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The dynamics of acculturative change: The potential of a developmental perspective in acculturation science

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Acculturation processes are, by definition, processes of change over time. Yet, acculturation science is dominated by static and a-developmental theorizing that makes no specific assumptions about temporal change processes. This review paper presents concepts and methods that utilize a developmental science perspective and demonstrates how these concepts can make acculturation science more dynamic and embedded in contextual developmental theorizing, particularly (but not exclusively) for studying immigrant youth. The described concepts include the life stage principle (e.g., how acculturative experiences may differ in their effects depending on the developmental stage in which individuals face them), the concept of phase transitions from Dynamic Systems Theory (e.g., acculturation may be seen as a phase transition with higher susceptibility to risk factors), ideas about distal and proximal sources of ontogenetic (acculturative) change, dynamic approaches to pubertal development (i.e., novel concepts of acculturation timing), insights on nonergodicity (i.e., a discussion on whether between subject effects indeed present within-person processes in acculturation), and a person-in-context perspective. This review presents the background of these concepts, describes the benefits for acculturation research, and suggests methodological approaches to use them in studies on immigration and acculturative change. Overall, this overview will instigate a novel understanding of acculturation research, which is arguably more in line with earlier aims of acculturation research: A better understanding of change in cultural patterns due to continuous first-hand contact between individuals from different cultures.

Keywords: developmental science, acculturative change, acculturation dynamics, immigrant youth

1. INTRODUCTION

Acculturation research has made impressive progress in the past decades. Scholars nowadays are aware of the attitudes, behaviors and affects associated with acculturation phenomena and also of how these variables are intertwined and embedded in context (Ward & Geeraert, 2016). Simultaneously, acculturation has been conceptualized as a stress-coping process, a learning experience, and a cognitive restructuring process (Berry, 1997; Ward, 2001). Nevertheless, most models in acculturation research have been derived from the social psychological literature or from ethnology/anthropology and remain somewhat static and variable oriented. While some scholars have begun to add a more developmental perspective to Acculturation Science (Juang & Syed, 2019; Schwartz et al., 2020; Suárez-Orozco et al., 2018; Titzmann & Lee, 2018), other researchers argue that “the study of acculturation from a developmental perspective is still in its infancy” (Ward & Szabó, 2019, p. 667). In most cases, developmental considerations remain limited to particular domains of acculturation, such as research on identity (Roberts et al., 1999). The aim of this review is to introduce concepts and methods derived from a developmental science perspective that can contribute to a more elaborated understanding of acculturation as a change process. We particularly focus on immigrant youth in this review, despite the fact that most approaches have the potential to inform acculturation research across the whole life-span. Our review has a major focus on immigrant youth, which refers to first generation adolescents who settle in a country that is different to the country of their birth. Nevertheless, many aspects can also be applied to second and third generation immigrants, or more generally to adolescents from ethnic-racial minority groups. For this reason, findings referring to such groups are included in the literature review if relevant.

The common denominator of developmental and acculturation science is the focus on

change processes. On the one hand, development “deals with the description, explanation, and modification (optimization) of intraindividual *change* [emphasis added] in behavior across the life span and with interindividual differences (and similarities) in intraindividual change” (Baltes et al., 1988, p. 4). Hence, the aim of developmental psychology is to describe, explain, predict, and change (or control) developmental outcomes. To reach this aim, developmental science has compiled a broad repertoire on conceptualizations of change. Acculturation, on the other hand, refers to “phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent *changes* [emphasis added] in the original culture patterns of either or both groups” (Redfield et al., 1936, p. 149). This widely used definition (more than 6,000 times cited in google scholar) shows that acculturation science is also primarily interested in change.

A major discrepancy between a developmental science and the acculturation perspective refers to the factors that instigate change. Whereas change is assumed to be driven by intercultural contact in acculturation research, developmental changes can be instigated through myriads of factors, including but not limited to intercultural contact. The factors that drive development are internal biological, psychological, external social, and societal factors that differ across the lifespan and are motivational forces of change (Havighurst, 1972). In addition, these factors are embedded in an age-graded societal context that reinforces and restricts individuals' access to experiences depending on age (Nurmi, 1993). Attending a specific concert or social event may, for example, be restricted to specific age-groups. On the other hand, intercultural contact instigates change through the affordance to cope with acculturative stress (Ward et al., 2001), with the confrontation of various identities (Phinney, 2003), and the requirement to learn new cultural skills (Masgoret & Ward, 2006).

Besides a focus on change, development and acculturation science share similarities in the evolution of theoretical models on change. Developmental psychology started with an interest in universalities of change and models that aimed at developmental steps towards a developmental endpoint – often through qualitatively different developmental stages (e.g., Erikson, 1963; Havighurst, 1972; Piaget, 1969). Similarly, early concepts of acculturation assumed more or less universal stages, such as culture shock, a honeymoon phase, or a W-curve of entry and re-entry (Lysgaard, 1955; Oberg, 1960; Ward et al., 2001). Meanwhile, both fields recognized the limitations of universal models and emphasize interindividual differences in intra-individual change, a life-span perspective, as well as a focus on specific groups (Baltes et al., 1988; Bornstein, 2017). Nevertheless, acculturation research often is still dominated by a variable-oriented research focus on inter-individual differences (e.g., how do certain configurations of acculturation orientations relate to psychosocial functioning). This review article aims at providing insights into the question of how developmental science approaches can provide a more nuanced understanding of acculturative change and will elaborate on developmental science concepts that can be utilized for a better understanding of how acculturative change unfolds over time. Using these conceptual ideas in acculturation research will promote acculturation theory development, empirical testing, as well as prevention and intervention planning in the field of acculturation. Moreover, we claim that both acculturation and developmental science should be better integrated, because both a sole acculturative or developmental perspective can be misleading.

2. WHY IS IT IMPORTANT TO INTEGRATE ACCULTURATIVE AND DEVELOPMENTAL PERSPECTIVES?

Adolescent immigrants are both adolescents and immigrants. Although this statement may not be an exceptional insight, it shows the

dilemma that researchers, teaching staff, or practitioners are confronted with. If teachers in schools, for example, emphasize the similarities in everyday life (e.g., “In the end they are all young people”, “I see all learners as students whose background is irrelevant to me”), they may run into the risk that social and status differences as well as existing prejudices and discrimination experiences are not addressed, which can also reduce sensitivity to racism in the long term (Plaut et al., 2018). In addition, such a color-blind view ignores the fact that immigrant or ethnically minoritized individuals (i.e., individuals who face discrimination and bad treatment due to an assumed membership in an ethnic group) bring culture-specific resources into societies (e.g., being multi-lingual, knowing different cultural systems, adding novel perspectives to an existing society). Ignoring such specific challenges and competencies can undermine efforts to achieve equal opportunities in a society and may perpetuate or even reinforce educational disparities. At the same time, a strong focus on migration- or group-specific experiences can promote the salience of ethnic groups, because human beings in general are socially “programmed” to utilize social categories in daily life. The mere awareness of the presence of one or more other groups creates a differentiation between “us” and “them,” which in turn almost automatically results in social comparison processes and in-group (vs. outgroup) preference (Brewer, 2019).

In acculturation research, the risk of misinterpreting cognition and behavior of immigrant youth as being solely defined by group membership has been recognized. Quite often in public and scientific debate immigrant youth development has been seen as primarily shaped by culture whereas non-immigrant ethnic majority youth are seen as individual actors - independent of culture (Causadias et al., 2018a). Such a cultural (mis)attribution bias has been shown to exist for explaining behavior of racial-ethnic minority members both in psychology (Causadias et al., 2018b) and in

developmental psychology specifically (Causadias et al., 2018a).

For this reason, researchers should be careful to use a purely ethnic lens to interpret data. In research on peer relations, ethnic homophily, the widespread tendency to prefer to befriend same-ethnic over cross-ethnic peers, for example, was sometimes described as a sign of salient ethnic boundaries in school contexts (Moody, 2001; Smith et al., 2016; Wimmer & Lewis, 2010). A recent study, however, actually asked students to describe friendship groups in their own words and found that ethno-racial labels were rarely utilized in these descriptions and that ethnic homophily was not associated with a more pronounced use of ethno-racial labels (Kroneberg & Wittek, 2023). These findings question assumptions of ethnic threat and competition theories that ethnic homophily signifies salient ethnic boundaries and may be indicative of inter-ethnic threat or conflict. Instead, ethnic homophily may be a mere by-product of opportunity structures, such as similar ways to school, recreational activities, or shared opinions and attitudes on music styles (e.g., pop or hip hop) and social/antisocial behavior (Stark & Flache, 2012).

Similarly, family relations may often be seen through an ethnic lens. For example, adolescent immigrants (but also later generations) often pick up the new language more easily and perform as language brokers in their family: Studies revealed that about 90% of immigrant adolescents translate documents for their parents - at least occasionally (Fuligni & Telzer, 2012; Morales & Hanson, 2005). At first sight, language brokering may be perceived as acculturation-related behavior, but it may generalize to general responsibilities so that immigrant adolescents take on other acculturation-unrelated responsibilities at home (Titzmann, 2012). In this regard, adolescents who language broker in their families may develop autonomy from parents and a sense of responsibility more quickly than other adolescents, which probably

should not always be attributed to cultural or ethnic differences (such as familism, an assumed cultural tendency for strong attachment, identification, and obligation to the family), but may simply be the result of the circumstances in an acculturating family system.

Moreover, research seems to suggest that immigrant youth are first and foremost youth who undergo the same developmental processes as all youth do (Motti-Stefanidi et al., 2021; Titzmann & Jugert, 2017; Titzmann et al., 2014). For instance, all youth face developmental tasks and not solving developmental tasks may lead youth to develop compensatory strategies to retain their self-worth or social status. A lack of social skills, for example, may be compensated by aggressiveness, which may also modify acculturation outcomes. Along these lines of thinking, a recent study showed that immigrant youth who struggled with school achievement, a key developmental task at this age, disengaged from school, which in turn led to lower involvement with the national and higher involvement with their ethnic culture (Motti-Stefanidi et al., 2023). While disengaging from school and higher involvement with ethnic culture is adaptive in protecting one's self-esteem when threatened with academic problems, it likely comes at the cost of further academic underachievement (cf. Baumert et al., 2023).

The examples given show that developmental science as well as acculturation research could capitalize on mutual recognition and influence – particularly during the adolescent years, but in fact across the whole life-span. Acculturation research may become better in explaining acculturative change over time and in predicting acculturative outcomes, which is the main focus of this review. Nevertheless, developmental science would also profit from a better understanding of how culture affects development and how “normative” and cultural or sociocultural changes co-act and inter-act in individuals' development. This would allow

developmental science to overcome an over-generalization of developmental processes (mainly derived from “normative” white, educated, affluent samples), pave the way for a stronger recognition of diverse developmental trajectories in Western countries, and may also help to more precisely view developmental processes as embedded in macro-social, -cultural and -economic conditions and changes in societies (e.g., Rogers et al., 2021).

3. HOW CAN ACCULTURATION RESEARCH PROFIT FROM DEVELOPMENTAL SCIENCE THEORY AND METHODS?

To answer this question, we present various research avenues on how acculturation research and developmental science can be amalgamated in order to make better predictions, to understand existing mixed findings, and to better grasp the dynamics in acculturation-related changes. The concepts chosen do not follow a specific developmental theory or approach. Rather we utilized prolific scientific discourses on how development unfolds over time and which methods are being used to test assumptions about developmental processes. The discourses range from broad theoretical life-span perspectives of development to questions of research designs to methodological debates that led to the questioning of interpretations of particular analyses. The presented approaches start with consideration of how certain acculturative experiences are made in comparison to specific life events or life stages, whether predictors are distal or more proximal from the expected outcomes, and how dynamics in acculturation can be measured. Further approaches describe theoretical and methodological conceptualizations of individual change in context, how these can be addressed, and how intervention research may contribute to our causal understanding of acculturative change. An overview of the presented developmental concepts, their relevance for acculturation research and concrete methodological recommendations is

displayed in Table 1. Although there may be more theories and approaches that could be stimulating, we believe that especially those selected here can instigate novelty and innovation in acculturation research. Furthermore, the methodological implications of these concepts can bring acculturation scholars in a position to apply these concepts in their research. Despite the fact that both developmental and acculturative processes co-occur across the life-span, and hence most considerations in this review can be applied accordingly, this review has a focus on adolescence, because this age-phase is relatively well-studied and characterized by both substantial acculturative and developmental change.

3.1 The Life Stage Principle

A first line of theorizing that may be able to make acculturation research more dynamic is the life stage principle in Elder’s life course perspective (Bengtson et al., 2012; Elder & Shanahan, 2007). The theoretical idea behind this principle is that experiences of individuals have different effects depending on the life stage in which these experiences occur and on the historical context in which they are made. Initial empirical evidence for this principle was found in studies showing that being recruited into warfare has more detrimental effects among older as compared to younger recruits, because the military service brought on average more disruptions to the lives of older (vs. younger) individuals (Elder et al., 1994). Similar evidence was also found for differential effects of the great depression on children at different ages (Elder, 1998).

When applied to acculturation research, the life stage principle may be helpful in improving predictions of acculturative processes. For example, the effects of a transition to a new country or of specific acculturation-related experiences may differ depending on the age and the historical time when they are made. An explanation for these differential effects can be derived from the developmental concept of

Table 1 Overview of Developmental Concepts and How They May Instigate Acculturation Research		
Description	Relevance for Acculturation Research	Recommendations
<i>Life Stage Principle</i>		
(Acculturative) experiences of individuals have different effects depending on the life stage in which these experiences are made.	The transition to a new country may affect individuals differently, depending on the developmental stage (age) at time of arrival.	<ul style="list-style-type: none"> • Test for interactions of acculturation processes with relevant developmental variables • Use comparative longitudinal designs with relevant groups • Take into account the developmental tasks migrants face during the transition
<i>Phase Transitions</i>		
There are periods of a developmental disequilibrium (e.g., life events) in which established patterns are destabilized and risks may have the potential to disproportionately affect the developmental system.	Migration to a new country may be considered a phase transition with different predictive patterns, but during the acculturation processes other phase transitions may occur that disrupt or facilitate acculturation.	<ul style="list-style-type: none"> • Test for different mechanisms of adaptation at different phases of acculturation • Consider acculturation models that assume various phases • Take into account developmental phase transitions (school entry, birth of a sibling, parental job transfers) in explaining acculturative outcomes • Check whether interventions address risks and opportunities that are appropriate for the acculturation phase adolescents are in • Test interactions between risk (and protective) factors with length of residence to explain developmental and/or acculturative outcomes
<i>Continuity and Discontinuity</i>		
(Acculturative) ontogenetic change can be the result of discontinuity or continuity.	Effects observed in acculturation studies may be the result of short-term OR long-term predictors.	<ul style="list-style-type: none"> • Consider underlying mechanisms (potential mediators) and adjust spacing between time-points accordingly • Use outcome-appropriate designs from daily diary to decade-spanning studies
<i>Developmental (Pubertal) Timing</i>		
Developmental	Acculturation is also a	<ul style="list-style-type: none"> • Take time seriously: how does

science has established concepts on how bio-psycho-social changes unfold over time with concepts of developmental timing.	process of change and developmental concepts of timing can help to better capture intra- and interindividual differences in acculturative change.	acculturative change unfold over time? <ul style="list-style-type: none"> • Implement novel concepts of acculturative change into models (chronological, transition, relative timing; acculturation tempo; acculturation pace; acculturation synchrony)
<i>Nonergodicity</i>		
Developmental science has shown that within- and between person effects can differ.	Findings related to interindividual differences in acculturation may not necessarily apply to intra-individual models.	<ul style="list-style-type: none"> • Tease apart interindividual differences from intra-individual change • Use longitudinal methods with relevant time-intervals (what is the “incubation time” for an effect?)
<i>Person-in-Context Approach</i>		
Human development takes place in person-context-interactions.	Acculturative processes are the result of constant interaction between the acculturating individual and their (cultural) context.	<ul style="list-style-type: none"> • Be aware that individuals cannot always choose, but sometimes face environmental restrictions • Use multilevel-models with individuals nested within hierarchies of context • Take into account the dependency of actors in dyads (e.g., actor-partner-interdependence models) or larger networks (e.g., social network analysis)
<i>Developmentally Informed Interventions</i>		
Developmental science offers well-developed interventions that may inform about causalities in developmental processes.	Acculturation research may similarly develop interventions to face the causality crisis recently described by acculturation scholars.	<ul style="list-style-type: none"> • Develop interventions that test causal assumptions • Think of quasi-experimental opportunities (e.g., waiting lists of immigrants) • In some instances, randomized experiments may be applicable • Think about alternative effects and side effects of interventions

developmental tasks (Havighurst, 1972; Hurrelmann & Quenzel, 2018). It assumes that each life stage comes with age-specific tasks, which should be accomplished before individuals can move on to the next stage, because otherwise the resolution of later tasks is impeded. These age-graded tasks differ between the life stages (childhood, adolescence, adulthood, old age) and are based on societal expectations, biological changes, or social interactions. Acculturation processes may be accelerated or impeded due to a mismatch of acculturative and developmental tasks (Motti-Stefanidi et al., 2021). A prominent example in this regard is language acquisition. When the acculturative task of learning a new language falls together with the developmental task of learning (any) first language, language acquisition is facilitated. As a result, adolescents who arrive at younger ages have an advantage in learning the new language (Güven & Islam, 2015), receiving a better education, better employment conditions, and better earnings later on (Hermansen, 2017).

In conceptual terms, such line of thinking has various implications. One is to increase the awareness that developmental and acculturative processes may be more or less in alignment and to consider both these processes in combination. At what developmental stage did individuals make the transition to a new country and which developmental tasks are associated with this age period? Methodologically, age-related processes and acculturation-related variables can also be studied in combination, for instance, by implementing interactions in cross-sectional or longitudinal regression models. As a first step, the inclusion of interactions between age at arrival and acculturation-related predictors may explain additional variance in any given outcome (developmental or acculturation-related). Further steps should go beyond using age as a general proxy for all simultaneously evolving developmental processes, and should directly measure the key developmental concept that is the expected

mechanism behind age-effects. If for example, autonomy development during adolescence is supposed to be the developmental mechanism that hinders or reinforces acculturation processes, it is better to assess autonomy directly rather than to infer its effect from age (Titzmann et al., 2015). The advantage of this strategy is that we learn more about mechanisms and also account for the substantial inter-individual differences in development – particularly during the adolescent years.

In addition, longitudinal comparative designs could be used to differentiate acculturative change processes between individuals at different developmental stages at the time of immigration (e.g., Fuligni, 2001; Silbereisen & Schmitt-Rodermund, 2000). One such study could show, for example, that adolescents from the former Soviet Union differed in their process of autonomy development: Adolescent immigrants who came to Germany at an age of five may have received their cultural imprint in Germany (school entry after immigration) and did not show any difference in autonomy development compared to their non-immigrant age mates, whereas adolescent immigrants who arrived after the age of 5 (school entry in the former Soviet Union) deviated in their autonomy change from their non-immigrant age mates but adjusted their autonomy expectations over time (Titzmann & Silbereisen, 2012). Hence, the cultural adaptation of the younger group (who entered Germany before the important life stage of school entry) may be less a change in terms of acculturation and more of enculturation, whereas it is the opposite for the older group (who entered Germany after the important life stage of school entry).

3.2 Phase Transitions

A second aspect that developmental science could contribute to acculturation research is the concept of phase transitions. Phase transitions are characterized by substantial changes in life circumstances. Developmentally, a phase transition is a period of disequilibrium in which

established behavioral or cognitive patterns are destabilized (for instance through environmental changes) so that relative stability and predictability of former states is disrupted. After this period, developmental systems restabilize and settle into new habits (Granic & Patterson, 2006). Hence, the basic assumption of phase transitions is that individuals may face transitions or crises in life during which stabilizing factors may be less powerful in buffering stress. Moreover, risk factors may be more potent to disproportionately affect the developmental system with a higher likelihood of maladaptation compared to more stable phases.

For acculturation research, the concept of phase transitions could be applied in various ways. On a most fundamental level, the transition to a new country should be considered as a phase transition with potentially reduced effects of protective and more adverse effects of risks in early phases of acculturation. Cultural behavioral patterns learned in the country of origin may not be appropriate in the new society and familiar social support systems (extended family, friendships etc.) may not be available anymore, which can be disruptive – particularly in early phases after immigration. For this reason, it seems promising to test whether associations found differ between newcomer and more experienced immigrants. This notion can also explain mixed findings. Varying effect sizes across studies may be the result of studying groups within or after phase transitions.

Methodologically, the existence of phase transitions can be assessed in various ways (Aiken et al., 1991). A first approach is to compare groups that differ in length of residence and test the strength of associations in each group – for example in multi-group structural equation models with equality constraints. The advantage of this method is that all associations in a model are tested simultaneously. A disadvantage is that cut-off criteria for identifying groups of different length of residence require

theoretical or empirical justifications. Some studies differentiated newcomer and experienced adolescents with a cut-off at seven years past immigration - based on the average time of finding jobs and long-term family housing. Results revealed that the use of the new language (German in this case) predicted *changes* in the share of same ethnic friends in friendship networks (Titzmann et al., 2023) and in self-efficacy (Titzmann & Jugert, 2017), but only among newcomer immigrant adolescents, whereas it predicted *levels* in both outcomes among experienced immigrant adolescents. These findings suggest different processes at these two immigration stages: A more dynamic initial process and a phase of greater stability when adolescents may have found their niche.

Another approach can utilize continuous interaction terms between predictors of interest and length of residence (or the specific variable that identifies the phase transition) in multiple regression models (Aiken et al., 1991). In that way, scholars do not need to identify the cut-off point for the beginning and the end of phase transitions beforehand. One such study tested the interaction between age (a well-known protective factor against victimization experiences) and length of residence and found that it took between three to four years after immigration for the factor age to become a significant protector against victimization in two independent samples: Russian adolescent immigrants in Germany and Israel (Jugert & Titzmann, 2017).

Acculturation research may profit from studying acculturation processes as phase transitions with particular risk and protective factors and from investigating the duration of phase transitions. It also seems plausible that the duration of phase transitions differs between individuals and across developmental contexts so that researchers may be able to identify factors that can extend or reduce its length. In addition, the migration to a new country is not the only phase transition that acculturation science

may turn to. There are many other potential developmental phase transitions for acculturating adolescents (e.g., they change their school, they start a romantic relationship) or for their family (e.g., siblings are born, parents get divorced, parents start a new job, the family moves to a new home). These phase transitions may co-occur with acculturation processes so that the family systems need to be restabilized thereafter, which may be windows of opportunities for adolescents to change their acculturation trajectories. Such developmental phase transitions, hence, may affect acculturative processes and may explain sudden acculturative changes as well as regressions in already established cognitions and behaviors.

3.3 Continuity and Discontinuity

A third consideration from developmental science is the question of what actually instigates such change. The answer of acculturation models is often driven by particular variables: acculturative stress, a cognitive preoccupation with who am I, or novel learning experiences (Berry, 1997; Ward, 2001). Developmental theories can add a temporal perspective to these lines of thinking, because ontogenetic change can be the result of discontinuity or continuity (Schulenberg & Maslowsky, 2015). If ontogenetic change is seen through a model of discontinuity (also termed the “contact sport” model), developmentally proximal characteristics are assumed to determine a given outcome. The result is that scholars tend to look for situational, short-term factors, such as situational aspects of peer interactions that may motivate adolescents to show acts of delinquency (Cohen & Felson, 1979). If, on the contrary, ontogenetic change is seen through a model of continuity (the “shot out of a cannon” model), developmentally distal characteristics determine a given developmental outcome (Schulenberg & Maslowsky, 2015). Models of continuity, for example, state that developmental outcomes are determined quite early in life so that investments should be made as early as possible (e.g., Heckman et al., 2013).

Acculturation research is only in the beginning of considering such temporal aspects of acculturation processes. A key question in this regard is whether acculturative outcomes are the result of temporally distant immigration conditions like pre-migration factors and conditions during the transition to a new country, or whether they are the result of more proximal factors – i.e., the daily interactions with members of the own or other ethnic communities in the new country. A substantial amount of acculturation research, however, does not address this question; instead, variable oriented and rather static personality science models dominate (e.g., Titzmann & Lee, 2022). Nevertheless, acculturation research revealed evidence for both ontogenetic continuity and discontinuity. In terms of continuity, long-term associations have been identified, such as effects of the preparation for the transition to a new country or other pre-migration factors on long-term adaptation of immigrants in the new country (Stoessel et al., 2014; Yijälä & Jasinskaja-Lahti, 2010). Other studies, however, also revealed discontinuity or short-term effects of day-to-day interactions. Along this line of thinking, daily diary data accounted for the short-term adaptation of immigrant or minoritized adolescents (Civitillo et al., 2024; Yip et al., 2022). Hence, acculturation research has found support for both continuity and discontinuity models, but is not (yet) able to provide a solid answer as to under which circumstance and for which outcome which model of ontogenetic change is more relevant or how the interplay between both models can explain long- and short-term adaptation of immigrant youth.

Acculturation research can also profit from this line of thinking through a more thorough consideration of the psychological mechanisms underlying expected effects. Some mechanisms may require substantial time intervals to unfold. If acculturation processes are mediated through social network or personality changes, which require months or years to unfold (Roberts et al., 2006; Wrzus et al., 2013), time intervals

between longitudinal assessments have to be substantial. Other mechanisms, for example mediations through mood alterations or sleep patterns, may be uncovered in much shorter intervals. Research on the effects of racial-ethnic discrimination illuminates both lines of thinking. The study by Yip et al. (2022), for instance, found that racial-ethnic discrimination had a delayed effect on the mood of minoritized adolescents of about one or two days. The delay is explained through disturbances in adolescents' sleep patterns. In other words, adolescents who are discriminated against do not sleep well after unpleasant discrimination experiences and are less concentrated and less relaxed the day after. Due to the short intervals in these mechanisms, these effects may be considered as examples of discontinuity. Other studies assume more long-term effects of discrimination on health disparities through processes of cell-ageing. The basic assumption here is that racial-ethnic discrimination is a form of psychological stress that accelerates telomere shortening (Chae et al., 2020; Lee et al., 2017). Telomeres are protein-DNA complexes that shorten after cell division and are valuable markers of cellular aging and may be responsible for an accelerated effect of discrimination on ageing (Coimbra et al., 2020). These processes take longer and hence, effects of racial-ethnic discrimination would only be seen after longer time lags and are an example of continuity.

In sum, considering temporal aspects of acculturation has consequences for research designs and in particular for the definition of lags in multiple assessment waves. Scholars need to ensure that assessment lags match the hypothesized mechanisms with shorter intervals for discontinuity and longer intervals for continuity assumptions (or combining both in measurement burst designs; Ram et al., 2014). Temporal considerations may also be helpful in explaining mixed findings. There is, for example a mismatch between cross-sectional and longitudinal evidence with regard to the

question of whether integration is the most beneficial acculturation strategy (Bierwaczek & Kunst, 2021). One explanation of this mismatch may be found in temporal aspects. It is well known that interventions may be sustainable, may fade out, or may increase (i.e., sleeper effect) with time (van Aar et al., 2017) and longitudinal research has shown that effects between predictors and outcomes differ depending on time intervals between assessments (Voelkle et al., 2018). When applied to acculturation research, this means that effects of certain acculturation strategies on immigrant adolescents' psychological adaptation may change over time contributing to heterogeneity in findings across studies.

3.4 Developmental (Pubertal) Timing

A fourth aspect in which developmental science can contribute to acculturation theory and research is related to different concepts of how acculturative change unfolds over time. Developmental Science can offer substantial insights in this regard from the intensive study of puberty. Puberty is a particular period of life that is characterized by multidimensional changes and tremendous interindividual differences in change trajectories. Developmental science has investigated bio-psycho-social changes and developed novel concepts to describe pubertal timing. Scholars have shown that it matters how adolescents progress through puberty: Trajectories into depression or risk-taking behavior, for instance, depend on when puberty begins (timing), whether adolescents are early or late as compared to peers (relative timing), how long it lasts from the first pubertal changes to reaching maturity (tempo), how fast pubertal changes occur (pace), and whether pubertal changes are similar or different across domains of maturity (synchrony) (Mendle, 2014; Stumper et al., 2020; Weichold et al., 2003). Puberty research can be a blueprint to make acculturation research more dynamic and less static.

Recent acculturation models have applied

these dynamic concepts of timing to acculturation research (Lee et al., 2020; Titzmann & Lee, 2022). The model differentiates between acculturative timing (chronological timing: youth's age at time of migration; transition timing: the actual start of acculturative changes that may precede or succeed the physical migration; and relative timing: the deviation in acculturative change from peers and relevant others of the same cohort), acculturation tempo (the duration of acculturation processes from start to a defined end), acculturation pace (the speed or rate of change in acculturation), and acculturation synchrony (whether adaptation unfolds similarly across different spheres of life). Empirical evidence suggests that these dynamic concepts can add to our understanding of acculturation. One study investigated the rate of change in language acquisition and found that conflicts in the family became more likely when immigrant adolescents acquired the new language more rapidly (Aumann et al., 2022). This finding adds a dynamic perspective to research on acculturation gaps (Lui, 2019; Sun & Geeraert, 2021; Telzer, 2010), because it suggests that the difference between parents and adolescents (i.e., the extent of the acculturation gap) may be only one aspect in immigrant adolescents' family relations. A different aspect may be sudden substantial changes that can destabilize family systems and may be the beginning of family system change. In addition, relative acculturation timing (deviations from peers) and acculturation transition timing (preparing for the transition to a new country) were found to predict the long-term adaptation of immigrant youth (Titzmann et al., 2023). On a more abstract level, these findings add a novel notion on potential side effects of acculturation that are not (yet) studied in greater detail: The acquisition of the new language, for example, may be advantageous for school success and host adaptation and, hence, may be a desirable characteristic from a societal perspective, but it may come at costs in the family and peer environment if the family or intra-ethnic peers do not value and support these

changes.

Methodologically, each of these aspects of acculturation timing requires specific considerations that are elaborated elsewhere (Titzmann & Lee, 2022). Some components, such as measuring acculturation pace, require longitudinal data to assess the rate of change between or within individuals. Other concepts, such as the deviation from peers of similar length of residence (i.e., relative timing) or how long it took to reach acculturative milestones (i.e., acculturation timing) can also be assessed in cross-sectional or self-report data. Importantly, not all acculturation timing components may be relevant for all outcomes so that researchers have to determine which temporal component of acculturation is relevant for which adaptation process. Table 2 illustrates some methodological approaches as well as potential areas of research for each component of acculturation timing.

3.5 Nonergodicity

A fifth contribution that developmental science can provide are approaches that differentiate between within- and between person effects. A problem not just in acculturation research is that psychologists often use group-based statistics to make claims about individual development over time (Reitzle & Dietrich, 2019; van der Gaag, 2023). But as shown by Molenaar (2004), this approach only holds when the (unrealistic) two assumptions of ergodicity (i.e., the assumption that the average value over a set of individuals in a sample will be equivalent to the average across a time series of points for a single individual) are met: homogeneity (i.e., all individuals are similar to each other) and stationarity (i.e., all individuals do not change over time). More and more evidence suggests that this is not the case for many psychological phenomena like personality structure, emotion dynamics, and identity development (van der Gaag, 2023) and that these phenomena reflect nonergodicity instead. Thus, group-level models may not capture average within-person

Table 2**Temporal Components of Acculturation Change (Titzmann & Lee, 2022)**

Component	Definition	Measurement
Acculturation Timing: Chronological	Time since or developmental stage at the day of immigration to a new country	Age at time of migration (or developmental age as measured by age-specific competencies or skills); length of residence
Acculturation Timing: Transition	The start of acculturative changes, which may precede or succeed the actual physical migration	Pre- and post- migration assessments of the start of acquisition of cultural knowledge and skills; retrospective measures
Acculturation Timing: Relative	The deviation in acculturative change from immigrant peers from the same cohort and context	Deviation from predicted values based on peer reports or from standardized acculturation scores, self-reported deviation
Acculturation Tempo	The duration of progressing through relevant acculturative tasks or stages	Measurement of the time from start to achieving a particular competence (e.g., language certificates) or milestone (e.g., job); or the timepoint when change rates in a specific process become very small in longitudinal studies; self-reported end of adaptation processes
Acculturation Pace	The speed at which acculturation occurs, which may vary inter- and intrapersonally	Rate of change between assessments in longitudinal research: difference scores, slopes in Latent Growth Modelling, true change scores
Acculturation Synchrony	The adaptation across different spheres of life	Measuring acculturation in multiple dimensions

processes accurately because between-individual correlations can be completely different from within-individual correlations (Hamaker, 2023). Complex Dynamic Systems (CDS) theory (Smith & Thelen, 2003; van Geert, 2011) makes a strong case for examining developmental processes in a person-centered (i.e., within-individual) manner, assuming for instance that current psychological states depend on individual previous states, which is called *iterativity* or history dependence in CDS terms. Yet, current theorizing often does not account for such effects of history dependence.

This observation also applies to most theories in acculturation science, which tend to be un-specific and vague about whether acculturative change should take place at the within- or the between-person level. Following these ideas, there is now stronger attention to the distinction of between-subjects differences (e.g., differences in attitudes between individuals) and within-subjects processes (e.g., attitude change within individuals across time). Traditionally, cross-lagged models have been used to study within-person effects. However, in traditional cross-lagged panel models within- and between-person sources of variance are conflated and it has been shown that this conflation can produce spurious effects (Hamaker et al., 2015). The few studies that have started to separate between-person from within-person effects (e.g., using random intercept cross-lagged panel modeling [RI-CLPM]) have led to some surprising and sobering findings. Investigations that are related to acculturation research using well-powered studies showed between-person but no within-person effects of intergroup contact on outgroup attitudes (Friehs et al., 2024; Shulman et al., 2024). These findings are in conflict with the contact hypothesis assuming that contact leads to intra-individual attitude change. More directly relevant to acculturation research, Romero et al. (2020) examined the relationship between bicultural stress and mental wellbeing among

Latinx immigrant adolescents using a RI-CLPM framework (Hamaker et al., 2015). Their findings showed mostly inconsistent within-person effects between bicultural stress and mental wellbeing, putting into question whether the observed between-person relationship of these constructs (e.g., adolescents higher in bicultural stress also score higher on depressive symptoms) actually reflects a causal relationship. Even studies that do find significant within-person relations between acculturation behavior and psychological adaptation suggest that it is important to differentiate between within-person and between-person effects because they can diverge. Serrano-Sánchez et al. (2024) showed that while home-cultural behavioral engagement was negatively associated with psychological adaptation at the within-level, host-cultural behavioral engagement was not significantly related to psychological adaptation at the within-level despite showing a significant relationship when analyzed using traditional CLPM. These examples underscore that acculturation research may profit from teasing apart interindividual differences from intra-individual change in order to produce findings that indeed allow to show how individuals change due to acculturative processes.

Methodologically, longitudinal assessments are a prerequisite to differentiate between- and within-person effects. A relevant aspect in this regard is the time between measurement intervals, because within-person processes need a certain period of time to unfold its effects. In medicine, this period may be seen as incubation time – the time it takes from a trigger (e.g., the infection) until the result is known (e.g., symptoms of the flu are recognized). As mentioned earlier, scholars have shown that effects between predictors and outcomes can vary depending on the time interval between measures (Hecht & Voelkle, 2021). To detect within-person effects, it seems wise to not only conduct longitudinal studies with months or years between assessments, but to systematically vary time intervals between short-term

time intervals based on theoretical considerations (Lerner et al., 2009) that may span from experience sampling methods (e.g., daily diary designs) to decade spanning longitudinal assessments (e.g., Becht et al., 2021).

Particularly experience sampling studies, in which participants answer questions once daily or even multiple times per day, have been shown to detect within-person change. These designs are particularly helpful to understand the impact of day-to-day or moment-to-moment experiences and move away from a pure focus on interindividual differences to include intra-individual change processes and can combine idiographic (patterns of change within individuals) and nomothetic (patterns of differences across individuals) methods (Ong & Leger, 2022). The advantage of such studies is that they investigate intra-individual change that is not confounded by between-person variability (even though between-person variability can be additionally analyzed in moderator analyses).

One of the few studies in the area of acculturation using such a design showed that daily fluctuations in acculturation components (practices, identities, values) were negatively associated with psychological wellbeing (Schwartz et al., 2021), whereas another study with longer time intervals (6-months) found that acculturative changes were positively associated with psychological adjustment (Schwartz et al., 2015). This differentiation between sudden day-to-day changes and more gradual changes, thus, is helpful to get a more complete picture of the dynamics of acculturation phenomena and shows that short-term and longer-term processes may not always match.

Besides a focus on within-person change, daily-diary designs are also helpful to understand the impact of both positive and negative interactions between immigrant youth and their surrounding socio-cultural contexts. For instance, one study examined the relationship between individual differences in

agreeableness and mainstream cultural orientation among ethnic-racial minority university students (Wu et al., 2024). They found that daily inter-ethnic contact mediated the effect of agreeableness on mainstream cultural orientation and on days when these students experienced less ethnic-racial discrimination, more agreeable students scored higher on mainstream cultural orientation. Another study examined the impact of daily experiences of school-based ethnic-racial discrimination among ethnic minority adolescents and showed that among those experiencing more (vs. less) discrimination from peers and teachers, school engagement fluctuated more strongly across days and that daily discrimination by teachers was negatively related to same-day cognitive engagement and next-day emotional engagement (Civitillo et al., 2024).

3.6 The Person-in-Context Approach

The sixth contribution relates to the understanding of individual development in context. A core tenet of developmental science is that human development takes place within person-context relationships (Bronfenbrenner, 1995), which necessitates to take a person-in-context approach to study the bidirectional influences that contexts have on individuals but also how individuals are active agents who act upon their environments (Lerner et al., 2015; Titzmann et al., 2024). Methodologically, a person-in-context approach to immigrant youth adaptation can be tackled by using dyadic designs (e.g., parent-child relationships), multi-level-designs that span from the individual to the societal level (cf. Asendorpf & Motti-Stefanidi, 2020), as well as social network designs (Leszczensky & Stark, 2020). Studies using such complex designs are still rare in acculturation research, probably also because they are time and resource intensive.

Dyadic designs help to better understand immigrant youth development and processes of enculturation in their immediate proximal microsystem (e.g., the family) and can be coupled

with data from other agents of the microsystem (e.g., neighborhood, school). For example, Tse et al. (2024) examined ethnic identity development of Mexican-origin adolescents and their mothers and how this is shaped by neighborhood contexts (i.e., levels of racial-ethnic diversity) using parallel latent growth models. Findings showed mother-child connectedness in ethnic identity exploration (but not ethnic identity centrality or resolution) as well as neighborhood effects, such that mothers living in more diverse neighborhoods were less likely to explore their ethnic identities. In another example, Titzmann and Gniewosz (2018) used Actor-Partner-Interdependence Models to examine transmission effects from adolescents to their mothers in a sample of immigrant mother-adolescent dyads in Germany. Their findings showed that particularly adolescents more heavily involved in family obligations and with good command of the host language (i.e., German) had a positive impact on their mothers' socio-cultural adaptation.

Multi-level designs allow to examine effects of higher-order units on lower-order units, for example, effects of the classroom (e.g., ethnic diversity) or neighborhood on the social-emotional adjustment of immigrant and non-immigrant students – apart from taking into account statistical dependencies of individuals with their contexts (e.g., students nested in classrooms). One such study revealed that ethnic diversity at the classroom level was associated with less victimization among ethnic minority (including first generation immigrant) adolescents but not related to victimization among ethnic majority students across four European countries (Spiegler et al., 2024). Such studies show that acculturation research may profit from a more contextual perspective where acculturating individuals are seen as part of their context who do not only act as individuals, but as part of a higher order group. For adolescents, the classroom may indeed be an evident higher order contextual factor, but for acculturation phenomena, classrooms or

schools as a whole may not always be the most meaningful higher-order unit, because this wholistic perspective ignores the ethnic composition of classrooms. Classes and schools may be further divided into groups – for example by ethnicity, heritage, or self-identification. One study examined the association of acculturation orientations with acculturative hassles (e.g., difficulties arising from having to deal with a new language and different cultural norms) among first-generation immigrant youth from the former Soviet Union (Titzmann & Jugert, 2015). Results showed that immigrant adolescents' individual outgroup orientation (i.e., how open they were to contact with ethnic majority peers) was negatively associated with acculturative hassles, but only if their fellow co-ethnic immigrant peers at school also scored on average medium to high on outgroup orientation. There was no significant association when co-ethnic peers scored low on outgroup orientation. In this case, the higher-order unit is schools but the relevant school characteristics were only aggregated from immigrant and not from non-immigrant students.

Multi-level designs can be easily extended to include developmental changes by including multiple assessments (e.g., time points nested in individuals who are nested in classrooms). A study using such a design examined the role of social context on the development of prejudice among Swedish majority adolescents and found that youth from ethnically more diverse classrooms were less affected by their parents' prejudice than youth from less diverse classrooms (Miklikowska et al., 2019). A similar design was used in a study examining the role of classroom adversity (indexed by student-reported socio-economic family status) on academic achievement, showing that while overall academic achievement decreased across three years of secondary school among both immigrant- and non-immigrant adolescents, this decrease was less marked among students attending more socially adverse classrooms (Motti-Stefanidi et al., 2012).

Classrooms are complex social arenas for adolescents' peer relations that involve both dyadic relationships (e.g., best friend) but also larger networks of friends (e.g., cliques). When one is interested in the development of peer relationships in classrooms, for instance whether there are tendencies to favor friends from the same ethnic group over friends from other ethnic groups (termed ethnic homophily), or to tease apart friendship selection from influence effects based on a certain behavior like smoking, dyadic and multi-level designs no longer suffice. Instead, (longitudinal) social network analyses (SNA) are necessary that are able to account for the *opportunity structure* of a particular classroom context (e.g., the opportunity to meet ingroup and outgroup friends) and relational network processes like *reciprocity* (e.g., individuals are likely to consider those as friends that initiate a friendship relation) and *transitivity* (e.g., friends of friends are also likely to become friends). For an introduction to social network analyses see Leszczensky and Stark (2020). Studies using SNA are still relatively rare in the area of acculturation research. For example, Sadewo et al. (2020) examined whether international students were more likely to select friends based on their level of psychological and sociocultural adjustment (i.e., selection) or whether friends became more similar on these two outcomes over time (i.e., influence). They found mostly selection and no influence effects – international students deselected friends dissimilar in psychological adjustment over time and they were more likely to befriend peers who differed in their level of sociocultural adjustment to themselves.

In sum, acculturation research may profit from a more contextualized view on acculturative change using dyadic, multi-level, and social network models.

3.7 Developmentally Informed Interventions

Finally, developmental science can inform acculturation research with regard to issues of causality in empirical research. If acculturation

indeed refers to changes in individuals' and groups' cultural behaviors, values, and identifications over time *due to* cultural exchange (Schwartz et al., 2020), acculturation processes need to be studied through a causal lens. If one takes these assumptions to heart, one would expect studies on acculturation to be either longitudinal or experimental. Unfortunately, this is far from true (Kunst, 2021). The snapshot approach to acculturation processes is a major challenge because it is impossible to tell whether cross-sectional differences observed between individuals are due to differences in acculturative timing, different subgroups within one larger sample (Hernán et al., 2011), or due to qualitatively different approaches to acculturation (Schwartz et al., 2020). Hence, although acculturation research has theoretical ideas about cause and effect, the empirical data often cannot address questions of causality, which has meanwhile been referred to as the 'causality crisis' in acculturation research (Kunst, 2021). The well-known integration hypothesis (Berry, 1997), which states that bicultural individuals (high in culture maintenance and culture adoption) will have the best psychological adaptation outcomes, for example, found little support in longitudinal studies (Bierwiazzonek & Kunst, 2021), and effect sizes of cross-sectional findings varied so greatly that integration may even be associated with negative psychological outcomes in 30 % of all studies (Bierwiazzonek et al., 2023).

Hence, acculturation research may profit from engaging in thinking more closely about causality. In order to achieve this aim, it is crucial that future work also employs more experimental designs. A further challenge in this regard is that acculturation research is often limited with regard to the feasibility of experimental manipulation. Individuals, for example, cannot be randomly allocated to certain immigration conditions and resources for immigrant adaptation programs cannot be detained from those in need. Hence, it may not always be feasible or ethically viable to conduct experimental

lab studies.

Developmental Science and other fields in psychology have faced similar challenges and developed elaborated intervention research strategies that can be informative for acculturation research as well (Montgomery et al., 2008; Wuermli et al., 2015). Intervention studies are particularly powerful if they are evaluated using experimental or quasi-experimental designs with potentials for causal inference. For example, it is well-established that social and emotional learning programs (SEL) show robust and substantial positive program effects (i.e., taking part in these programs improves social and emotional learning), particularly if these programs meet recommended implementation practices (Sequenced, Active, Focused, Explicit) (Durlak et al., 2011). Similarly, effects of intergroup contact on prejudice could be uncovered in randomized experimental trials (Paluck et al., 2019) and a number of social psychological interventions could show causal effects on minoritized students learning outcomes (Yeager & Walton, 2011). For example, experiments have shown that the negative effects of stereotype threat on mathematic performance through the double jeopardy of being a girl with an ethnic minority background can be reduced through self-affirmation tasks (Lokhande & Müller, 2019). Although the concept of stereotype threat received some criticism recently (e.g., Picho-Kiroga et al., 2021), research associated with it shows how experimental methods can inform acculturation research on various ethnic groups. One form of developmentally informed interventions in acculturation processes that has attracted a lot of research attention lately is the 'identity project' intervention (Umaña-Taylor & Douglass, 2017). This intervention builds on the idea that developing a sense of identity is a core developmental task in adolescence and that exploration of and commitment to racial-ethnic identities can be a positive resource for immigrant and ethnic minority adolescents (Umaña-Taylor et al., 2014). It should be added that a recent

meta-analysis on identity interventions suggests that effects of the identity project intervention are less robust than previously thought and more research is needed to understand when it may work and for whom (Crocetti et al., 2024).

Such intervention projects may help acculturation research to become better in testing causality assumptions in its theories. Nevertheless, intervention research is not without challenges – particularly in acculturation research: What is a good control group? Which is the best timepoint for follow-up assessments? Does the intervention result in iatrogenic effects (i.e., adverse side effects) and how can they be detected? Which program elements contribute most to the success or failure of a particular intervention? How can scientific test trials be scaled up to state- or nation-wide implementation? Who is the best person (e.g., researchers, therapists, counselors, teachers, or peers) to deliver the intervention? All these questions require a thorough planning of interventions based on state of the art intervention research literature (Melnyk & Morrison-Beedy, 2012). Hence, it may sometimes and for some questions be difficult to base novel findings on experimental work. In this case, more sophisticated methods of causal modelling may be a viable alternative even with (longitudinal) correlational data although they do not allow for causal inference in the way that experiments with random allocation to conditions do. These methods include regression discontinuity models (Imbens & Lemieux, 2008) or more recent data-driven machine-learning models that help to detect causal factors (Biazoli et al., 2024). In some cases, quasi-experimental variations or natural experiments can be informative, and individuals on waiting-lists may serve as an option for control groups. Despite these additional efforts, the potential to inform about causal effects seems worth the burden of time and labor-intensive intervention studies because it may indeed fill a widely known gap in acculturation research.

4. CONCLUSION

The most striking communality between developmental psychology and acculturation research is the interest in the understanding of change over time. This commonality alone suggests that acculturation research and developmental psychology would profit from a comprehensive integration of both lines of theory. Acculturation research, on the one hand, may profit from a better understanding of dynamic processes of acculturation. Developmental psychology, on the other hand, may profit due to increased sensitivity with regard to developmental processes in a growingly multicultural world, in which universal developmental processes may become less likely. There are, however, also other arguments for a more thorough integration of developmental psychology and acculturation research. Particularly in adolescence (but, in fact, across the whole lifespan) developmental and acculturative changes co-occur and it is therefore necessary to examine both processes in concert in order to avoid one-sided and misguided interpretations. Not only in the study of immigrants, but also in the study of the ethnic majority populations (Kunst et al., 2021), which can also acculturate through direct culture contact or through processes of media consumption and remote acculturation (Ferguson, 2013; Ferguson et al., 2016).

This review aimed at providing some impulses for how developmental psychology may advance our understanding of acculturation research to make it more dynamic and less static. We are aware that this review cannot be fully comprehensive as there are more theoretical approaches and lines of thinking. It is important, however, that the ideas find their way into relevant research. If taken seriously, longitudinal assessments (which became more common in this line of research recently) are not sufficient to uncover acculturative processes. Longitudinal data are only a first step, but require more theoretical assumptions on the dynamics, have to be planned in terms of

spacing between assessments, should be combined with assessments of relevant developmental processes, would profit from implemented intervention trials, and need to be analyzed with sophisticated statistical tools. The presented approaches will not only help to showcase the changes taking place in acculturation processes, but will also be able to uncover the mechanisms that drive acculturative change. The latter is going to be decisive if the long-term goal of acculturation research is not only to describe and predict how individuals change when they move from one culture to another, but aims at providing a scientific rationale for prevention and intervention programs that can help individuals in multicultural societies to live up to their fullest potentials independent of their heritage.

5. CONFLICTS OF INTEREST

The authors declare no competing interests.

6. AUTHOR CONTRIBUTIONS

PFT produced first drafts on the introduction, conclusions, life stage principle, continuity and discontinuity, phase transition, and puberty. PJ produced first drafts on nonergodicity, person in context, and intervention. Afterwards, both authors jointly revised all parts of the manuscript in various rounds of revisions.

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