means that the self as a whole is reflected upon, albeit momentarily.

The phenomenology of explicit state self-esteem, therefore, can be characterized as experiencing the self in the moment as an object of evaluation (i.e. *self-as-object*; Ryan & Brown, 2003). In accordance with research on *contingent self-esteem* (where an individual's self-esteem level is contingent on other-regard; Deci & Ryan, 1995; Kernis, 2003), the emergence of explicit state self-esteem may be more disadvantageous than the emergence of implicit self-esteem. This is because of the in-the-moment and context-sensitive experience of state self-esteem (DeHart & Pelham, 2007; Kernis et al., 1993; Leary & Downs, 1995; Rosenberg, 1986). Given that explicit state self-esteem results in the experience of the self-as-object (as positive or negative), a contingency arises of the worth of the self as a whole (at that moment) and the positive or negative experiences that occur within the immediate context. In contrast, the emergence of implicit state self-esteem implies that reflective attention is not directed at emotional/behavioral self-experiences, and as a result, that the self as a whole is not evaluated (i.e. *self-as-process*; Ryan & Brown, 2003).

The distinction in state self-esteem quality (as implicit versus explicit), and the implications for the experience of state self-esteem as contingent, may be a potentially important area of research given that the cognitive awareness of a contingency between the self as a *whole* (i.e. explicit state self-esteem) and contextual cues from significant others (such as parents) is a risk factor for psychological well-being (e.g., Assor, Roth, & Deci, 2004; Roth, Assor, Niemiec, Deci, & Ryan, 2009). While literature regarding contingent self-esteem typically refers to *trait* self-esteem, the SOSE model provides the framework for understanding why it may be important to examine the phenomenology of explicit *state* self-esteem as possibly more highly contingent, compared to implicit state self-esteem.

Alongside the psychological consequences of implicit versus explicit *state* self-esteem, future research is also needed in order to investigate the psychological consequences of implicit versus explicit *trait* self-esteem. From the SOSE model, implicit and explicit trait self-esteem are conceptualized as separate attractors (where an individual may have multiple implicit and multiple explicit trait self-esteem attractors; Chapter 5). In accordance with the finding that larger discrepancies in valence of potential attractor states corresponds with lower levels of self-certainty (Vallacher et al., 2002), we hypothesized that larger discrepancies in valence between implicit and explicit trait self-esteem attractors would be experienced negatively. This is because larger discrepancies would likely result in a pull between largely discrepant, and inconsistent, potential experiences of state self-esteem. Future research would profit from exploring the psychological consequences of having a trait self-esteem landscape that consists of largely discrepant (regarding valence) implicit and explicit trait self-esteem attractors.

6.5 Limitations

As mentioned earlier, the current thesis adopted a novel methodological approach, where data consisted of observations of moment-to-moment emotional and behavioral self-experiences across the time span of one parent-child interaction. While this kind of data was necessary for the explorative and dynamic-focused nature of the current thesis, it also had its disadvantages. In order to quantify the observations and create time series that could then be analyzed, it was necessary to code each verbalization, action, and emotional expression for each adolescent. It goes without saying that this is a time-intensive process, starting with the development of a reliable coding scheme (see Appendix), to the filming of the dyads, to the training of coders, and finally, to the coding of the various dyadic interactions. While the resulting data was both rich (as it was multivariate by nature) and extensive (including many data points for each individual, i.e., approximately 800), the number of dyads from which data was received was limited.

The use of appropriate analyses (i.e., Monte Carlo re-sampling techniques) meant that the limited sample size did not result in a loss of statistical power, however. As a result, the statistical significance of the findings in this thesis means that it *was* possible to generalize to one underlying theoretical explanation, thereby validating the theory developed in this thesis. However, it would be useful to increase the sample size in order to generalize the findings regarding specific dynamics and characteristics to the general population.

Another disadvantage of the time-intensive methodological approach is that it was beyond the scope of this thesis to include explicit analyses regarding the role of the parent in the adolescents' self-esteem dynamics. While the parent was included as a continuous source of perturbations on the adolescents' state self-esteem (Chapter 4), the time restrictions of this research project meant that it was not possible to move past the structural impact that the parent had (i.e., the *structure* of variability). It would have been interesting to include analyses of the *content* of parental behavior as well. Additional research is necessary in order to shed light on the content-related influence that parents have on their children's self-esteem during interactions.

Finally, the new empirical approach utilized in this thesis necessitates more validation. The aim of the empirical studies in this thesis (Chapters 3 and 4) was to empirically validate the SOSE model (Chapter 2), and not to empirically validate a new measurement of state and trait self-esteem. On the one hand, the fact that the data utilized was theory-grounded supports the construct validity of our approach. On the other hand, additional research is needed in order to systematically investigate the convergent and divergent validity.

6.6 Concluding Remarks

Altogether, the findings in this thesis support the proposed Self-Organizing Self-Esteem model. As such, this thesis shows that self-esteem is likely more dynamic and more complex than researchers previously assumed. Specifically, the chapters of this thesis show that these dynamics and the complexity of self-esteem stem from the intrinsic dynamics of the nested structure of self-esteem; from the level of concrete self-experiences, to state self-esteem iterations, to the emergence of trait self-esteem attractors. In doing so, I hope to have shed light on the nature and origin of self-esteem, based on the underlying processes that occur within and between the nested levels of self-esteem, and the intrinsic dynamics that arise from these processes.

My hope is that this theoretical model provides the framework and the language necessary for other researchers to understand and discuss the underlying ontology of self-esteem based on complex dynamic systems principles. Moreover, I hope that the methodological and empirical groundwork provided in this thesis allow and encourage self-esteem researchers – or any researchers interested in trait-like psychological constructs – to further explore the intrinsic dynamics of self-esteem. As explorative and inductive research, the purpose of the current thesis was to advance the theoretical understanding of self-esteem and to encourage self-esteem researchers to join in this voyage.

6.7 References

- Allen, J., Hauser, S., Bell, K., & O'Connor, T. (1994). Longitudinal assessment of autonomy and relatedness in adolescent-family interactions as predictors of adolescent ego development and self-esteem. *Child Development*, 65(1), 179–94. doi:10.1111/j.1467-8624.1994.tb00743.x
- Assor, A., Roth, G., & Deci, E. L. (2004). The emotional costs of parents' conditional regard: a self-determination theory analysis. *Journal of Personality*, 72(1), 47–88.
- Baccus, J., Baldwin, M., & Packer, D. (2004). Increasing implicit self-esteem through classical conditioning. *Psychological Science*, 15(7), 498–502.
- Bassano, D., & Van Geert, P. (2007). Modeling continuity and discontinuity in utterance length: a quantitative approach to changes, transitions and intra-individual variability in early grammatical development. *Developmental Science*, 10(5), 588–612. doi:10.1111/j.1467-7687.2006.00629.x
- Baumeister, R. F., Tice, D. M., & Hutton, D. G. (1989). Self-presentational motivations and personality differences in self-esteem. *Journal of Personality*, 57(3), 547–579. doi:10.1111/j.1467-6494.1989.tb02384.x
- Birkeland, M., Melkevik, O., Holsen, I., & Wold, B. (2012). Trajectories of global self-esteem development during adolescence. *Journal of Adolescence*, 35(1), 43–54. doi:10.1016/j.adolescence.2011.06.006
- Block, J., & Robins, R. (1993). A longitudinal study of consistency and change in self-esteem from early adolescence to early adulthood. *Child Development*, 64(3), 909–23.
- Borsboom, D. (2005). *Measuring the Mind: Conceptual Issues in Contemporary Psychometrics*. New York: Cambridge University Press. doi:10.1017/CBO9780511490026
- Borsboom, D., Mellenbergh, G., & Van Heerden, J. (2003). The theoretical status of latent variables. *Psychological Review*, 110(2), 203–219. doi:10.1037/0033-295X.110.2.203
- Bosson, J., Swann, W., & Penebaker, J. (2000). Stalking the perfect measure of implicit self-esteem: The blind men and the elephant revisited? *Journal of Personality and Social Psychology*, 79(4), 631–643. doi:10.1037//0022-3514.79.4.631
- Brown, J. D. (1998). *The Self*. Boston: McGraw-Hill.
- Brown, J. D., & Marshall, M. a. (2001). Self-Esteem and Emotion: Some Thoughts about Feelings. *Personality and Social Psychology Bulletin*, 27(5), 575–584. doi:10.1177/0146167201275006
- Buhrmester, M. D., Blanton, H., & Swann, W. B. (2010). Implicit self-esteem: Nature, measurement, and a new way forward. *Journal of Personality and Social Psychology*, 100(2), 365–385. doi:10.1037/a0021341
- Bulanda, R., & Majumdar, D. (2008). Perceived parent-child relations and adolescent self-esteem. *Journal of Child and Family Studies*, 18(2), 203–212. doi:10.1007/s10826-008-9220-3

- Cast, A. D., & Burke, P. J. (2002). *A Theory of Self-Esteem*. University of North Carolina Press, 80(3), 1041–1068.
- Chakravartty, A. (2005). Causal Realism : Events and Processes. *Erkenntnis*, 63(1), 7–31. doi:10.1007/s10670-005-4411-4
- Coan, J. (2010). Emergent ghosts of the emotion machine. *Emotion Review*, 2(3), 274–285. doi:10.1177/1754073910361978
- Cramer, A., Sluis, S., Noordhof, A., & Wichers, M. (2012). Dimensions of normal personality as networks in search of equilibrium: You can't like parties if you don't like people. *European Journal of Personality*, 26, 414–431. doi:10.1002/per.1866
- Cramer, A., Waldorp, L., Van der Maas, H., & Borsboom, D. (2010). Comorbidity: a network perspective. *The Behavioral and Brain Sciences*, 33(2-3), 137–50; discussion 150–93. doi:10.1017/S0140525X09991567
- Deci, E. L., & Ryan, R. M. (1995). Human autonomy: The basis for true self-esteem. In M. H. Kernis (Ed.), *Efficacy, Agency, and Self-Esteem* (pp. 31–49). New York, NY US: Plenum Press.
- DeHart, T., & Pelham, B. (2007). Fluctuations in state implicit self-esteem in response to daily negative events. *Journal of Experimental Social Psychology*, 43(1), 157–165. doi:10.1016/j.jesp.2006.01.002
- DiDonato, M. D., England, D., Martin, C. L., & Amazeen, P. G. (2013). Dynamical Analyses for Developmental Science: A Primer for Intrigued Scientists. *Human Development*, 56(1), 59–75. doi:10.1159/000342936
- Dijksterhuis, A. (2004). I like myself but I don't know why: enhancing implicit self-esteem by subliminal evaluative conditioning. *Journal of Personality and Social Psychology*, 86(2), 345–55. doi:10.1037/0022-3514.86.2.345
- Dowe, P. (2000). Causality and explanation. *British Journal for the Philosophy of Science*, 51, 165–174.
- Dowe, P. (2010). Causal process theories. In B. Helen, H. Christopher, & M. Peter (Eds.), *Oxford Handbook of Causation* (Vol. 1, pp. 213–233). Oxford, England: Oxford University Press. doi:10.1093/oxfordhb/9780199279739.001.0001
- Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: Norton.
- Erol, R., & Orth, U. (2011). Self-esteem development from age 14 to 30 years: a longitudinal study. *Journal of Personality and Social Psychology*, 101(3), 607–19. doi:10.1037/a0024299
- Evans, J. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology*, 59, 255–78. doi:10.1146/annurev.psych.59.103006.093629
- Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition. research: their meaning and use. *Annual Review of Psychology*, 54, 297–327. doi:10.1146/annurev.psych.54.101601.145225
- Fogel, A. (1993). *Developing Through Relationships*. Chicago: The University of Chicago Press.

- Fortes, M., Delignières, D., & Ninot, G. (2004). The dynamics of self-esteem and physical self: between preservation and adaptation. *Quality & Quantity*, 38, 735–751. doi:10.1007/s11135-004-4764-9
- Frankish, K. (2010). Dual-Process and Dual-System Theories of Reasoning. *Philosophy Compass*, 5(10), 914–926. doi:10.1111/j.1747-9991.2010.00330.x
- Gable, S., Gosnell, C., & Prok, T. (2012). Close relationships. In M. Mehl & T. Conner (Eds.), *Handbook of Research Methods for Studying Daily Life* (pp. 511–524). New York: The Guilford Press.
- Gawronski, B., & Bodenhausen, G. V. (2007). Unraveling the processes underlying evaluation: Attitudes from the perspective of the APE model. *Social Cognition*, 25(5), 687–717.
- Granic, I., Hollenstein, T., Dishion, T. J., & Patterson, G. R. (2003). Longitudinal analysis of flexibility and reorganization in early adolescence: A dynamic systems study of family interactions. *Developmental Psychology*, 39(3), 606–617. doi:10.1037/0012-1649.39.3.606
- Granic, I., O’Hara, A., Pepler, D., & Lewis, M. D. (2007). A dynamic systems analysis of parent-child changes associated with successful “real-world” interventions for aggressive children. *Journal of Abnormal Child Psychology*, 35(5), 845–857. doi:10.1007/s10802-007-9133-4
- Granic, I., & Patterson, G. R. (2006). Toward a comprehensive model of antisocial development: a dynamic systems approach. *Psychological Review*, 113(1), 101–31. doi:10.1037/0033-295X.113.1.101
- Greenberg, J., Solomon, S., Pyszczynski, T., Rosenblatt, A., Burling, J., Lyon, D., Pinel, E. (1992). Why do people need self-esteem? Converging evidence that self-esteem serves an anxiety-buffering function. *Journal of Personality and Social Psychology*, 63(6), 913–922. doi:10.1037/0022-3514.63.6.913
- Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: attitudes, self-esteem, and stereotypes. *Psychological Review*, 102(1), 4–27.
- Greenwald, A. G., & Farnham, S. (2000). Using the implicit association test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology*, 79(6), 1022–1038. doi:10.1037//0022-3514.79.6.1022
- Hollenstein, T., Granic, I., Stoolmiller, M., & Snyder, J. (2004). Rigidity in parent-child interactions and the development of externalizing and internalizing behavior in early childhood. *Journal of Abnormal Child Psychology*, 32(6), 595–607. doi:0091-0627/04/1200-0595/0
- Hollenstein, T., Lichtwarck-Aschoff, A., & Potworowski, G. (2013). A Model of Socio-emotional Flexibility at Three Time Scales. *Emotion Review*, 5(4), 397–405. doi:10.1177/1754073913484181
- Kernis, M. (2003). Toward a conceptualization of optimal self-esteem. *Psychological Inquiry*, 14(1), 1–26. doi:10.1207/S15327965PLI1401_01

- Kernis, M., Cornell, D., Sun, C., Berry, A., & Harlow, T. (1993). There's more to self-esteem than whether it is high or low: the importance of stability of self-esteem. *Personality Processes and Individual Differences*, 65(6), 1190–1204. doi:10.1037/0022-3514.65.6.1190
- Koerner, A. F., & Fitzpatrick, M. A. (2006). Family conflict communication. In J. G. Oetzel & S. Ting-Toomey (Eds.), *The Sage Handbook of Conflict Communication. Integrating Theory, Research, and Practice*. Thousand Oaks, California: Sage Publications, Inc.
- Kroger, J. (2000). *Identity Development: Adolescence Through Adulthood*. Thousand Oaks, CA US: Sage Publications, Inc.
- Kunnen, S. (Ed.) (2012). *A Dynamic Systems Approach to Adolescent Development*. New York, NY US: Psychology Press.
- Leary, M. R., & Downs, D. (1995). Interpersonal functions of the self-esteem motive. In M. Kernis (Ed.), *Efficacy, Agency and Self-esteem* (pp. 123–144). New York, NY US: Plenum Press.
- Lichtwarck-Aschoff, A., Hasselman, F., Cox, R., Pepler, D., & Granic, I. (2012). A characteristic destabilization profile in parent-child interactions associated with treatment efficacy for aggressive children. *Nonlinear Dynamics, Psychology, and Life Sciences*, 16(3), 353–79.
- Lichtwarck-Aschoff, A., Van Geert, P., Bosma, H., & Kunnen, S. (2008). Time and identity: A framework for research and theory formation. *Developmental Review*, 28(3), 370–400. doi:10.1016/j.dr.2008.04.001
- Markus, K., & Borsboom, D. (2013). Reflective measurement models, behavior domains, and common causes. *New Ideas in Psychology*, 31(1), 54–64. doi:10.1016/j.newideapsych.2011.02.008
- Olson, M. A., & Fazio, R. H. (2009). Implicit and explicit measures of attitudes. The perspective of the MODE model. In R. E. Petty, R. H. Fazio, & P. Briñol (Eds.), *Attitudes. Insights From the New Implicit Measures* (pp. 19–62). New York, NY US: Psychology Press.
- Oosterwegel, A., Field, N., Hart, D., & Anderson, K. (2001). The relation of self-esteem variability to emotion variability, mood, personality traits, and depressive tendencies. *Journal of Personality*, 69(5), 689–708. doi:10.1111/1467-6494.695160
- Orth, U., Trzesniewski, K. H., & Robins, R. W. (2010). Self-esteem development from young adulthood to old age: a cohort-sequential longitudinal study. *Journal of Personality and Social Psychology*, 98(4), 645–58. doi:10.1037/a0018769
- Peters, E., & Slovic, P. (2007). Affective asynchrony and the measurement of the affective attitude component. *Cognition & Emotion*, 21(2), 300–329. doi:10.1080/02699930600911440
- Reijntjes, A., Thomaes, S., Kamphuis, J., Bushman, B., De Castro, B., & Telch, M. (2011). Explaining the paradoxical rejection-aggression link: the mediating effects of hostile intent attributions, anger, and decreases in state self-esteem on peer rejection-

- induced aggression in youth. *Personality & Social Psychology Bulletin*, 37(7), 955–63. doi:10.1177/0146167211410247
- Robins, R. W., & Trzesniewski, K. H. (2005). Self-esteem development across the lifespan. *Current Directions in Psychological Science*, 14(3), 158–162. doi:10.1111/j.0963-7214.2005.00353.x
- Robins, R. W., Trzesniewski, K. H., Tracy, J. L., Gosling, S. D., & Potter, J. (2002). Global self-esteem across the life span. *Psychology and Aging*, 17(3), 423–434. doi:10.1037//0882-7974.17.3.423
- Rosenberg, M. (1979). *Conceiving the Self*. Malabar, FL: Robert E. Krieger.
- Rosenberg, M. (1986). Self-concept from middle childhood through adolescence. In J. Suls & A. G. Greenwald (Eds.), *Psychological Perspectives on the Self* (Vol. 3) (pp. 107–135). Hillsdale, NJ: Erlbaum.
- Roth, G., Assor, A., Niemiec, C. P., Deci, E. L., & Ryan, R. M. (2009). The emotional and academic consequences of parental conditional regard: comparing conditional positive regard, conditional negative regard, and autonomy support as parenting practices. *Developmental Psychology*, 45(4), 1119–42. doi:10.1037/a0015272
- Ryan, R. M., & Brown, K. W. (2003). Why we don't need self-esteem: On fundamental needs, contingent love, and mindfulness. *Psychological Inquiry*, 14(1), 71–76.
- Salmon, W. (1998a). *Causal Propensities*. Oxford Scholarship Online, (June 2012), 1–11. doi:10.1093/0195108647.003.0014
- Salmon, W. (1998b). Scientific explanation. Causation and unification. In *Causality and Explanation* (pp. 68–78). New York: Oxford University Press. doi:10.1093/0195108647.003.0008
- Scheff, T. J., & Fearon, D. S. (2004). Cognition and Emotion? The Dead End in Self-Esteem Research. *Journal for the Theory of Social Behaviour*, 34(1), 73–90. doi:10.1111/j.1468-5914.2004.00235.x
- Schmittmann, V., Cramer, A., Waldorp, L., Epskamp, S., Kievit, R., & Borsboom, D. (2011). Deconstructing the construct: A network perspective on psychological phenomena. *New Ideas in Psychology*, 1–11. doi:10.1016/j.newideapsych.2011.02.007
- Smits, I., Soenens, B., Vansteenkiste, M., Luyckx, K., & Goossens, L. (2010). Why do adolescents gather information or stick to parental norms? Examining autonomous and controlled motives behind adolescents' identity style. *Journal of Youth and Adolescence*, 39(11), 1343–56. doi:10.1007/s10964-009-9469-x
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, 8(3), 220–47.
- Tangney, J., & Fischer, K. (1995). Self-conscious emotions and the affect revolution: Framework and overview. In *Self-Conscious Emotions: The Psychology of Shame, Guilt, Embarrassment, and Pride*. (pp. 3–22). NY US: Guilford Press.
- Thelen, E., & Smith, L. B. (1994). *A Dynamic Systems Approach to the Development of Cognition and Action*. Cambridge, MA US: The MIT Press.

- Trzesniewski, K. H., Donnellan, M. B., & Robins, R. W. (2003). Stability of self-esteem across the life span. *Journal of Personality and Social Psychology*, 84(1), 205–220. doi:10.1037/0022-3514.84.1.205
- Vallacher, R. R., & Nowak, A. (2000). Landscapes of self-reflection: Mapping the peaks and valleys of personal assessment. In A. Tesser, B. R. Felson, & J. M. Suls (Eds.), *Psychological Perspectives on Self and Identity* (pp. 35–65). Washington, DC US: American Psychological Association.
- Vallacher, R. R., Nowak, A., Froehlich, M., & Rockloff, M. (2002). The Dynamics of Self-Evaluation. *Personality and Social Psychology Review*, 6(4), 370–379. doi:10.1207/S15327957PSPR0604_11
- Vallacher, R. R., Van Geert, P. L. C., & Nowak, A. (2015). The intrinsic dynamics of psychological process. *Current Directions in Psychological Science*. doi:10.1177/0963721414551571
- Van der Maas, H. L. J., Dolan, C. V., Grasman, R. P., Wicherts, J. M., Huizenga, H. M., & Raijmakers, M. E. J. (2006). A dynamical model of general intelligence: the positive manifold of intelligence by mutualism. *Psychological Review*, 113(4), 842–61. doi:10.1037/0033-295X.113.4.842
- Van der Maas, H. L. J., & Molenaar, P. C. (1992). Stagemwise cognitive development: an application of catastrophe theory. *Psychological Review*, 99(3), 395–417.
- Van Dijk, M., & van Geert, P. (2007). Wobbles, humps and sudden jumps: A case study of continuity, discontinuity and variability in early language development. *Infant and Child Development*, 16, 7–33. doi:10.1002/icd
- Van Geert, P. (2014). Group versus individual data in a dynamic systems approach to development. *Enfance*, 3, 283–312.
- Van Geert, P., & Van Dijk, M. (2002). Focus on variability: New tools to study intra-individual variability in developmental data. *Infant Behavior and Development*, 25(4), 340–374. doi:10.1016/S0163-6383(02)00140-6
- Van Halen, C. (2002). Personal Self-Definition as a Lifelong Praxis. In *The Uncertainty of Self and Identity*. Unpublished doctoral dissertation (pp. 1–20). Groningen, The Netherlands: University of Groningen.
- Van Orden, G., Kello, C., & Holden, J. (2010). Situated Behavior and the Place of Measurement in Psychological Theory. *Ecological Psychology*, 22(1), 24–43. doi:10.1080/10407410903493145
- Zimmerman, M. A., Copeland, L. A., & Shope, J. T. (1997). A Longitudinal Study of Self-Esteem : Implications for Adolescent Development. *Journal of Youth and Adolescence*, 26(2), 117–141.

