AMERICAN PSYCHOLOGICAL ASSOCIATION

Developmental Psychology

ISSN: 0012-1649

2024, Vol. 60, No. 11, 1992–2007
https://doi.org/10.1037/dev0001657

Reexamining Developmental Continuity and Discontinuity in the 21st Century: Better Aligning Behaviors, Functions, and Mechanisms

Isaac T. Petersen
Department of Psychological and Brain Sciences, University of Iowa

Developmental science aims to explain development across the lifespan. Jerome Kagan observed that the same behavior can occur for different reasons, and differing behaviors can occur for the same reason. To help account for persistence, desistence, and transformation of behavior across development, Kagan introduced various types of continuity and discontinuity of forms and functions of behavior. This framework provides opportunities for identifying explanatory mechanisms in behavior development. However, misconceptions remain in applying the concepts that Kagan introduced. Much of the literature assumes developmental continuity in constructs without examining whether assumptions are supported, leading to faulty developmental inferences. For instance, the use of the same measure across time to assess development assumes that the behavior occurs for the same reason across time (homotypic continuity). In addition, just because one behavior predicts a different behavior at a later time does not necessarily indicate that age-differing behaviors occur for the same reason (heterotypic continuity). This review aims to advance conceptualizations of continuity and discontinuity from a contemporary perspective with aims to improve mechanistic understanding of behavior development across the lifespan. To better align behaviors, functions, and mechanisms, research should (a) examine (dis)continuity of individual behaviors rather than merely syndromes, (b) identify the function(s) of the given behavior(s), and (c) identify the cognitive and biological processes that underlie the behavior–function pairs. Incorporating examples from research on development of humans and nonhuman animals, I discuss challenges from work that has followed Kagan's ideas and ways to advance understanding of continuity and discontinuity across development.

Public Significance Statement
Research in developmental science has paid insufficient attention to types of developmental continuity and discontinuity. To advance understanding of development across the lifespan, research should (a) examine (dis)continuity of individual behaviors rather than merely syndromes, (b) identify the function(s) of the given behavior(s), and (c) identify the cognitive and biological processes that underlie the behavior–function pairs.

Keywords: continuity, discontinuity, stability, heterotypic continuity, homotypic continuity

Developmental science aims to explain development across the lifespan—including development of behavior, cognition, emotion, and biology, in interaction with the environment. However, despite inadequate empirical support, much research assumes that the same behavior—or age-differing behaviors—occur for the same reason across time. For instance, use of the same measure across development to study children's change in externalizing behavior assumes that such behaviors reflect the same process at each developmental period. Likewise, use of age-differing items to assess math skills assumes that such performance reflects the same dimension or construct of math ability across development. Developmental inferences depend on accurately specifying the functions and mechanisms that underlie behavior. Assumptions of continuity in behavior form, function, and/or mechanism impede progress by preventing researchers from more fully specifying the processes that underlie behavior and development. Moreover, incorrect assumptions of continuity lead to faulty inferences of development. The present review aims to advance conceptualizations of continuity and discontinuity from a contemporary perspective. Consistent with the aims of the special issue, I first briefly describe the history of continuity and discontinuity and Jerome Kagan's contributions. Then, I describe various types of continuity and discontinuity, when they are most likely to occur, and challenges and recommendations when applying these concepts. For a more comprehensive

This article was published Online First October 19, 2023.
Isaac T. Petersen https://orcid.org/0000-0003-3072-6673
Isaac T. Petersen was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (Grant HD098235). The author graciously thanks Mark Blumberg for providing helpful feedback on an early draft of the article. The author declares no conflicts of interest. The preprint of this article was posted at the following URL: https://psyarxiv.com/ghkm6.

Isaac T. Petersen served as lead for conceptualization, funding acquisition, writing–original draft, and writing–review and editing.

Correspondence concerning this article should be addressed to Isaac T. Petersen, Department of Psychological and Brain Sciences, University of Iowa, G60 Psychological and Brain Sciences Building, Iowa City, IA 52242, United States. Email: isaac-t-petersen@uiowa.edu

lens to understanding developmental continuity, I incorporate examples from research on development of humans and nonhuman animals.

Historical Perspective and Kagan's Contributions to Continuity and Discontinuity

Considerations of developmental continuity and discontinuity have a long and venerable history in developmental science. Issues of continuity and discontinuity go back to the ancients with the debate regarding whether the organism is preformed from biological characteristics (preformationism) or whether the organism's form begins as an undifferentiated mass that emerges over time (epigenesis). In the mid-20th century, Jerome Kagan aspired to explain why children with given temperamental tendencies showed particular behaviors in early childhood and different behaviors in adulthood. Kagan's discussion of continuity reflected the importance of temperament—that one's temperament influences how children interact with, interpret, and actively shape their environment, and that the child is an active agent in their environment. Temperament is defined as constitutionally based ways in which individuals regulate and react to their environment (Rothbart & Bates, 2006). Although there are many approaches to conceptualizing temperament, the most dominant models propose three general dimensions that are relatively orthogonal: positive emotionality, negative emotionality, and self-regulation (Bates et al., 2014; Rothbart et al., 2004). Individual differences in temperament are thought to be (a) early appearing, (b) biologically based, and (c) relatively stable (Rothbart & Bates, 2006). Individual differences in temperament emerge in infancy (Putnam et al., 2001). Moreover, individual differences in temperament are related to neural systems reflecting processes such as approach versus withdrawal tendencies (Nigg, 2006).

However, most relevant to the present review, individual differences in temperament and personality have been shown to be *relatively stable* across the lifespan (Costa et al., 2019). Although individuals' and mean levels of positive emotionality, negative emotionality, and self-regulation change across development, *individual differences* (i.e., rank order) in these dimensions tend to be relatively stable. That is, children who show more positive emotionality than their peers also tend to show more positive emotionality than their peers as adults (Bates et al., 2010; Costa et al., 2019). The stability of individual differences in dimensions of temperament allows the possibility that individuals show some degree of continuity in behavior form and/or function across development.

Continuity Versus Stability

Whereas the concept of continuity addresses the trajectory of development *within* individuals, stability refers to the maintenance of *between*-individual or group characteristics (Bornstein et al., 2017; Schulenberg et al., 2014; Schulenberg & Zarrett, 2006).[1] For instance, one might consider stability of the mean, variance, or rank order (individual differences) of a group's scores on a construct across time or the stability of the structure of a construct or of the stability of the strength of an effect (Harris et al., 2023). Rank-order stability refers to the maintenance of individuals' relative rank ordering (i.e., individual differences) across time. Mean-level stability refers to the maintenance of a group's average level across time. Mean-level and rank-order stability are distinct; scores can have high mean-level stability but low rank-order stability or vice versa, as depicted in Figure 1.

Continuity of some entity—for example, causes, courses, forms, functions, or environments—means that a given individual (or many given individuals) shows the same entity across time. For example, the person who shows the same behavior form at time point 1 (T1) and at time point 2 (T2) demonstrates continuity. By contrast, discontinuity indicates that a given individual (or many given individuals) shows a differing entity—for example, causes, courses, forms, functions, or environments—across time. For instance, the person who shows a different behavior form at T1 compared to their behavior form at T2 demonstrates discontinuity. As an example, a child's aggressive behavior shows continuity if the child hits others in childhood and adolescence. A child shows discontinuity in the form of the behavior if they hit others in childhood but not in adolescence. In contrast to continuity, physical aggression shows rank-order *stability* across childhood to adolescence to the extent that the children who are more physically aggressive (relative to their peers) also tend to be more physically aggressive (relative to their peers) in adolescence. A construct shows rank-order instability to the extent that individual differences at T1 are not associated with individual differences at T2—that is, an individual's standing relative to their peers at T1 indicates nothing about their standing relative to their peers at T2. Figure 2 depicts the distinction between continuity in course and rank-order stability. Physical aggression shows mean-level instability across childhood to adolescence to the extent that the average level of aggression (across individuals) changes from childhood to adolescence. Stability and continuity are not unitary; when describing them, it is important to specify which aspects of stability (e.g., of mean, variance, or rank order) and continuity (e.g., of causes, courses, forms, functions, or environments) one is referring to.

Although these examples are described with two time points for simplicity, it is preferable to evaluate (dis)continuity and (in)stability in longitudinal designs with three or more time points. For instance, it would be preferable to evaluate the continuity and stability of people's aggression across three or more time points. Use of three or more time points allows accounting for measurement error through growth curve modeling. Thus, use of three or more time points can provide greater confidence that people's apparent differences in level across time reflect true changes in their level on the construct (i.e., discontinuity in course) rather than merely measurement error.

Entities for Consideration of Continuity and Discontinuity

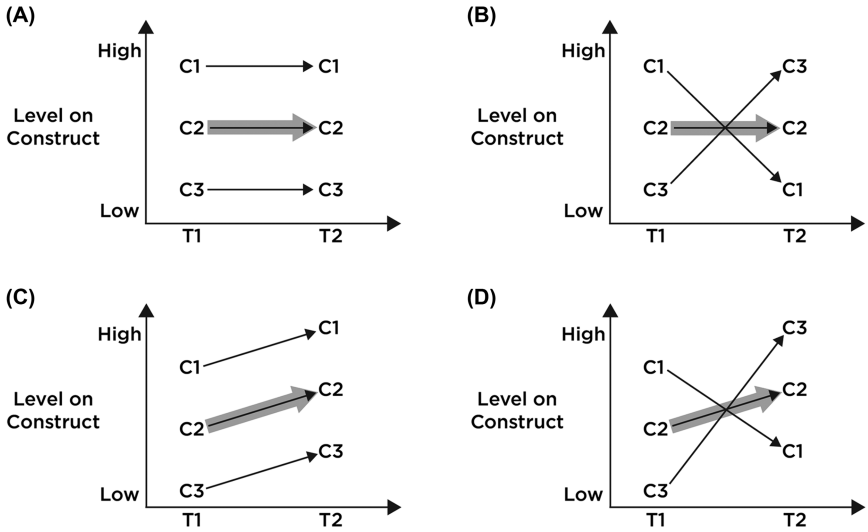
Now, consider a researcher who has evidence that a given person's behavior shows continuity over time. But, continuity in what? And what type of continuity? It is important to distinguish continuity and discontinuity in causes, courses, forms, functions, mechanisms, and contexts of behavior.

Contexts and Causes

Schulenberg and Zarrett (2006) distinguished continuity and discontinuity of four attributes of behavior: contexts, causes, forms, and functions. They referred to continuity of the causes of behavior as ontogenetic continuity. Ontogenetic continuity occurs

[1] My definitions of continuity and stability more closely align with those of Schulenberg and colleagues (2006, 2014) than those of Bornstein et al. (2017).

Figure 1
Mean-Level Stability Versus Rank-Order Stability



Note. C1, C2, and C3 are three individual children assessed at two time points: T1 and T2. (A) Depicts mean-level stability with rank-order stability. (B) Depicts mean-level stability with rank-order instability. (C) Depicts mean-level instability with rank-order stability. (D) Depicts mean-level instability with rank-order instability. The gray arrow depicts the mean (average) trajectory. T1 = time point 1; T2 = time point 2; C1 = child 1; C2 = child 2; C3 = child 3.

when events and experiences in childhood and adolescence continue to influence outcomes in adulthood. In this perspective, distal influences continue to progressively shape development. Ontogenetic discontinuity occurs when outcomes are influenced by more recent and current experiences rather than earlier experiences. Thus, ontogenetic discontinuity reflects more developmentally proximal influences. However, distal and proximal effects—and thus ontogenetic continuity and discontinuity—may both be present simultaneously. Proximal effects may operate independently of distal effects or may amplify, neutralize, or reverse distal effects.

As part of ontogenetic continuity and discontinuity, it is important to consider continuity versus discontinuity of the individual's surrounding social context and the broader cultural context and historical time. Various cultures and historical periods differ in their support for and expectations regarding continuity and discontinuity across the lifespan (Schulenberg & Zarrett, 2006).

Courses

One can also consider continuity and discontinuity of an individual's course. Here, I refer to "course" as one's trajectory (i.e., level across time) in a given construct or behavior. For instance, one child may increase over time in depression, whereas another child may decrease over time. Continuity in course can occur due to perpetuating or maintaining environmental factors in combination with dispositional factors. Discontinuity in course can arise from a variety of time-varying effects described later.

Forms, Functions, and Mechanisms of Behavior

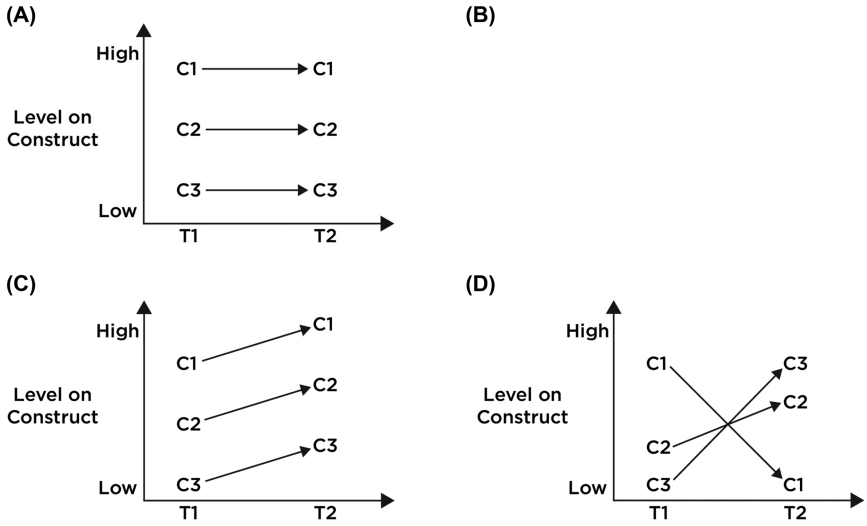
Discontinuity of the contexts and causes of an individual's development lays the foundation for discontinuity in the form and function of an individual's behavior across development (Schulenberg & Zarrett, 2006). The notion of continuity versus discontinuity of the forms and functions of behavior is typically attributed to Kagan (Kagan, 1969, 1971, 1980; Kagan & Moss, 1962). Kagan distinguished between the form of the behavior (i.e., its morphology) and its underlying construct (i.e., function or process). The behavior form refers to the manifest (i.e., observable) response. By contrast, in this context, a construct refers to a latent (i.e., not directly observable) concept of the process or function that underlies the behavior. The behavior's function may be considered the reason or adaptive value for a given behavior (Tinbergen, 1963). For instance, one child may hit others (behavior form) to gain access to a desired object like a toy (function), where the underlying construct might be callousness. A different child may hit others (behavior form) when threatened to protect oneself (function), where the underlying construct might be fear.

With advances in mechanistic understanding of behavior process, research should extend this framework to consider continuity versus discontinuity in mechanisms of behavior. Mechanisms of behavior are the behavior machinery (Tinbergen, 1963)—the biological substrate of a given behavior. For instance, one child may hit others due to neural activation patterns in reward circuitry, whereas another child may hit others due to neural activation patterns in fear circuitry.

Note that (dis)continuity of behavior form, function, and mechanism can occur independently of the course. For instance, a child may show continuity in high levels of externalizing behavior over time, indicating continuity in course, and may show different externalizing behaviors in early childhood (e.g., physical aggression) compared to adolescence (e.g., relational aggression), indicating discontinuity in behavior form.

Figure 2

Continuity in Course Versus Rank-Order Stability



Note. C1, C2, and C3 are three individual children assessed at two time points: T1 and T2. (A) Continuity in course with rank-order stability. (B) Has no depiction because continuity in course for all individuals cannot yield rank-order instability or mean-level instability. (C) Depicts discontinuity in course with rank-order stability. (D) Depicts discontinuity in course with rank-order instability. Continuity in course is sometimes called "stability in level." T1 = time point 1; T2 = time point 2; C1 = child 1; C2 = child 2; C3 = child 3.

Types of Continuity and Discontinuity

The four types of continuity versus discontinuity of the forms and functions of behavior that Kagan (1969) described are in Figure 3. The four types of continuity and discontinuity are depicted in Figure 4 with an example analogy using buildings.

Homotypic Continuity

Homotypic continuity (aka complete continuity) involves continuity of the behavior form and continuity of the construct. That is, the individual shows the same behavior form across development, and the behavior occurs for the same reasons. For instance, a child shows homotypic continuity if they tease others to get attention from peers and they continue in adolescence to tease others to get attention.

Phenotypic Continuity

Phenotypic continuity (aka functional discontinuity) involves continuity of the behavior form but discontinuity of the construct. That is, the individual shows the same behavior form across development, but the behavior occurs for different reasons across development. For instance, Kagan (1969) described crying as a potential example of phenotypic continuity. An 8-month-old might cry when they are hungry or encounter a stimulus that violates their expectations, whereas an 8-year-old might cry when they want to escape parental restrictions, fear being harmed, or anticipate punishment. As another example, a 14-year-old may use substances, such as alcohol, for experimentation and sensation seeking; however, in adulthood, the person may continue to use the substance in attempts to cope with their symptoms of anxiety or withdrawal (Schulenberg & Zarrett, 2006).

Heterotypic Continuity

Heterotypic continuity (aka genotypic continuity) involves continuity of the construct but discontinuity of the behavior form. That is, the individual shows different behavior forms across development that occur for the same reasons. In the seminal longitudinal Fels study, Kagan and Moss (1962) found that girls who had frequent tantrums at 6–10 years of age tended to become women who were more motivated in school, less dependent on others, and more masculine in their interests than women who had fewer tantrums as children. They interpreted the different behavior forms at different ages as arising from the same construct: a tendency to avoid adopting "female sex-role standards" (p. 200).

Heterotypic continuity is akin to the metamorphosis of a caterpillar to a butterfly and the transformation of water to ice or steam—the underlying essence stays the same but the manifestation changes. For example, it has been argued that self-regulation shows changes in behavioral manifestation from more rudimentary to more complex forms with development (Chang et al., 2015). Figure 5 provides an example depiction of how a construct, such as self-regulation, may show changes in behavioral manifestation.

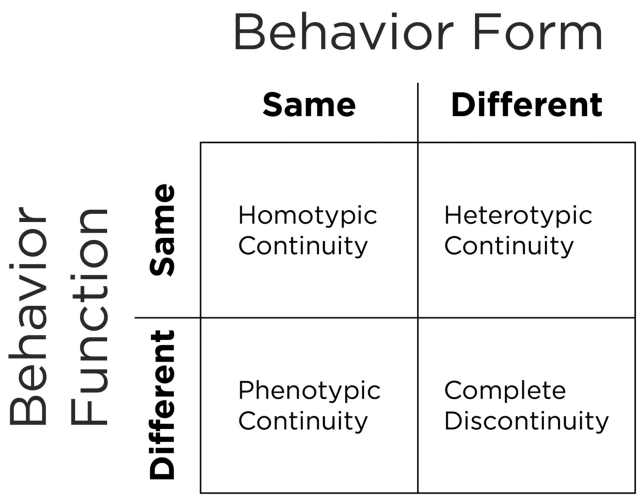
Complete Discontinuity

Complete discontinuity involves discontinuity of the behavior form and discontinuity of the construct. That is, the individual shows different behavior forms across development that occur for different reasons. We can consider complete discontinuity using

Figure 3

Type of Continuity Based on Behavior Form and Function Across Development

Type of continuity based on whether:
- the behavior form is the same or different across time, and
- the behavior function is the same or different across time



Note. The Latin square depicts Kagan's (1969) typology of continuity as a function of behavior form and function. However, it is also important to consider continuity versus discontinuity of the mechanisms underlying a given behavior–function pair.

Kagan's frame of societal gender norms. For example, a girl may show masculine interests and associated behaviors in childhood, whereas this individual may experience greater pressure as an adolescent to align with societal gender norms and show more feminine behaviors. In this case, the individual would be showing different behavior forms as arising from differing constructs, such as "masculinity" in childhood versus social conformity in adolescence.

Why Might Individuals' Behavior Show Discontinuity in Their Forms and/or Functions?

Given how prevalent discontinuity is in development, it is important to consider potential reasons why individuals' behavior may show discontinuity in their forms and/or functions. Discontinuity in forms and/or functions of behavior could occur due to many possible nonmutually exclusive reasons. Especially likely contributors to discontinuity in forms and/or functions of behavior are discontinuity in the contexts or causes of behavior. One possibility is time-varying genetic factors. If genetic factors express differently across development, behavior forms and functions could show discontinuity. Likewise, discontinuity in the environment could also help explain discontinuity in behavior forms and functions. For instance, which contexts a person experiences tend to vary across development. School entry represents an important transition in childhood and influences children's socialization agents and experiences. Additionally, Stamps (2003) described behavioral neophenotypes—new behaviors for a species due to their relocation to a different habitat. She argued that, if organisms relocate to a new environment after having developed for extended periods in a different type of environment, the organism may experience adjustment difficulties because "much of their morphology, physiology, and behavior has already been shaped by factors experienced in their previous environment" (p. 9). Different behavioral manifestations across environments are consistent with pathoplasticity of constructs—that constructs can manifest differently as a function of cultural, environmental, and individual factors (Beauchaine et al., 2018; Stompe et al., 2006), such as with culture-bound syndromes (Kaiser & Weaver, 2019; Ventriglio et al., 2016).

In addition, with development, there are changes in experience-dependent capacity that may lead to discontinuity in the forms of behavior. For instance, children may learn more advanced ways of accomplishing their goals, such as expressing their feelings verbally rather than through aggression. An additional potential reason for discontinuity in behavior forms and functions is sociocultural norms. As Kagan and Moss (1962) noted, "When [a behavior] conflicts with traditional sex-role standards, the relevant motive is more likely to find behavioral expression in derivative or substitute responses that are socially more acceptable" (p. 200). Stamps (2003) described phenotypic variety and (dis)continuity in behavior in terms of a reaction range or norm that arises from a complex interaction of genetics, the environment—through processes such as social learning and cultural transmission—and the developmental timing of experiences.

In sum, continuity in contexts, causes, and courses need not be present for heterotypic continuity or phenotypic continuity.

When Are Constructs Most Likely to Show Discontinuity in Behavior Form (i.e., Heterotypic Continuity)?

Kagan (1969, 1971) described the periods when constructs may be most likely to show discontinuity in their behavior form (i.e., heterotypic continuity). For instance, he argued that heterotypic continuity among humans was especially likely earlier in development, in particular the first 10 years of life (Kagan, 1969). During this developmental span, the child learns more effective ways of accomplishing their goals. Moreover, Kagan (1969) also argued that peers and family members tend to insist that a child inhibit behaviors they consider as inappropriate relative to sociocultural norms for one's age, gender, etc. In addition, Kagan argued that heterotypic continuity may be especially likely after major changes in the psychological ecology of the child, such as the birth of a sibling, changes in the family structure (e.g., new partner, divorce, separation), or entry into school.

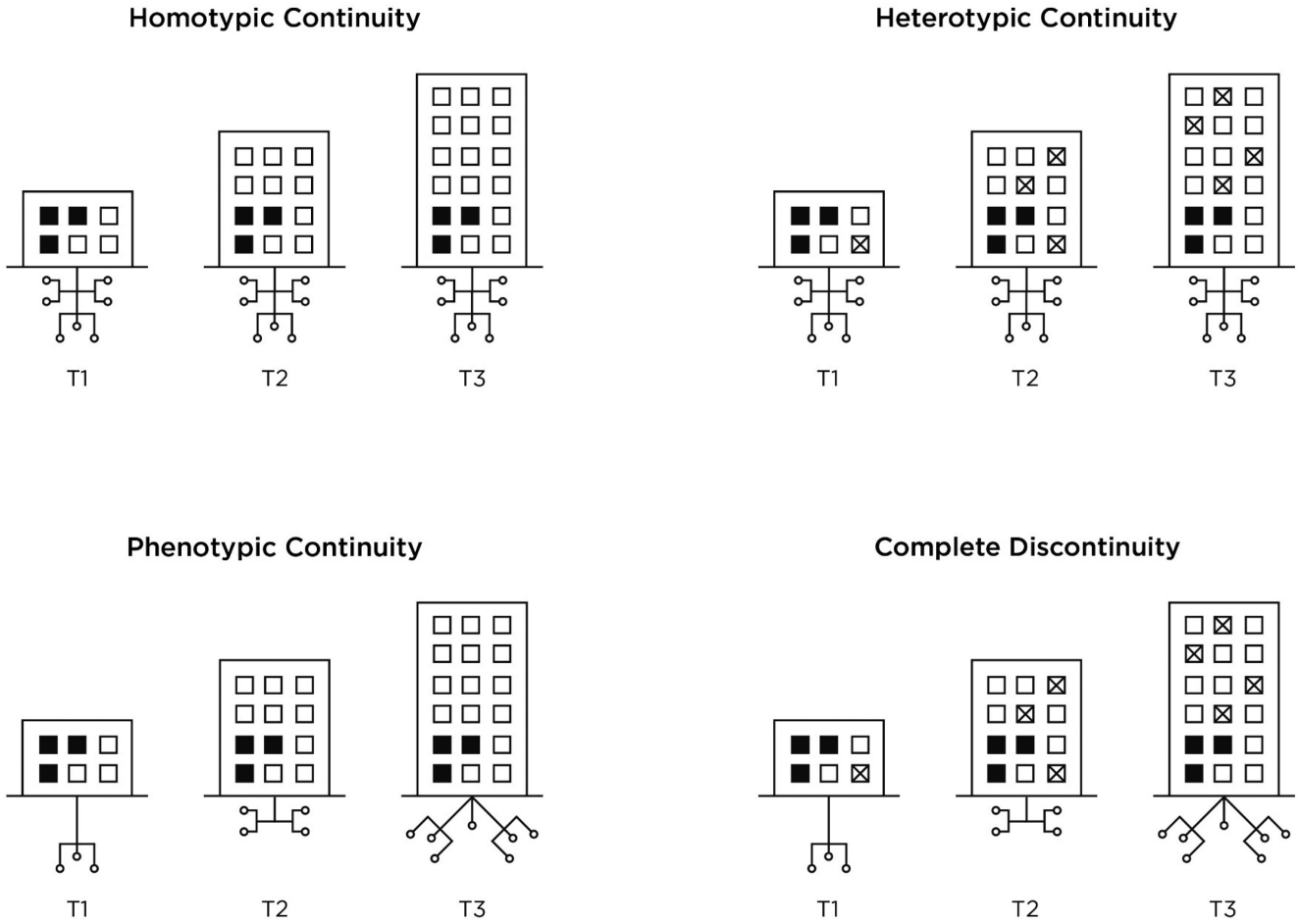
Moreover, he noted that heterotypic continuity may be more likely to occur when there are key developmental transitions that lead to the reorganization of behavior and process. According to Kagan, one such transition occurs between 18 and 24 months of age, during the emergence of language skills. Another transition may occur between 5 and 7 years of age, when children develop the ability to sustain attention on a problem, to inhibit inappropriate or irrelevant actions and to select appropriate ones. He noted that older children are better able than younger children to hide their anxiety from others, noting that older children have a thicker "veneer of defenses against anxiety" (Kagan, 1969, p. 998).

Identifying Discontinuity in Behavior Form for a Given Construct (i.e., Heterotypic Continuity)

There are several ways to identify discontinuity in behavior form for a given construct, that is, heterotypic continuity. As

Figure 4

Depiction of Types of Continuity and Discontinuity



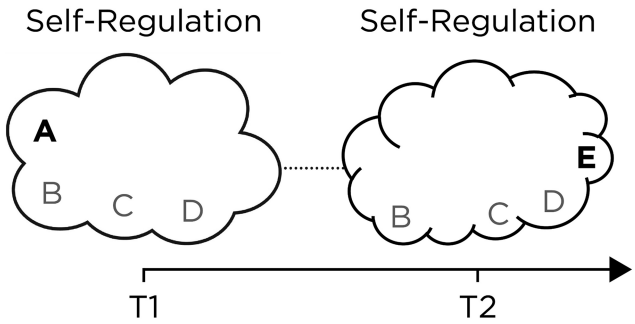
Note. Depiction of the types of continuity and discontinuity in the form of a 2 (behavioral manifestation, underlying processes) × 2 (same vs. different across time) Latin square. The illustrations above the lines are buildings, representing the surface structure (i.e., behavioral manifestation). The illustrations below the lines depict the underlying processes supporting the buildings at each time point. The squares on the buildings are windows. The black windows represent content facets that are active across all time points (i.e., age-common content). The windows that contain Xs represent content facets that are active at some but not all time points (i.e., age-unique content). The white windows represent content facets that are inactive and therefore are not part of the construct at that time point. The increasing size of the buildings at later time points reflects growth with development. The top row of the Latin square involves the same underlying processes across time, whereas the bottom row involves different underlying processes across time. The left column of the Latin square involves the same behavioral manifestation across time, whereas the right column involves a different behavioral manifestation across time. Homotypic continuity (top left) describes the same behaviorial manifestation with the same underlying process (i.e., construct) across development. Heterotypic continuity (top right) describes the same underlying process with a different behaviorial manifestation across development. Phenotypic continuity (or functional discontinuity; bottom left) describes the same behavior with different underlying processes across development. Complete discontinuity (bottom right) describes different behavioral manifestations with different underlying processes across development. Thus, in both homotypic continuity and heterotypic continuity, the active content facets reflect the same construct or underlying process across time, whereas in phenotypic continuity and discontinuity, the active content facets do not reflect the same construct across time. From "Studying a Moving Target in Development: The Challenge and Opportunity of Heterotypic Continuity," by I. T. Petersen, D. E. Choe, and B. LeBeau, 2020, *Developmental Review*, *58*, Article 100935, p. 2. (https://doi.org/10.1016/j.dr.2020.100935). Copyright 2020 by Elsevier. Reprinted with permission. T1 = time point 1; T2 = time point 2; T3 = time point 3.

described earlier, continuity and discontinuity are properties of within-individual trajectories, so the most rigorous evaluation of continuity and discontinuity occurs at the individual level. Identifying discontinuity in behavior form for an individual would involve observing that the individual demonstrates a different behavior in the same situation and context and/or to accomplish the same function.

Nevertheless, there may be ways of leveraging studies of larger samples to inform understanding of continuity and discontinuity in behavior form. Using samples, one can examine changes in the manifestation of a construct in terms of its facets (i.e., structure) and its stability of individual differences. For instance, if individual differences in a given behavior (e.g., disobedience) at T1 are not associated with individual differences in the same behavior at T2, it suggests that

Figure 5

Example Depicting, at Two Time Points, the Content Facets of a Construct That Shows Heterotypic Continuity (Self-Regulation)



Note. Example depicting, at two time points, the content facets of a construct that shows heterotypic continuity (self-regulation). The construct changes in its behavioral manifestation across time. The construct includes different content facets across time: The construct includes content A, B, C, and D at T1, whereas the construct includes content B, C, D, and E at T2. The age-differing content facets (A and E) change in meaning with respect to the construct (i.e., functional discontinuity). For instance, content A reflects the construct at T1 but not at T2. Functional discontinuity of the content facets encompassed by a construct is evidence of heterotypic continuity of the construct. That is, if a given content facet changes in meaning across time (i.e., functional discontinuity), a construct that encompasses that content facet could change in its manifestation across age (i.e., heterotypic continuity). Adapted from "Heterotypic Continuity of Inhibitory Control in Early Childhood: Evidence From Four Widely Used Measures," by I. T. Petersen, J. E. Bates, M. E. McQuillan, C. P. Hoyniak, A. D. Staples, K. M. Rudasill, D. L. Molfese, and V. J. Molfese, 2021, *Developmental Psychology*, *57*(11), p. 1758 (https://doi.org/10.1037/dev0001025). Copyright 2021 by the American Psychological Association. T1 = time point 1; T2 = time point 2.

the same behavior may not reflect the same construct across time. For instance, disobedience in childhood might reflect externalizing problems, whereas in adulthood, disobedience to authority could reflect prosocial functions, including protesting against societally unjust actions. In such a case, the behavior (disobedience to authority) shows phenotypic continuity, and the underlying construct (externalizing problems) shows heterotypic continuity if it manifests differently in adulthood.

Likewise, if the facets of the construct change in terms of frequency and/or their relation to the construct, that would also provide evidence consistent with heterotypic continuity. For instance, if a behavior emerges in adolescence (e.g., substance use) despite persistence of the underlying construct (e.g., externalizing behavior), the underlying construct shows discontinuity in behavior form across early childhood to adolescence. In addition, if a behavior facet of a construct is associated with the construct at T2 but not at T1, it suggests that the construct shows discontinuity in behavior form and does not include the facet at T1. For instance, threatening others is more strongly associated with externalizing problems in adolescence than in early childhood (Lubke et al., 2018).

In the next section, I discuss challenges from work that have followed Kagan's ideas of continuity and discontinuity.

Challenges With Subsequent Work in Developmental Science

Kagan's perspective on the various types of continuity and discontinuity provided a broader conceptual framework from which to examine development across the lifespan. However, there have been key challenges with subsequent work in developmental science, as described below.

Strong (Untested) Assumptions of Homotypic Continuity

Measurement considerations are crucial to inferences of continuity and discontinuity. Invalid, unreliable, or nonequivalent measurement could make discontinuous processes seem continuous (or vice versa). To make inferences regarding continuity, the same construct must be assessed validly (i.e., construct equivalence), and on a comparable scale (i.e., measurement equivalence), across time. The lack of construct or measurement equivalence is a major threat to the validity of developmental inferences. Studies—both cross-sectional and longitudinal—in developmental science aim to understand development, that is, change over time. However, there are major risks in drawing inferences about developmental processes from cross-sectional designs (Kraemer et al., 2000). As discussed earlier, (dis)continuity considers whether a given individual shows the same entity (e.g., behavior form, function, and/or mechanism) across time. Thus, by definition, cross-sectional designs cannot establish continuity or discontinuity because they do not examine the same individual(s) across time. Nevertheless, many longitudinal and cross-sectional studies attempt to examine the same construct across multiple ages.

Most commonly, such studies use the same measure at each age, especially when examining individuals' change in their level on a given construct across time (e.g., growth curve models), because the scores are on the same mathematical metric and may seem comparable. However, use of the same measure at different ages (for the purposes of assessing a given construct) assumes that the construct shows homotypic continuity, that is, continuity in behavior form and in its underlying process. When the behavioral manifestation of a construct stays the same across development, it can be measured the same way across time, for example, physical growth measured in height and weight with the same ruler or scale, respectively.

Just because scores on the same measure are on the same *mathematical* scale, however, does not mean that the scores are on the same *conceptual* scale. If the construct shows discontinuity in behavior form (i.e., heterotypic continuity) and the measurement approach does not align with the changes in behavioral manifestation, the measurement will be invalid for the given construct. For instance, if externalizing problems include temper tantrums and biting in early childhood but include substance use and sexual aggression in adolescence, measurement would be invalid if the measures do not reflect these developmental differences in behavior form of externalizing problems. Simulation and empirical work have demonstrated that using the same measure across time yields inaccurate estimates of trajectories, both at the individual and group level, when the construct shows heterotypic continuity (Chen & Jaffee, 2015; Petersen et al., 2018; Petersen, LeBeau, et al., 2021).

Thus, when using the same measure across time, it is important to provide theoretical and empirical evidence that the construct likely shows homotypic continuity across the developmental span examined, and that the measure validly assesses the same construct at

each time point. Given how many constructs likely show discontinuity in behavior form, the reflexive use of the same measure across ages, without support or justification, may obscure the search for understanding development. Tests of longitudinal measurement invariance (Widaman et al., 2010) and/or differential item functioning (Robitzsch, 2021) may help give the researcher greater confidence that they are assessing the same construct on the same scale across ages (cf. Petersen et al., 2020; Robitzsch & Lüdtke, 2023). Such tests require at least two observable indicators (e.g., items) at each age to infer whether they relate to the latent construct (i.e., to each other) in the same way across time. Researchers generally recommend establishing at least partial scalar invariance (i.e., invariance of some factor loadings and intercepts) across ages in order to examine changes in people's level across time (Little, 2013). However, relatively few studies establish longitudinal measurement invariance to the scalar level. Questions of measurement invariance are also relevant when considering generalizability of inferences by examining the same research questions using multiple longitudinal data sets that include assessments that were intended to assess similar-sounding constructs. Without establishing measurement invariance or harmonization, inferences from such comparisons can be compromised by the jingle–jangle fallacy. The jingle fallacy is the erroneous assumption that two different things are the same because they have the same label; the jangle fallacy is the erroneous assumption that two identical or near-identical things are different because they have different labels. It is important to evaluate measurement comparability and not to just rely on labels.

Nevertheless, tests of longitudinal measurement invariance do not absolve the researcher from theoretical considerations of whether all of the facets of the construct were assessed (i.e., content validity) at each age and whether the measures change in meaning with respect to the construct (construct validity invariance; Knight & Zerr, 2010). Widaman et al. (2010) described a series of studies on the construct of numerical facility. The second graders used reconstructive, counting strategies for addition and subtraction problems, whereas the college students used memory retrieval strategies. Thus, the construct of numerical facility changed in manifestation, resulting in changes in the meaning of the reaction time measures, despite having established longitudinal measurement invariance. That is, establishing longitudinal measurement invariance does not ensure that the construct shows homotypic continuity. In general, stronger evidence is needed to substantiate that use of the same measure over time assesses the same construct across time in the same way, with content validity. If the construct does not show homotypic continuity, development cannot be inferred from changes in an individual's level on the same measure across time in a longitudinal design or from age-related differences in a cross-sectional design.

Strong (Untested) Assumptions of Heterotypic Continuity

In addition to researchers frequently making strong, untested assumptions that constructs show continuity in their behavior form (i.e., homotypic continuity), assertions that a construct demonstrates heterotypic continuity also involve strong assumptions. To demonstrate heterotypic continuity, it is important to establish that the age-differing behaviors are the result of the *same* underlying construct—for example, process, mechanism, disposition, function, reason, expectation, or source of anxiety. However, it can be difficult to establish that the age-differing behaviors reflect the same construct. Nevertheless, it is important to distinguish heterotypic continuity from alternative possibilities depicted in Figure 6 and described below.

Parallel Development

One alternative to heterotypic continuity that is important to rule out is parallel development, in which two constructs—and two resulting (sets of) behaviors—develop and manifest concurrently (at least for some period) in development (Blumberg, 2013). If two behaviors occur during the same developmental period, the behaviors may reflect different constructs. For instance, prima facie, suckling and feeding by rats appear as if they may show heterotypic continuity, because they achieve similar ends (i.e., access to nutrition), and adults often feed whereas infants often suckle. Nevertheless, both suckling and feeding express early in development during the same developmental period (Blumberg, 2013), and suckling eventually ceases at weaning while feeding persists. However, suckling and feeding are mechanistically unrelated in rats (Blumberg, 2013), indicating that the transition from suckling to feeding does not involve mechanistic continuity.

Developmental Progression

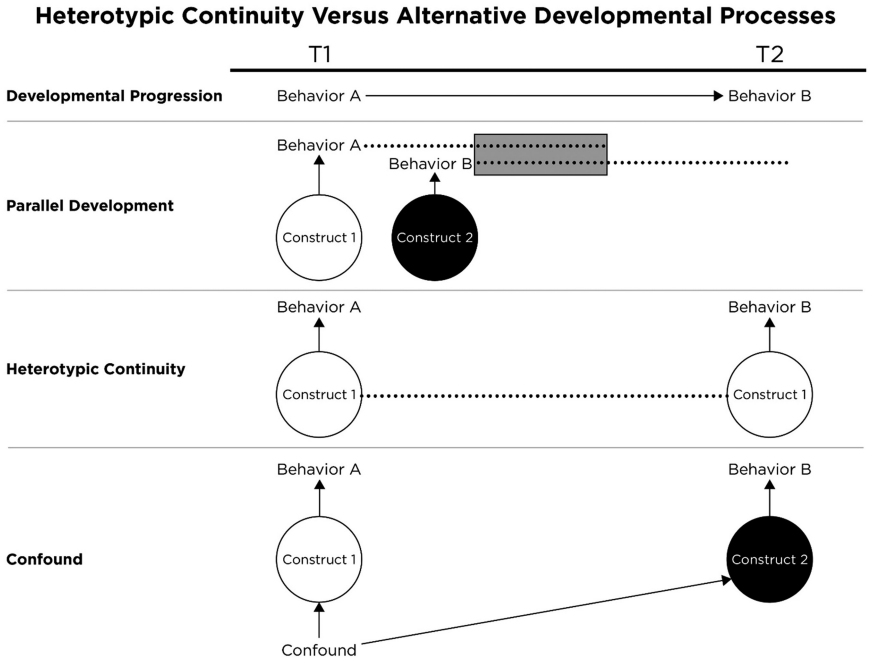
Another alternative to rule out is developmental progression, in which the change in behavioral form is the consequence of earlier features that lead to distinct outcomes (Rutter et al., 2006). When later outcomes are the consequence of earlier features, the later outcomes are considered sequelae, not a manifestation of the same construct. For instance, if substance use leads people to become depressed, the association between substance use at T1 and depression at T2 reflects developmental progression, not heterotypic continuity. Developmental progression dovetails with the idea that organisms actively seek out environments that have feedback influences (Stamps, 2003).

Confound

A third alternative to rule out is that the association between two behaviors reflects a third variable confound that influences both processes and explains their covariation, rather than reflecting the continuity of a common construct. A common confound, for instance, that may influence both the earlier and later outcomes may be continuing social influences. For instance, Kagan et al. (1978) found that attentiveness in infancy predicted IQ scores in preadolescence. Kagan (1980) noted that it might seem easy to assert based on this finding, after the fact, that the construct of cognitive alertness and intelligence may lead to heterotypic continuity such that it manifests as attentiveness in infancy and IQ scores in preadolescence. However, when controlling for the socioeconomic status of the child's family, the authors found that there was no longer an association between attentiveness in infancy and later IQ scores (Kagan et al., 1978). As Kagan (1980) aptly noted, "In almost all longitudinal studies the investigators have been so eager to find heterotypic continuities that they often failed to consider seriously the possible role of continuing social influences, for their presence would have weakened the conclusion so dearly sought … the developmental psychologist may have been too quick to assume stability and continuity when the evidence was weak and [researchers often] prefer to look to the past rather than to more recent contexts in interpreting the present" (p. 65).

Figure 6

Heterotypic Continuity Versus Alternative Developmental Processes



Note. Arrows reflect causal influence. Dotted lines reflect persistence (i.e., continuity) of the same behavior or construct across time. T1 = time point 1; T2 = time point 2.

In sum, just because a behavior at T1 predicts a distinct behavior at T2 does not necessarily indicate heterotypic continuity. As with any correlation, a mere association between two behaviors does not clarify the process that led to the association. Heterotypic continuity would not be present if the behaviors show parallel development, show developmental progression, or are associated merely due to a confound. In each of these cases, the two behavior forms do not reflect the same construct. The assumption that two differing behaviors (or the same behavior) across time reflect the same underlying process impedes progress by preventing investigators from searching for and specifying the underlying functions and mechanisms of each behavior.

Weak Empirical Record of Heterotypic Continuity

Thanks to Kagan's framework of continuity and discontinuity in forms and functions of behavior, heterotypic continuity has been the focus of much investigation and discussion in developmental science. In recognition that many constructs likely show discontinuity in behavior form, studies have frequently considered the possibility that a construct may show heterotypic continuity, consistent with Kagan's framework. Despite many studies considering the possibility of heterotypic continuity, there is little empirical record demonstrating heterotypic continuity. Moreover, the empirical record on (dis)continuity hinges on accurate and equivalent measurement, as described earlier.

Most studies asserting heterotypic continuity find a predictive association of one behavior or syndrome at T1 in predicting another behavior or syndrome at T2 (e.g., Ferdinand et al., 2007; Lahey et al., 2014; Lavigne et al., 2014; Miller et al., 2009; Nagin & Tremblay, 2001; Putnam et al., 2008; Richards et al., 2022; Shevlin et al., 2017; Snyder et al., 2017; Speranza et al., 2023; Wichstrøm et al., 2017). Such studies document interesting associations among seemingly disparate processes. For example, a study might examine whether attention-deficit/hyperactivity disorder (ADHD) symptoms at T1 predict depression or substance use at T2. However, for reasons described earlier, such an association does not, by itself, demonstrate heterotypic continuity. Researchers have commonly referred to heterotypic continuity as the association between one behavior at T1 and a distinct behavior at T2. However, this is incorrect. *Heterotypic continuity is an inference, not an association between two distinct behaviors*. Just because one diagnosis predicts another diagnosis does not mean that they share a common underlying process—such as a genetic, psychological, and/or biological process—that caused them both. One behavior could be a consequence of the earlier behavior (i.e., developmental progression). For instance, inattention-related difficulties may lead someone to perform poorly at school, which may lead to anxiety and low mood, and then to use of substances. In this case, the association between ADHD and substance use does not reflect heterotypic continuity. Alternatively, a confound—such as continuing social influences—could explain their covariation. For these reasons, the finding that a behavior at T1 predicts the same behavior or a different behavior at T2 indicate homotypic and heterotypic *prediction*, respectively, not necessarily continuity.

Another construct that some researchers have argued demonstrates heterotypic continuity is cognition across infancy to adulthood, in the form of core knowledge (Spelke & Kinzler, 2007). Researchers frequently use movement as an index of cognition in infants. However, movement is not controlled by the cortex in newborns because they do not have the cortical capacity for adult-like motor

control (Blumberg & Adolph, 2023). Thus, the cognitive functioning derived from movement in infants does not show continuity with adult forms of cognition, which argues against claims that infants possess core knowledge that they retain across development. This example highlights that it is unwise to assume genetic or mechanistic continuity between age-differing behaviors.

Constructs That (Might) Show Changes in Behavioral Manifestation Across Development

Many constructs purportedly show changes in behavioral manifestation across development consistent with heterotypic continuity, including externalizing problems (Chen & Jaffee, 2015; Miller et al., 2009; Moffitt, 1993; Patterson, 1993; Petersen et al., 2015; Petersen & LeBeau, 2022; Wakschlag et al., 2010), internalizing problems (Petersen et al., 2018; Weems, 2008; Weiss & Garber, 2003), thought-disordered problems (Rutter et al., 2006), inhibitory control (Petersen, Bates, et al., 2021; Petersen et al., 2016), self-regulation (Chang et al., 2015; Hosch et al., 2022), sleep states (Blumberg, 2013), substance use (Schulenberg & Maslowsky, 2009), and temperament (Putnam et al., 2008). However, much of the work asserting that these and other constructs show heterotypic continuity is conceptual in nature rather than based in rigorous empiricism, and is based on strong assumptions. Much of the empirical work suggesting that these constructs show heterotypic continuity relies on predictive relations between distinct behavioral forms—oftentimes diagnoses or syndromes—for which it is unclear whether the distinct behavioral forms share a common function or mechanism. In addition, whether constructs are considered to show changes in behavioral manifestation may depend on how broadly or narrowly we define constructs. Moreover, questions arise about whether constructs are the right level of analysis, and whether we should focus on the observable individual components of behavior instead. In sum, despite considerable focus on the possibility of heterotypic continuity, the empirical record of constructs that demonstrate heterotypic continuity is weak. In the next section, I discuss recommendations to advance understanding of continuity and discontinuity across development.

Better Ways to Examine Continuity Versus Discontinuity

Given the limitations of the empirical record, it is important to examine continuity versus discontinuity in ways that better align behaviors, functions, and mechanisms. To achieve this aim, research should: (a) examine (dis)continuity at the level of individual behaviors rather than merely at the level of syndromes, (b) identify the function(s) of the given behavior(s), and (c) identify the cognitive and biological processes or mechanisms underlying the behavior–function pairs. I describe each in detail below.

Examine (Dis)continuity of Individual Behaviors

First, instead of just examining predictive relations between diagnoses or syndromes that represent collections of symptoms or behaviors, it can also be important to understand the (dis)continuity and (in)stability of individual behaviors. For instance, in a study of externalizing problems, it would be valuable to know whether individual behaviors, such as hitting others, disobedience, substance use, and so on, demonstrate (a) stability of individual differences and (b) whether they show continuity within the same individual. If disobedience in childhood does not predict disobedience in adulthood in a longitudinal sample, it suggests that individual differences in disobedience are not stable across childhood to adulthood, and it is less likely that disobedience shows continuity within individuals.

Identify the Function(s) of the Given Behavior(s)

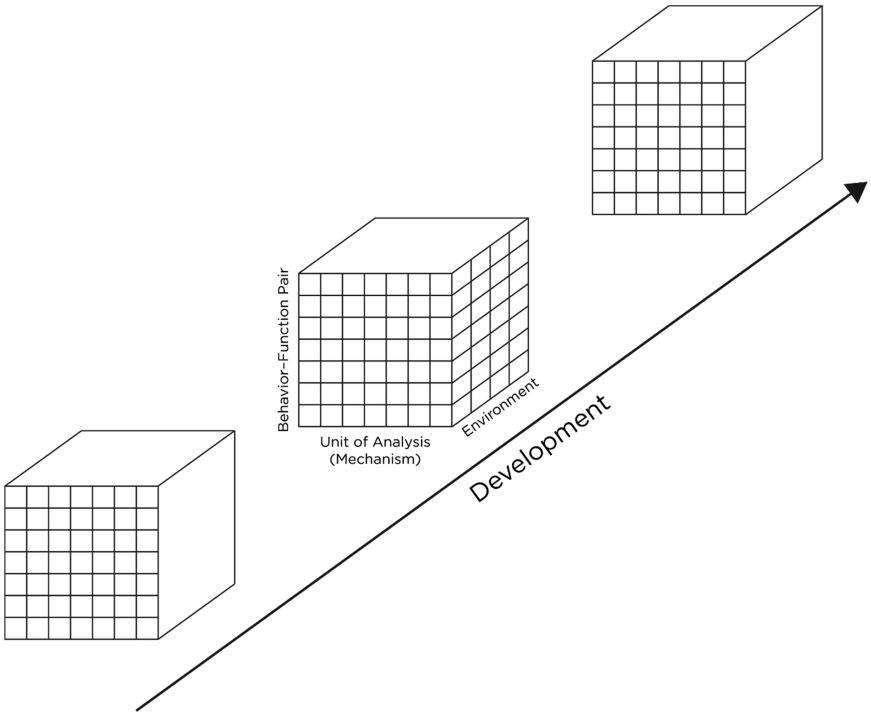
Second, it is important to identify the function(s) of the given behavior(s). Relying solely on the surface-level behavior is insufficient for understanding how and why the behavior occurs. That is, the behavior, by itself, does not specify its function; the same behavior can occur for different reasons. One child may act aggressively to obtain a desired object, such as a toy, because of a strong sensitivity to reward, low fear of punishment, and low empathy. Another child may act aggressively in response to a perceived slight because of high fear and the misattribution of an ambiguous cue as hostile. Likewise, two rodents may push a lever for differing reasons—one may push to obtain an appetitive stimulus, whereas another may push to avoid an aversive stimulus. That is, we should not solely consider behavior morphology when interpreting behavior. Moreover, an individual may engage in a behavior for multiple functions simultaneously. To identify behavior functions, research can leverage underutilized methods in (dis)continuity research, including functional behavior analysis (FBA) and experimental manipulation. FBA involves rigorous observation and examination of contextual factors and patterned sequences of antecedents, behaviors, and consequences, to generate hypotheses for the potential function(s) of a given behavior for a particular individual. Common functions of misbehavior include positive reinforcement arising from approach-related behaviors and/or negative reinforcement arising from avoidance-related behaviors. Avoidance-related behaviors include escape from undesirable situations. Approach-related behaviors include access to attention and tangibles (e.g., preferable objects, food, or activities; Broussard & Northup, 1995; Gresham, 2015). Researchers can then use manipulations to test the hypotheses about the potential behavior functions for the individual. Moreover, manipulations can be used as a "shock to the system" to see how individuals respond to various stimuli and in various contingencies.

Identify the Mechanisms Underlying the Behavior–Function Pairs

Third, it is important to identify the cognitive and biological processes or mechanisms that underlie various behavior–function pairs. For instance, aggression (behavior) for the purpose of access to attention (function) is an example of one behavior–function pair, whereas aggression for the purpose of escape from an undesirable situation would be a different behavior–function pair. Each behavior–function pair may have a distinct underlying mechanism. Examining behavior–function pairs as a unit of analysis leads to more complex behavioral units. These behavior–function pairs may be an important building block for developmental science. In this framework, aggression for access to attention is considered a distinct "behavior" (i.e., behavior–function pair) from aggression for an escape function. Treating behavior–function pairs as a behavioral unit gets complicated when we consider the complex interactions among proliferating combinations of behavior–function pairs and their manifold combinations in relation to environmental and biological processes, and how their effects change over time. Figure 7 provides a visual depiction of this framework. Nevertheless, identifying distinct behavioral units

Figure 7

Framework Depicting Behavior–Function Pairs in Relation to Environmental and Biological Processes Across Development



Note. Adapted from Woody and Gibb's (2015) depiction of the integration of the RDoC domains and units of analysis with environmental and developmental influences. One behavior–function pair might include, for instance, aggression for the purpose of access to attention; by contrast, aggression for the purpose of escape from an undesirable situation would be a distinct behavior–function pair. Units of analysis might include, for instance, genes, molecules, cells, circuits, physiology, etc. Environment includes different contexts and environmental influences. Adapted from "Integrating NIMH Research Domain Criteria (RDoC) Into Depression Research," by M. L. Woody and B. E. Gibb, 2015, *Current Opinion in Psychology*, *4*, p. 7 (https://doi.org/10.1016/j.copsyc.2015.01.004). Copyright 2015 by Elsevier. Adapted with permission. RDoC = research domain criteria.

will be crucial to identify underlying mechanisms. It will be important for future work to consider how best to grapple analytically with this complexity. An integration of complex behavioral units with the environment and biology may require diverse and novel approaches from network and systems science for modeling dynamic systems underlying complex connections (Fried, 2022).

It will be valuable for research to examine the development of cognitive and biological mechanisms in concert with their behavioral manifestations, at various developmental periods. Heterotypic continuity is a descriptor, not an explanation (Rutter et al., 2006); therefore, research needs to identify the mediating mechanisms of behavior continuity and discontinuity.

Ways to Account for Heterotypic Continuity

When the goal is to examine individuals' change in their level on a construct over time (e.g., trajectories or growth curves) and the construct shows heterotypic continuity, it is important to account for the construct's changes in behavior form. It is important to use differing measures across development to maintain construct validity, with statistical schemes that link the differing measures onto the same scale. Many studies examining cognitive development have linked differing measures across development onto the same scale (e.g., Kenyon et al., 2011; McArdle et al., 2009; McArdle & Grimm, 2011; Murayama et al., 2013; Wang et al., 2013). However, surprisingly few studies of social development have linked differing measures across development onto the same scale to account for heterotypic continuity. If a construct changes in behavioral form and the measures do not align with these changes, the measures' scores will not validly capture the construct and its changing manifestation. Approaches to linking scores from different measures onto the same scale include observed score approaches and latent variable approaches, such as with item response theory or structural equation modeling. Many resources describe approaches to linking scores from different measures onto the same scale to account for heterotypic continuity (Kolen & Brennan, 2014; Lai, 2021; McDaniel et al., 2023; Petersen et al., 2020; Tyrell et al., 2019).

When Is It Time to Jettison Our Current Constructs?

To advance the aims of identifying continuity and discontinuity in development, it is crucial to leverage constructs that are accurate and

useful. It is important to know when a given construct is not the most accurate representation of a psychological process or function. Current constructs are inevitably wrong in some regard and do not carve nature at its joints. The field needs constructs that better map onto cognitive functions and biological mechanisms. Thus, research should strive to continually refine our current constructs, in terms of greater delineation of constructs' form and facets across developmental periods and how the constructs are linked to cognitive and biological processes.

In addition to refining our constructs, we should also be prepared to jettison constructs that are not accurate or useful. It is important to detect signs when the use of a given construct impedes progress. If it is unclear what would be lost by discarding a given construct, the construct has become a fallback for researchers—a shorthand or term of convenience. In terms of accuracy, constructs should map onto particular cognitive and biological processes. In terms of utility, constructs should make lawful predictions.

Example of a Construct in Need of Refining: Externalizing Problems

For example, the construct of externalizing problems is perhaps a useful summary of a wide variety of behaviors that covary (Bates et al., 2014), and some of which may share common etiology (Olson et al., 2000). Nevertheless, the construct is likely overly general and combines many distinct functions and mechanisms (though higher order constructs that include externalizing problems, such as the *p* factor and general factor of psychopathology, are even more general; Caspi et al., 2014; Smith et al., 2020). When the field refers to externalizing problems, internalizing problems, depression, autism, ADHD, or conduct disorder, etc., each of these constructs is likely a combination of many, many subconstructs. ADHD is not one thing; it is many things.

DSM-Based Constructs

It is important to consider whether diagnoses specified in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) are veritable disorders or diseases. There are many concerns about the diagnoses specified in the *DSM*, including that (a) they ignore causes and etiology—they do not provide explanations for behavior (Fried, 2022); (b) they show substantial comorbidity—a person who meets criteria for one disorder is likely to also meet criteria for other disorders (Caspi et al., 2020); (c) they show substantial heterogeneity—two people who meet criteria for the same diagnosis can look quite different in terms of symptoms, course, etiology, and treatment response (Fried, 2022; Galatzer-Levy & Bryant, 2013); (d) which diagnoses one experiences at a given time do not portend the types of diagnoses they will experience in the future—people show considerable diagnosis switching from one disorder to another (and even across diagnostic families—e.g., from an externalizing disorder to an internalizing or thought disorder) across development (Caspi et al., 2020); (e) even though diagnoses are categorical, considerable research demonstrates that psychopathology is most accurately represented dimensionally, not categorically (Markon et al., 2011); and (f) they may pathologize normality—lifetime prevalence estimates of mental disorder from prospective longitudinal studies suggest that over 70%–80% of people will meet criteria for a mental criteria at some point in their life (Schaefer et al., 2017).

Moreover, I am skeptical about whether *DSM* labels are "disorders" characterized by pathology and disease—that is, a harmful dysfunction. Instead, *DSM* labels may be better conceptualized as "illnesses," where *DSM* diagnoses reflect mismatches of behaviors with cultural expectations, based on perceptions by the client or by others in their social network (Tomblin, 2023). For instance, evolutionary pressures often favor phenotypic diversity (Stamps, 2003). The diagnoses specified in the *DSM* are not defined biologically; they are merely descriptions of behavior. As currently defined, *DSM*-based disorders are not things that people "have"; rather, they are things that people "do" or "experience." This is not to dismiss a person's experience of depression or other challenging experiences. These challenging experiences are real. Instead, I contend that the diagnostic categories defined by the *DSM* are fictive categories that do not accurately capture the underlying psychological and biological processes. Every behavior has an associated contextual and biological substrate; however, *DSM* categories do not show sensitivity and specificity in relation to psychological and biological processes (Tiego et al., 2023). Thus, these constructs are in need of revision or of jettisoning entirely in favor of constructs that more accurately reflect underlying mechanisms of the behavior–function pairs.

Emerging Frameworks of Psychopathology

Emerging frameworks of psychopathology may provide better alternatives to *DSM*-based constructs. For instance, hierarchical nosologies such as the hierarchical taxonomy of psychopathology (HiTOP) more efficiently capture variance in psychopathology compared to *DSM* diagnoses (Kotov et al., 2021). However, HiTOP constructs are not yet defined in terms of biological processes, and thus do not carve nature at its joints. Research domain criteria (RDoC) constructs intend to address that gap by grounding constructs in biological processes (Insel, 2014). However, neither HiTOP nor RDoC (nor the *DSM*) sufficiently integrates developmental considerations of continuity and discontinuity (Tackett & Hallquist, 2022). As argued by Woody and Gibb (2015), it is important to consider the RDoC dimensions—domains of functioning and units of analysis—within the context of environmental and developmental influences. Nevertheless, emerging frameworks are important steps forward.

Potential Utility of Constructs Before Identifying Biological Mechanisms

In some cases, constructs may have utility even if they have not (yet) been linked to particular cognitive and biological processes. For instance, a construct can be useful if it has predictive utility as a gestalt, above and beyond the sum of its parts. As an example, it is an empirical question whether socioeconomic status—as operationalized by the combination of educational attainment, income, and occupational prestige—has greater predictive utility than its individual components (Cubbin et al., 2000; El Moheb et al., 2022). This might be the case, for instance, if the effects of individual components compound with additional socioeconomic advantage or disadvantage, as would be evidenced in a statistical interaction/moderation—for example, the effects of educational attainment on outcomes may depend on the level of income. However, there may also be utility in examining the individual components of a construct such as

socioeconomic status and how the components are differentially related to outcomes.

Important Considerations at the Population Level

"Drilling down" to identify mechanisms of behavior has yielded important evidence of biological pathways including epigenetic changes, neurodevelopmental disruption, and reprogramming of the stress and immune regulatory systems (Nelson et al., 2020). In addition to "drilling down" to identify cognitive and behavioral mechanisms of behavior, it is also important for research to "ramp up" to consider environmental effects at a societal and population level (Keating, 2016). Indeed, behaviors, functions, and constructs—and the effects of environmental processes—may differ across populations. Just as constructs may manifest differently across development (i.e., heterotypic continuity), they may also manifest differently across groups, for instance, as in culture-bound syndromes. Moreover, the effects of environmental processes can differ across populations. For instance, countries differ in the steepness of their social gradient—the strength of association between socioeconomic factors and health, suggesting that societal responses play an important role in health outcomes (Keating, 2016). Thus, it will be important to conduct cross-cultural and international comparisons (Keating, 2016) and to consider issues such as generalizability, measurement invariance (Han et al., 2019), and population equivalence across groups (Heeringa & Berglund, 2020).

Is It Even Worth Searching for Underlying Constructs?

Another question is whether research should even search for underlying constructs in attempts to identify continuous processes. In some cases, constructs may involve subjective experiences, such as a construct like anger (Tinbergen, 1963). What if constructs are the wrong way of thinking about behavior development? For instance, some have argued that we should focus on the individual components of observable behavior and the situations and contexts in which they occur (Blumberg, 2013). Tinbergen (1963) argued that, in our search for the reasons and causes of behavior, researchers should not abandon observation and description of behavior.

According to an epigenesis perspective (Cicchetti & Cannon, 1999; Gottlieb, 2007; Spencer et al., 2009), development arises from reciprocal effects within and across levels (e.g., genetic activity, neural activity, behavior, environment), and the levels reflect changing entities across development. Thus, discontinuity may be the norm rather than the exception. Such a perspective calls to the mind the Greek philosopher Heraclitus who argued that the world is in flux and that nothing is stable. He argued that life is like a river, asserting akin to: "No man ever steps in the same river twice, for it's not the same river and he's not the same man." In this view, the search for underlying constructs may be fruitless. I concede that that the search for underlying constructs may be unproductive, or at the least, challenging.

However, there can be utility in identifying underlying constructs of behavior. The same behavior can occur for different reasons, and it is worth distinguishing behaviors with the same form that have differing functions or mechanisms—even if (and especially if) the functions and mechanisms of behavior change across development. Nevertheless, in some cases, the utility of latent constructs has yet to be realized. This raises the question of what the right level of analysis is. Nevertheless, every level of analysis involves some degree of abstraction. Moreover, one can always drill deeper for a more fine-grained unit of analysis. For instance, broadband externalizing problems can be reduced to aggression, impulsivity, rule-breaking, inattention, and hyperactivity. Aggression can be further reduced based on the function (e.g., reactive and proactive forms); which can be further reduced based on the form (e.g., verbal, physical, psychological, or relational aggression); which can be further reduced based on the biological mechanisms, and so on. Drilling down in some cases may be useful, whereas in other cases it may come at the risk of reductionism—which may limit our understanding of complex phenomena and developmental systems. Discussions of which level of analysis to use raise the longstanding distinction between lumpers and splitters. I do not know which level(s) of analysis will be most productive. Moreover, the levels of analysis that are most useful may depend on the behavior and the goal. Nevertheless, I argue that decisions regarding which level(s) of analysis to examine should be tied to the underlying mechanisms of the behavior.

In sum, the field needs to be willing to refine and jettison particular constructs in our search for the approximation of truth. Toward that aim, research needs to better define, distinguish, and operationalize constructs. I would like to see research advance greater delineation of constructs' form and facets across developmental periods, paired with improved understanding of the etiological and mechanistic processes underlying them.

Conclusion

In conclusion, it is important for research in developmental science to pay better attention to continuity and discontinuity across the lifespan. I outlined three suggestions: (a) examine (dis)continuity of individual behaviors, (b) identify the function(s) of the given behavior(s), and (c) identify the cognitive and biological processes that underlie the behavior–function pairs. Accordingly, theories, methods, measures, and analyses should consider and account for continuity and discontinuity in causes, courses, forms, functions, mechanisms, and contexts of behavior. Accomplishing these aims will have important implications, including more accurate specification of constructs, their units of analysis (forms, functions, and mechanisms), their development, and their causes.

References

Bates, J. E., Schermerhorn, A. C., & Goodnight, J. A. (2010). Temperament and personality through the life span. In M. Lamb & A. Freund (Eds.), *Handbook of life-span development: Social and emotional development* (Vol. 2, pp. 208–253). Wiley.

Bates, J. E., Schermerhorn, A. C., & Petersen, I. T. (2014). Temperament concepts in developmental psychopathology. In K. Rudolph & M. Lewis (Eds.), *Handbook of developmental psychopathology* (3rd ed., pp. 311–329). Springer. https://doi.org/10.1007/978-1-4614-9608-3_16

Beauchaine, T. P., Constantino, J. N., & Hayden, E. P. (2018). Psychiatry and developmental psychopathology: Unifying themes and future directions. *Comprehensive Psychiatry*, *87*, 143–152. https://doi.org/10.1016/j.comppsych.2018.10.014

Blumberg, M. S. (2013). Homology, correspondence, and continuity across development: The case of sleep. *Developmental Psychobiology*, *55*(1), 92–100. https://doi.org/10.1002/dev.21024

Blumberg, M. S., & Adolph, K. E. (2023). Protracted development of motor cortex constrains rich interpretations of infant cognition. *Trends in*

Cognitive Sciences, *27*(3), 233–245. https://doi.org/10.1016/j.tics.2022.12.014

Bornstein, M. H., Putnick, D. L., & Esposito, G. (2017). Continuity and stability in development. *Child Development Perspectives*, *11*(2), 113–119. https://doi.org/10.1111/cdep.12221

Broussard, C. D., & Northup, J. (1995). An approach to functional assessment and analysis of disruptive behavior in regular education classrooms. *School Psychology Quarterly*, *10*(2), 151–164. https://doi.org/10.1037/h0088301

Caspi, A., Houts, R. M., Ambler, A., Danese, A., Elliott, M. L., Hariri, A., Harrington, H., Hogan, S., Poulton, R., Ramrakha, S., Rasmussen, L. J. H., Reuben, A., Richmond-Rakerd, L., Sugden, K., Wertz, J., Williams, B. S., & Moffitt, T. E. (2020). Longitudinal assessment of mental health disorders and comorbidities across 4 decades among participants in the Dunedin birth cohort study. *JAMA Network Open*, *3*(4), e203221. https://doi.org/10.1001/jamanetworkopen.2020.3221

Caspi, A., Houts, R. M., Belsky, D. W., Goldman-Mellor, S. J., Harrington, H., Israel, S., Meier, M. H., Ramrakha, S., Shalev, I., Poulton, R., & Moffitt, T. E. (2014). The p factor: One general psychopathology factor in the structure of psychiatric disorders? *Clinical Psychological Science*, *2*(2), 119–137. https://doi.org/10.1177/2167702613497473

Chang, H., Shaw, D. S., & Cheong, J. (2015). The development of emotional and behavioral control in early childhood: Heterotypic continuity and relations to early school adjustment. *Journal of Child and Adolescent Behaviour*, *3*(3), 204. https://doi.org/10.4172/2375-4494.1000204

Chen, F. R., & Jaffee, S. R. (2015). The heterogeneity in the development of homotypic and heterotypic antisocial behavior. *Journal of Developmental and Life-Course Criminology*, *1*(3), 269–288. https://doi.org/10.1007/s40865-015-0012-3

Cicchetti, D., & Cannon, T. D. (1999). Neurodevelopmental processes in the ontogenesis and epigenesis of psychopathology. *Development and Psychopathology*, *11*(3), 375–393. https://doi.org/10.1017/S0954579499002114

Costa, P. T., McCrae, R. R., & & Löckenhoff, C. E. (2019). Personality across the life span. *Annual Review of Psychology*, *70*(1), 423–448. https://doi.org/10.1146/annurev-psych-010418-103244

Cubbin, C., LeClere, F. B., & Smith, G. S. (2000). Socioeconomic status and injury mortality: Individual and neighbourhood determinants. *Journal of Epidemiology and Community Health*, *54*(7), 517–524. https://doi.org/10.1136/jech.54.7.517

El Moheb, M., Lu, K., Herrera-Escobar, J., Orlas, C. P., Breen, K., Sanchez, S. E., Velmahos, G., Kaafarani, H. M. A., Salim, A., & Nehra, D. (2022). Perceived socioeconomic status: A strong predictor of long-term outcomes after injury. *Journal of Surgical Research*, *275*, 172–180. https://doi.org/10.1016/j.jss.2021.12.046

Ferdinand, R. F., Dieleman, G., Ormel, J., & Verhulst, F. C. (2007). Homotypic versus heterotypic continuity of anxiety symptoms in young adolescents: Evidence for distinctions between DSM-IV subtypes. *Journal of Abnormal Child Psychology*, *35*(3), 325–333. https://doi.org/10.1007/s10802-006-9093-0

Fried, E. I. (2022). Studying mental health problems as systems, not syndromes. *Current Directions in Psychological Science*, *31*(6), 500–508. https://doi.org/10.1177/09637214221114089

Galatzer-Levy, I. R., & Bryant, R. A. (2013). 636,120 ways to have posttraumatic stress disorder. *Perspectives on Psychological Science*, *8*(6), 651–662. https://doi.org/10.1177/1745691613504115

Gottlieb, G. (2007). Probabilistic epigenesis. *Developmental Science*, *10*(1), 1–11. https://doi.org/10.1111/j.1467-7687.2007.00556.x

Gresham, F. M. (2015). *Disruptive behavior disorders: Evidence-based practice for assessment and intervention*. Guilford Press.

Han, K., Colarelli, S. M., & Weed, N. C. (2019). Methodological and statistical advances in the consideration of cultural diversity in assessment: A critical review of group classification and measurement invariance testing. *Psychological Assessment*, *31*(12), 1481–1496. https://doi.org/10.1037/pas0000731

Harris, J. L., Swanson, B., & Petersen, I. T. (2023). *A developmentally informed systematic review and meta-analysis of the strength of general psychopathology in childhood and adolescence*. PsyArXiv. https://doi.org/10.31234/osf.io/nbqx7

Heeringa, S. G., & Berglund, P. A. (2020). *A guide for population-based analysis of the adolescent brain cognitive development (ABCD) study baseline data*. bioRxiv. https://doi.org/10.1101/2020.02.10.942011

Hosch, A., Oleson, J. J., Harris, J. L., Goeltz, M. T., Neumann, T., LeBeau, B., Hazeltine, E., & Petersen, I. T. (2022). Studying children's growth in self-regulation using changing measures to account for heterotypic continuity: A Bayesian approach to developmental scaling. *Developmental Science*, *25*(6), e13280. https://doi.org/10.1111/desc.13280

Insel, T. R. (2014). Mental disorders in childhood: Shifting the focus from behavioral symptoms to neurodevelopmental trajectories. *JAMA*, *311*(17), 1727–1728. https://doi.org/10.1001/jama.2014.1193

Kagan, J. (1969). The three faces of continuity in human development. In D. A. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 983–1002). Rand McNally.

Kagan, J. (1971). *Change and continuity in infancy*. Wiley.

Kagan, J. (1980). Perspectives on continuity. In O. G. Brim Jr, & J. Kagan (Eds.), *Constancy and change in human development* (pp. 26–74). Harvard University Press.

Kagan, J., Lapidus, D. R., & Moore, M. (1978). Infant antecedents of cognitive functioning: A longitudinal study. *Child Development*, *49*(4), 1005–1023. https://doi.org/10.2307/1128740

Kagan, J., & Moss, H. A. (1962). *Birth to maturity: A study in psychological development*. Wiley. https://doi.org/10.1037/13129-000

Kaiser, B. N., & Weaver, L. J. (2019). Culture-bound syndromes, idioms of distress, and cultural concepts of distress: New directions for an old concept in psychological anthropology. *Transcultural Psychiatry*, *56*(4), 589–598. https://doi.org/10.1177/1363461519862708

Keating, D. P. (2016). Social inequality in population developmental health: An equity and justice issue. In S. S. Horn, M. D. Ruck, & L. S. Liben (Eds.), *Advances in child development and behavior* (Vol. 50, pp. 75–104). JAI Press. https://doi.org/10.1016/bs.acdb.2015.12.002

Kenyon, D. M., MacGregor, D., Li, D., & Cook, H. G. (2011). Issues in vertical scaling of a K-12 English language proficiency test. *Language Testing*, *28*(3), 383–400. https://doi.org/10.1177/0265532211404190

Knight, G. P., & Zerr, A. A. (2010). Informed theory and measurement equivalence in child development research. *Child Development Perspectives*, *4*(1), 25–30. https://doi.org/10.1111/j.1750-8606.2009.00112.x

Kolen, M. J., & Brennan, R. L. (2014). *Test equating, scaling, and linking: Methods and practices* (3rd ed.). Springer. https://doi.org/10.1007/978-1-4939-0317-7

Kotov, R., Krueger, R. F., Watson, D., Cicero, D. C., Conway, C. C., DeYoung, C. G., Eaton, N. R., Forbes, M. K., Hallquist, M. N., Latzman, R. D., Mullins-Sweatt, S. N., Ruggero, C. J., Simms, L. J., Waldman, I. D., Waszczuk, M. A., & Wright, A. G. C. (2021). The hierarchical taxonomy of psychopathology (HiTOP): A quantitative nosology based on consensus of evidence. *Annual Review of Clinical Psychology*, *17*(1), 83–108. https://doi.org/10.1146/annurev-clinpsy-081219-093304

Kraemer, H. C., Yesavage, J. A., Taylor, J. L., & Kupfer, D. (2000). How can we learn about developmental processes from cross-sectional studies, or can we? *American Journal of Psychiatry*, *157*(2), 163–171. https://doi.org/10.1176/appi.ajp.157.2.163

Lahey, B. B., Zald, D. H., Hakes, J. K., Krueger, R. F., & Rathouz, P. J. (2014). Patterns of heterotypic continuity associated with the cross-sectional correlational structure of prevalent mental disorders in adults. *JAMA Psychiatry*, *71*(9), 989–996. https://doi.org/10.1001/jamapsychiatry.2014.359

Lai, M. H. C. (2021). Adjusting for measurement noninvariance with alignment in growth modeling. *Multivariate Behavioral Research*, *58*(1), 30–47. https://doi.org/10.1080/00273171.2021.1941730

Lavigne, J. V., Gouze, K. R., Bryant, F. B., & Hopkins, J. (2014). Dimensions of oppositional defiant disorder in young children: Heterotypic continuity

with anxiety and depression. *Journal of Abnormal Child Psychology*, *42*(6), 937–951. https://doi.org/10.1007/s10802-014-9853-1

Little, T. D. (2013). *Longitudinal structural equation modeling*. Guilford Press. https://www.guilford.com/books/Longitudinal-Structural-Equation-Modeling/Todd-Little/9781462510160

Lubke, G. H., McArtor, D. B., Boomsma, D. I., & Bartels, M. (2018). Genetic and environmental contributions to the development of childhood aggression. *Developmental Psychology*, *54*(1), 39–50. https://doi.org/10.1037/dev0000403

Markon, K. E., Chmielewski, M., & Miller, C. J. (2011). The reliability and validity of discrete and continuous measures of psychopathology: A quantitative review. *Psychological Bulletin*, *137*(5), 856–879. https://doi.org/10.1037/a0023678

McArdle, J. J., & Grimm, K. J. (2011). An empirical example of change analysis by linking longitudinal item response data from multiple tests. In A. A. von Davier (Ed.), *Statistical models for test equating, scaling, and linking* (pp. 71–88). Springer. https://doi.org/10.1007/978-0-387-98138-3_5

McArdle, J. J., Grimm, K. J., Hamagami, F., Bowles, R. P., & Meredith, W. (2009). Modeling life-span growth curves of cognition using longitudinal data with multiple samples and changing scales of measurement. *Psychological Methods*, *14*(2), 126–149. https://doi.org/10.1037/a0015857

McDaniel, H. L., Saavedra, L. M., Morgan-López, A. A., Bradshaw, C. P., Lochman, J. E., Kaihoi, C. A., Powell, N. P., Qu, L., & Yaros, A. C. (2023). Harmonizing social, emotional, and behavioral constructs in prevention science: Digging into the weeds of aligning disparate measures. *Prevention Science*. Advance online publication. https://doi.org/10.1007/s11121-022-01467-0

Miller, J. L., Vaillancourt, T., & Boyle, M. H. (2009). Examining the heterotypic continuity of aggression using teacher reports: Results from a national Canadian study. *Social Development*, *18*(1), 164–180. https://doi.org/10.1111/j.1467-9507.2008.00480.x

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, *100*(4), 674–701. https://doi.org/10.1037/0033-295X.100.4.674

Murayama, K., Pekrun, R., Lichtenfeld, S., & vom Hofe, R. (2013). Predicting long-term growth in students' mathematics achievement: The unique contributions of motivation and cognitive strategies. *Child Development*, *84*(4), 1475–1490. https://doi.org/10.1111/cdev.12036

Nagin, D. S., & Tremblay, R. E. (2001). Analyzing developmental trajectories of distinct but related behaviors: A group-based method. *Psychological Methods*, *6*(1), 18–34. https://doi.org/10.1037/1082-989X.6.1.18

Nelson, C. A., Bhutta, Z. A., Burke Harris, N., Danese, A., & Samara, M. (2020). Adversity in childhood is linked to mental and physical health throughout life. *BMJ*, *371*, Article m3048. https://doi.org/10.1136/bmj.m3048

Nigg, J. T. (2006). Temperament and developmental psychopathology. *Journal of Child Psychology and Psychiatry*, *47*(3–4), 395–422. https://doi.org/10.1111/j.1469-7610.2006.01612.x

Olson, S. L., Bates, J. E., Sandy, J. M., & Lanthier, R. (2000). Early developmental precursors of externalizing behavior in middle childhood and adolescence. *Journal of Abnormal Child Psychology*, *28*(2), 119–133. https://doi.org/10.1023/A:1005166629744

Patterson, G. R. (1993). Orderly change in a stable world: The antisocial trait as a chimera. *Journal of Consulting and Clinical Psychology*, *61*(6), 911–919. https://doi.org/10.1037/0022-006X.61.6.911

Petersen, I. T., Bates, J. E., Dodge, K. A., Lansford, J. E., & Pettit, G. S. (2015). Describing and predicting developmental profiles of externalizing problems from childhood to adulthood. *Development and Psychopathology*, *27*(3), 791–818. https://doi.org/10.1017/S0954579414000789

Petersen, I. T., Bates, J. E., McQuillan, M. E., Hoyniak, C. P., Staples, A. D., Rudasill, K. M., Molfese, D. L., & Molfese, V. J. (2021). Heterotypic continuity of inhibitory control in early childhood: Evidence from four widely used measures. *Developmental Psychology*, *57*(11), 1755–1771. https://doi.org/10.1037/dev0001025

Petersen, I. T., Choe, D. E., & LeBeau, B. (2020). Studying a moving target in development: The challenge and opportunity of heterotypic continuity. *Developmental Review*, *58*, Article 100935. https://doi.org/10.1016/j.dr.2020.100935

Petersen, I. T., Hoyniak, C. P., McQuillan, M. E., Bates, J. E., & Staples, A. D. (2016). Measuring the development of inhibitory control: The challenge of heterotypic continuity. *Developmental Review*, *40*, 25–71. https://doi.org/10.1016/j.dr.2016.02.001

Petersen, I. T., & LeBeau, B. (2022). Creating a developmental scale to chart the development of psychopathology with different informants and measures across time. *Journal of Psychopathology and Clinical Science*, *131*(6), 611–625. https://doi.org/10.1037/abn0000649

Petersen, I. T., LeBeau, B., & Choe, D. E. (2021). Creating a developmental scale to account for heterotypic continuity in development: A simulation study. *Child Development*, *92*(1), e1–e19. https://doi.org/10.1111/cdev.13433

Petersen, I. T., Lindhiem, O., LeBeau, B., Bates, J. E., Pettit, G. S., Lansford, J. E., & Dodge, K. A. (2018). Development of internalizing problems from adolescence to emerging adulthood: Accounting for heterotypic continuity with vertical scaling. *Developmental Psychology*, *54*(3), 586–599. https://doi.org/10.1037/dev0000449

Putnam, S. P., Ellis, L. K., & Rothbart, M. K. (2001). The structure of temperament from infancy through adolescence. In A. Eliasz & A. Angleitner (Eds.), *Advances in research on temperament* (pp. 165–182). Pabst Scientist.

Putnam, S. P., Rothbart, M. K., & Gartstein, M. A. (2008). Homotypic and heterotypic continuity of fine-grained temperament during infancy, toddlerhood, and early childhood. *Infant and Child Development*, *17*(4), 387–405. https://doi.org/10.1002/icd.582

Richards, J. S., Hartman, C. A., Ormel, J., & Oldehinkel, A. J. (2022). Continuity of psychopathology throughout adolescence and young adulthood. *Journal of Clinical Child and Adolescent Psychology*. Advance online publication. https://doi.org/10.1080/15374416.2022.2042695

Robitzsch, A. (2021). A comparison of linking methods for two groups for the two-parameter logistic item response model in the presence and absence of random differential item functioning. *Foundations*, *1*(1), 116–144. https://doi.org/10.3390/foundations1010009

Robitzsch, A., & Lüdtke, O. (2023). Why full, partial, or approximate measurement invariance are not a prerequisite for meaningful and valid group comparisons. *Structural Equation Modeling: A Multidisciplinary Journal*. Advance online publication. https://doi.org/10.1080/10705511.2023.2191292

Rothbart, M. K., & Bates, J. E. (2006). Temperament. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (Vol. 3, 6th ed., pp. 99–166). Wiley.

Rothbart, M. K., Ellis, L. K., & Posner, M. I. (2004). Temperament and self-regulation. In R. F. Baumeister, & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 357–370). Guilford Press.

Rutter, M., Kim-Cohen, J., & Maughan, B. (2006). Continuities and discontinuities in psychopathology between childhood and adult life. *Journal of Child Psychology and Psychiatry*, *47*(3–4), 276–295. https://doi.org/10.1111/j.1469-7610.2006.01614.x

Schaefer, J. D., Caspi, A., Belsky, D. W., Harrington, H., Houts, R., Horwood, L. J., Hussong, A., Ramrakha, S., Poulton, R., & Moffitt, T. E. (2017). Enduring mental health: Prevalence and prediction. *Journal of Abnormal Psychology*, *126*(2), 212–224. https://doi.org/10.1037/abn0000232

Schulenberg, J. E., & Maslowsky, J. (2009). Taking substance use and development seriously: Developmentally distal and proximal influences on adolescence drug use. *Monographs of the Society for Research in Child Development*, *74*(3), 121–130. https://doi.org/10.1111/j.1540-5834.2009.00544.x

Schulenberg, J. E., Patrick, M. E., Maslowsky, J., & Maggs, J. L. (2014). The epidemiology and etiology of adolescent substance use in developmental perspective. In M. Lewis & K. D. Rudolph (Eds.), *Handbook of*

developmental psychopathology (pp. 601–620). Springer US. https://doi.org/10.1007/978-1-4614-9608-3_30

Schulenberg, J. E., & Zarrett, N. R. (2006). Mental health during emerging adulthood: Continuity and discontinuity in courses, causes, and functions. In J. J. Arnett & J. L. Tanner (Eds.), *Emerging adults in America: Coming of age in the 21st century* (pp. 135–172). American Psychological Association. https://doi.org/10.1037/11381-006

Shevlin, M., McElroy, E., & Murphy, J. (2017). Homotypic and heterotypic psychopathological continuity: A child cohort study. *Social Psychiatry and Psychiatric Epidemiology*, *52*(9), 1135–1145. https://doi.org/10.1007/s00127-017-1396-7

Smith, G. T., Atkinson, E. A., Davis, H. A., Riley, E. N., & Oltmanns, J. R. (2020). The general factor of psychopathology. *Annual Review of Clinical Psychology*, *16*(1), 75–98. https://doi.org/10.1146/annurev-clinpsy-071119-115848

Snyder, H. R., Young, J. F., & Hankin, B. L. (2017). Strong homotypic continuity in common psychopathology-, internalizing-, and externalizing-specific factors over time in adolescents. *Clinical Psychological Science*, *5*(1), 98–110. https://doi.org/10.1177/2167702616651076

Spelke, E. S., & Kinzler, K. D. (2007). Core knowledge. *Developmental Science*, *10*(1), 89–96. https://doi.org/10.1111/j.1467-7687.2007.00569.x

Spencer, J. P., Blumberg, M. S., McMurray, B., Robinson, S. R., Samuelson, L. K., & Tomblin, J. B. (2009). Short arms and talking eggs: Why we should no longer abide the nativist–empiricist debate. *Child Development Perspectives*, *3*(2), 79–87. https://doi.org/10.1111/j.1750-8606.2009.00081.x

Speranza, A. M., Liotti, M., Spoletini, I., & Fortunato, A. (2023). Heterotypic and homotypic continuity in psychopathology: A narrative review. *Frontiers in Psychology*, *14*, Article 1194249. https://doi.org/10.3389/fpsyg.2023.1194249

Stamps, J. (2003). Behavioural processes affecting development: Tinbergen's fourth question comes of age. *Animal Behaviour*, *66*(1), 1–13. https://doi.org/10.1006/anbe.2003.2180

Stompe, T., Karakula, H., Rudalevičiene, P., Okribelashvili, N., Chaudhry, H. R., Idemudia, E., & Gscheider, S. (2006). The pathoplastic effect of culture on psychotic symptoms in schizophrenia. *World Cultural Psychiatry Research Review*, *1*(3), 157–163.

Tackett, J. L., & Hallquist, M. (2022). The need to grow: Developmental considerations and challenges for modern psychiatric taxonomies. *Journal of Psychopathology and Clinical Science*, *131*(6), 660–663. https://doi.org/10.1037/abn0000751

Tiego, J., Martin, E. A., DeYoung, C. G., Hagan, K., Cooper, S. E., Pasion, R., Satchell, L., Shackman, A. J., Bellgrove, M. A., Fornito, A., Abend, R., Goulter, N., Eaton, N. R., Kaczkurkin, A. N., Nusslock, R., & the Hi, T. O. P. N. F. W. G. (2023). Precision behavioral phenotyping as a strategy for uncovering the biological correlates of psychopathology. *Nature Mental Health*, *1*(5), 304–315. https://doi.org/10.1038/s44220-023-00057-5

Tinbergen, N. (1963). On aims and methods of ethology. *Zeitschrift für Tierpsychologie*, *20*(4), 410–433. https://doi.org/10.1111/j.1439-0310.1963.tb01161.x

Tomblin, J. B. (2023). *Philosophical and theoretical foundations of developmental language disorder*. PsychArchives. https://doi.org/10.23668/psycharchives.12845

Tyrell, F. A., Yates, T. M., Widaman, K. F., Reynolds, C. A., & Fabricius, W. V. (2019). Data harmonization: Establishing measurement invariance across different assessments of the same construct across adolescence. *Journal of Clinical Child and Adolescent Psychology*, *48*(4), 555–567. https://doi.org/10.1080/15374416.2019.1622124

Ventriglio, A., Ayonrinde, O., & Bhugra, D. (2016). Relevance of culture-bound syndromes in the 21st century. *Psychiatry and Clinical Neurosciences*, *70*(1), 3–6. https://doi.org/10.1111/pcn.12359

Wakschlag, L. S., Tolan, P. H., & Leventhal, B. L. (2010). Research review: 'ain't misbehavin': Towards a developmentally-specified nosology for preschool disruptive behavior. *Journal of Child Psychology and Psychiatry*, *51*(1), 3–22. https://doi.org/10.1111/j.1469-7610.2009.02184.x

Wang, S., Jiao, H., & Zhang, L. (2013). Validation of longitudinal achievement constructs of vertically scaled computerised adaptive tests: A multiple-indicator, latent-growth modelling approach. *International Journal of Quantitative Research in Education*, *1*(4), 383–407. https://doi.org/10.1504/IJQRE.2013.058307

Weems, C. F. (2008). Developmental trajectories of childhood anxiety: Identifying continuity and change in anxious emotion. *Developmental Review*, *28*(4), 488–502. https://doi.org/10.1016/j.dr.2008.01.001

Weiss, B., & Garber, J. (2003). Developmental differences in the phenomenology of depression. *Development and Psychopathology*, *15*(2), 403–430. https://doi.org/10.1017/S0954579403000221

Wichstrøm, L., Belsky, J., & Steinsbekk, S. (2017). Homotypic and heterotypic continuity of symptoms of psychiatric disorders from age 4 to 10 years: A dynamic panel model. *Journal of Child Psychology and Psychiatry*, *58*(11), 1239–1247. https://doi.org/10.1111/jcpp.12754

Widaman, K. F., Ferrer, E., & Conger, R. D. (2010). Factorial invariance within longitudinal structural equation models: Measuring the same construct across time. *Child Development Perspectives*, *4*(1), 10–18. https://doi.org/10.1111/j.1750-8606.2009.00110.x

Woody, M. L., & Gibb, B. E. (2015). Integrating NIMH research domain criteria (RDoC) into depression research. *Current Opinion in Psychology*, *4*, 6–12. https://doi.org/10.1016/j.copsyc.2015.01.004

Received February 18, 2023
Revision received July 17, 2023
Accepted September 11, 2023 ■