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Student Engagement in Adolescence: A Scoping Review of Longitudinal Studies 2010–2020

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We systematically mapped and analyzed the longitudinal research on adolescent student engagement published during 2010–2020. A total of 104 studies of 104,304 adolescents met inclusion criteria. Studies were mainly conducted in North America (43%) or Europe (34%). Over half studied engagement across one or more years. Most studies (93%) focused on antecedents of engagement rather than outcomes of engagement (38%). Data were commonly collected using self-report questionnaires (87%) and analyzed using path, growth, and cross-lagged models. Studies mainly examined engagement in classroom activities, school, or schoolwork; and focused on behavioral engagement (70%), followed by emotional (61%), then cognitive engagement (35%). No studies used a specific theory of engagement development, but instead referred to self-determination, ecological systems, and stage-environment fit theories.
Key words: adolescents – longitudinal studies – scoping review – student engagement

Student engagement has been studied extensively during the past decade (2010–2020). There has been a sixfold increase in studies of engagement in the school context. Of the 13,528 records identified between the years 2000 and 2020, 11,696 were published between the years 2010 and 2020 (The search was conducted at the end of March 2020 using the Web of Science, using the terms school/student/academic engagement, and adolescence/adolescent, and was limited to the fields of education and psychology). Of these records, 8,128 concerned student engagement in adolescence (see Figure 1). This presents the challenge of maintaining oversight of the scope and directions of the research on student engagement. Such an oversight is extremely valuable for helping researchers systematically advance research to provide a scientific advance while avoiding redundancies. Although there are several narrative reviews on engagement (Christenson, Reschly, & Wylie, 2012; Sinatra, Heddy, & Lombardi, 2015; Upadyaya & Salmela-Aro, 2013; Wang & Degol, 2014; Wang, Fredricks, Ye, Hofkens, & Linn, 2019; Wang, Degol, & Henry, 2019), and systematic or scoping reviews on different forms of engagement (e.g., engagement in science education: Aker & Ellis, 2019) and the relationship between engagement and other constructs (e.g., achievement: Lei, Cui, & Zhou, 2018), there is no review that examines how engagement has been studied longitudinally, that is, across two or more timepoints. This topic is of special interest to developmental psychologists of student engagement, and to researchers interested in longitudinal methods and their potential for inferring causality and describing trends, and their enhanced robustness against age, cohort, and history effects. Because this is a scoping review of the field, we do not (meta)-analyze the results of the studies. Instead, we used an iterative and systematic process to identify the key methodological components of the longitudinal studies and to extract and analyze data on these. This allows us to present a synthesis of the field of longitudinal studies of adolescent student engagement published in the decade 2010 and 2020. This work serves as a starting place for informing future systematic reviews and meta-analyses of student engagement development.

All four authors made equal contribution to the manuscript, thus they should be considered joint first author.

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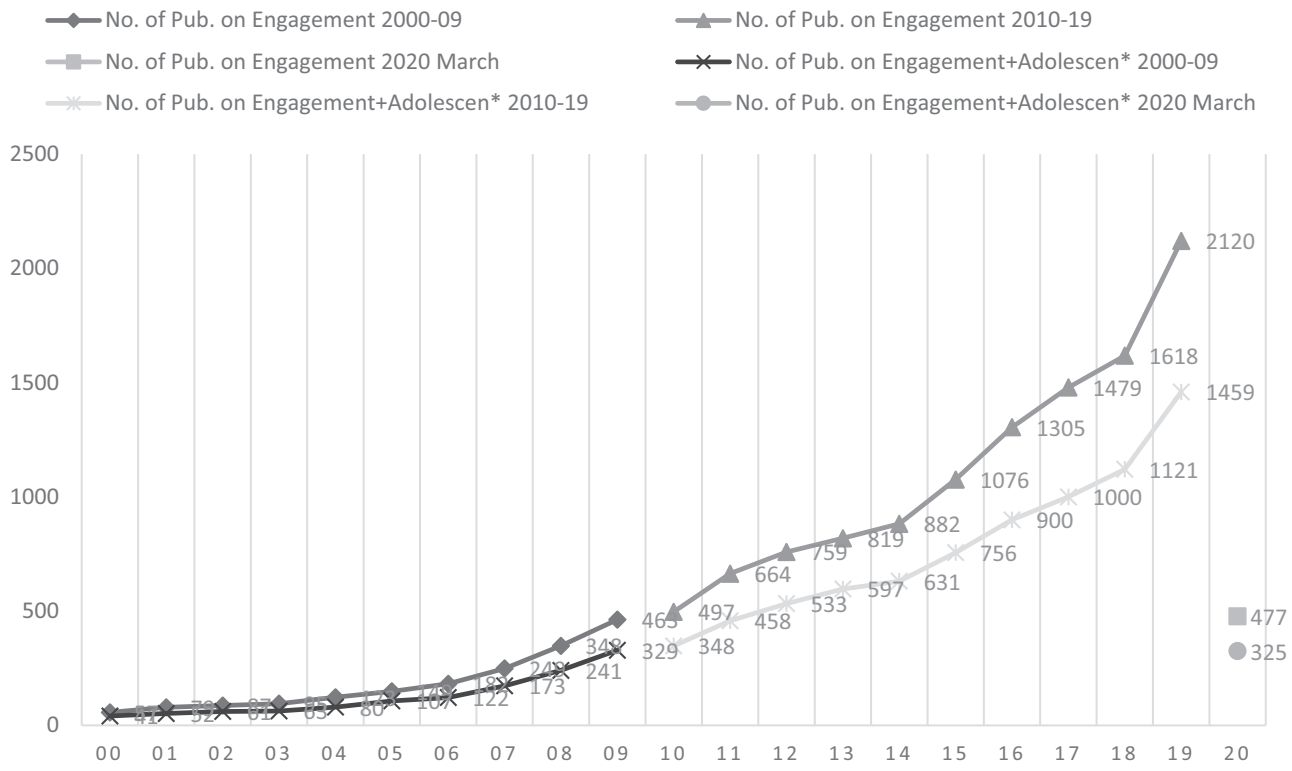

FIGURE 1 Numbers of publications per year on academic engagement/school engagement/student engagement and adolescence/adolescent(s).

Conceptualizing Student Engagement

Our focal construct in this scoping review is student engagement which has also been described as academic engagement (Furrer & Skinner, 2003), school engagement (Fredricks, Blumenfeld, & Paris, 2004), and schoolwork engagement (Salmela-Aro & Upadyaya, 2012). Researchers have been interested in how and why students focus at school, invest in their studies, behave, interact with peers and other people around them while learning, and learn in diverse educational activities and settings over time. Because engagement is a core mechanism of knowledge building in and out of educational contexts (Howard-Jones et al., 2018), it has been called the "holy grail of learning" (Sinatra et al., 2015). Engagement can be contrast to disengagement and disaffection, which are conceptualized as qualitatively different phenomena. Disengagement refers to the reduction of involvement in an activity, for example when students stop doing their schoolwork or drop out of school; and disaffection refers to a loss of motivation or enjoyment in an activity which can spiral into deeper disaffection and influence patterns of disengagement across time (Skinner, 2016). In this review, we focus specifically on student engagement, to allow for a more detailed examination of this construct and its associated methodologies.

In the literature published during the past decade, student engagement has mostly been conceptualized as a multidimensional construct (Christenson et al., 2012; Schmidt, Rosenberg, & Beymer, 2018; Wang, Fredricks, et al., 2019; Wang, Degol, et al., 2019). The main dimensions of student engagement have included emotional engagement (feelings about school, learning, and/or a task; Fredricks et al., 2004), cognitive engagement (mental effort and strategies employed while learning; Wang, Fredricks, et al., 2019; Wang, Degol, et al., 2019), behavioral engagement (observable participation in activities; Wang, Fredricks, et al., 2019; Wang, Degol, et al., 2019), social engagement (cooperation with others; Wang & Hofkens, 2019), and agentic engagement (students' active contribution in shaping their academic activities; Reeve & Tseng, 2011). In line with the work engagement literature, schoolwork engagement has also been conceptualized as energy, dedication, and absorption in studies/school (Salmela-Aro & Upadyaya, 2012). However,

the most dominant perspective on student engagement during the past decade has been the concept of multidimensional engagement, including aspects such as emotions, cognitions, and behaviors (Fredricks et al., 2004).

Emotional engagement encompasses the positive affective reactions and attitudes attributed to school activities, such as flow experiences, enjoyment, liking, belonging, and happiness (Csikszentmihalyi, 1990; Salmela-Aro, Moeller, Schneider, Spicer, & Lavonen, 2016; Symonds & Hargreaves, 2016). Cognitive engagement refers to the degree to which students exert the mental effort needed to understand complex ideas and master difficult skills, and the extent to which students show a desire to go beyond the requirements, including willingness to do high-quality work (Fredricks et al., 2004; Wang, Fredricks, et al., 2019). Behavioral engagement describes students' participation in classroom and school activities and includes attention, concentration, and on-task behavior, and broader patterns of participation such as attending extracurriculuar activities and school (Li & Lerner, 2013; Skinner, 2016).

In addition to emotional, cognitive, and behavioral engagement, research on agentic engagement (e.g., Reeve & Tseng, 2011) and social engagement (Wang & Hofkens, 2019) are emerging. In agentic engagement, students are involved in shaping their experience of a task, acting either independently or as co-agents (Salmela-Aro, 2009) with their peers and other people involved in the learning process. For individual students, agency can influence the internal dynamics of engagement, for example self-regulating the co-actions between emotion, motivation, and action (Schunk & Zimmerman, 2012). Social engagement refers to students' engagement in social processes at school, including the effort and time they spend interacting with peers. Social engagement is not a dimension of academic engagement but is rather an important sub-type of engagement in schooling (where students can be engaged both academically and socially; Tuovinen, Tang, & Salmela-Aro, 2020; Wang & Hofkens, 2019).

The engagement construct is also viewed as a multilevel phenomenon, which can be described using the concept of the "grain size" of how engagement is conceptualized and studied (Sinatra et al., 2015). Student engagement can refer to how involved students are in academic tasks, lessons on specific subjects, being part of classroom processes, and participating in school. Each of these "objects" of engagement is nested within the other, with tasks nested in lessons, lessons nested within classrooms, and classrooms nested within schools (Skinner & Pitzer, 2012). Clarifying the object of engagement in studies is an important task for researchers, with some researchers deliberately measuring engagement across grain sizes to holistically capture engagement in schooling (e.g., Wang, Fredricks, et al., 2019; Wang, Degol, et al., 2019) and others focusing on the smaller grain size of engagement in individual tasks for the purpose of investigating specific cognitive and social learning processes (e.g., Higashi & Schunn, 2020; Symonds, Schoon, Eccles, & Salmela-Aro, 2019).

Methods of Researching Student Engagement

Multiple internal dimensions and types of student engagement lend themselves to various approaches to capture data on how adolescents invest in, and involve themselves in, school activities. Self-report surveys aim to discover what adolescents think and feel about schooling, and ask adolescents to estimate the extent of their involvement in school activities (e.g., Olivier, Archambault, De Clercq, & Galand, 2019). Observations of adolescents engaging in academic work are made by teachers and researchers (e.g., Vollet, Kindermann, & Skinner, 2017), and sometimes by peers (e.g., Shin, 2020). Learning analytics have also been applied to examine student engagement, for example, by measuring trace data (i.e., task accuracy, interaction, and completion; Camacho, Elena, Olivares, Flores Gallego, & Orozco Barbosa, 2020). Also, physiological arousal representing increased attention to the object of engagement has been studied by measuring electrodermal activity (e.g., Wu, Lu, & Lien, 2021). The move toward multi-modal and multi-informant methods of researching engagement is currently increasing rigor in the field.

The past decade has witnessed a burgeoning of research applying an alternative approach to variable-oriented analyses, the "person-oriented" approach, in studies of engagement. Compared to the variable-oriented approach, the person-oriented approach aims to identify diverse homogeneous groups from within the same sample of students (Bergman & Trost, 2006). In student engagement research, a person-oriented approach has been used to identify unique trajectories of engagement development (e.g., Archambault & Dupéré, 2017), internally divergent forms of engagement, for example, high cognitive engagement but low emotional engagement (Schmidt et al., 2018; Symonds et al., 2019) and profiles of students who

simultaneously show indicators of both positive and negative academic well-being, such as burnout and engagement (Tuominen-Soini & Salmela-Aro, 2014).

The Development of Student Engagement

In variable-oriented research, the general decreasing trend in engagement over the school years has been well documented (Wigfield et al., 2015). In person-oriented research on student engagement, researchers have unpacked these trends to identify heterogeneous engagement trajectories. Instead of a general decline in engagement, person-oriented studies have demonstrated that engagement remains relatively stable over time in the majority of students, but declines gradually or rapidly in smaller groups of students (Symonds, Schoon, & Salmela-Aro, 2016; Wylie & Hodgen, 2012). Some studies have also found that a small proportion of students display increasing cognitive, emotional, and behavioral engagement (Zhen et al., 2020). These results on distinct engagement trajectories indicate the need for more research on the smaller groups of students who report low/decreasing engagement, with a focus on how to prevent further decreases and raise their level of engagement.

Although the longitudinal research on student engagement focuses on trajectories and causal predictors, there are no specific theories of how engagement develops across time. Rather, researchers apply general developmental theories and perspectives to explain observed changes in student engagement, for example self-determination theory (Ryan & Deci, 2020) which proposes that motivational outcomes (such as engagement) are impelled by the satisfaction of person's intrinsic psychological needs for autonomy, competence, and relatedness. Given our focus on longitudinal research, it is of interest to consider which developmental theories underpin researchers' conceptualizations and rationales for studying engagement across time.

THE CURRENT RESEARCH

The aim of the current research was to conduct a scoping review of the longitudinal studies on student engagement in adolescence published in the last decade 2010–2020. A scoping review is needed to bring coherence to the field and to identify targets for questions and methods that will systematically advance the science of student engagement. Using a systematic approach, the review focused on five key aspects of the evidence base: study demographics (including geographic location, sample size and gender composition, and study timescale), study focus (on antecedents or outcomes of engagement, or on engagement research methodology), study methods (of data collection and analysis), conceptualization of student engagement as a construct, and theoretical perspective on engagement development. These seven aspects were chosen to provide a broad yet comprehensive overview of how the studies were conceptualized and designed, situated against the backdrop of study demographics (e.g., sample size, gender balance, and geographic location) to aid interpretation of identified trends and variations. The main question answered by the review is: how has adolescent student engagement been studied longitudinally in the past decade (2010–2020)?

METHODS

To answer the research question as it pertained to study demographics, study focus, study methods, and conceptual and theoretical perspectives, we conducted a scoping review of the published literature on longitudinal empirical studies of student engagement in adolescence. A scoping review was determined as the most appropriate methodology based on the definition of scoping reviews outlined in Munn et al., (2018). Scoping reviews aim "to identify the types of available evidence in a given field, to clarify key concepts/definitions in the literature, [and] to examine how research is conducted on a certain topic or field" (Munn et al., 2018, p. 2), for the purpose of identifying evidence gaps. Scoping reviews differ from systematic literature reviews by not evaluating study quality, because they do not seek to answer a specific question about a studied phenomenon (e.g., the effectiveness of a treatment). Instead, scoping reviews focus on mapping the evidence base as we do here.

On October 3, 2020, we searched Scopus, Psych Info, and the education databases in ProQuest (ERIC, Australian Education Index, and ProQuest Education) for longitudinal studies of student engagement in adolescence. Our inclusion criteria were that studies had to research adolescent student engagement as an empirical (observable) phenomenon across two or more time points and were published in English in peer-reviewed academic journals during the past decade, 2010–2020. Table 1 displays the search string which used Boolean operators to combine sets of search terms to return a comprehensive set of records.

TABLE 1
Search Terms and Strings

	Search terms	*Boolean*
Student engagement	("school engagement" OR "engagement in school*" OR "student engagement" OR "pupil engagement" OR "learner engagement" OR "emotional engagement" OR "cognitive engagement" OR "behavioral engagement" OR "behavioural engagement" OR "agentic engagement" OR "academic engagement")	AND
Longitudinal study	(longitudinal OR developmental OR cohort OR life-span OR "life course" OR transition OR long term OR "longer term" OR trajector* OR growth OR maturation)	AND
Adolescent sample	(child* OR adolescen* OR student* OR youth OR "young person" OR "young people" OR pupil*)	NOT
	(pre-school OR kindergarten OR playschool OR "nursery school" OR daycare OR "further education" OR college OR university OR "third level" OR polytechnic OR "young adult" OR "higher education")	

Record Screening

The record screening process took place using Microsoft Excel and is summarized in Figure 2. Each step was preserved on a separate Excel sheet in a single workbook. In the first step, the initial set of records from each database were combined and duplicates were removed.

In the second step, titles and abstracts were screened using the inclusion criteria to identify (1) empirical analyses of data collected on student engagement on two or more occasions (longitudinal), (2) with samples aged between 10 and 18 years (early to late adolescence). One author screened all records, and two authors screened a unique 50% of the records each, so that each record was screened independently by two authors. Each record was evaluated against the inclusion criteria and scored as "yes," "unsure," or "no" for having met the criteria. After this process, there was a percentage agreement of 78.4% for the inclusion criteria of longitudinal studies of student engagement, and of 86.9% for the inclusion criteria of adolescent samples. The four authors discussed each record where there was a disagreement and made a joint decision about whether to shortlist the record for full-text screening.

In the third step, the agreed set of records scoring "yes" or "unsure" was transferred into a list for full-text screening. PDFs of each full text were obtained from the search databases or research

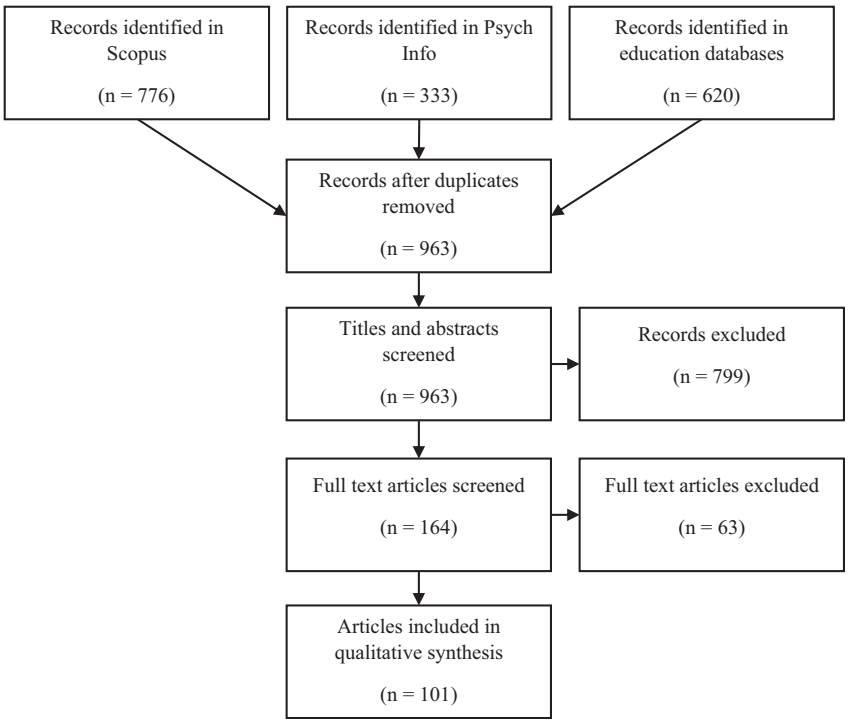

FIGURE 2 Prisma diagram of search process.

repositories. The full texts were randomly divided between three authors, who read the texts' methods sections to determine whether the inclusion criteria were met. Each full text was scored as a "yes" or "no" after reading. A fourth author was randomly assigned three texts from each of the other three authors' lists (nine duplicate texts in total) and screened these independently to check for consistency in the full-text screening process. The records scoring "yes" after full-text screening were transferred to the list of included records.

Data Extraction

A coding frame (Table S1) was developed by the authors to aid extraction of data (information from the publications) on the topics of study demographics, study focus, study methods, and conceptual and theoretical perspectives. First, the authors designed a draft coding frame in line with these aspects, based on their knowledge of longitudinal studies of student engagement. Second, the authors independently coded four sample texts that were chosen to represent a diverse set of methods (a three-year study with annual student self-report surveys; an 18-interval study of wearables conducted across several months; a seven wave one-year study of a single student; and a repeated-measures randomized controlled trial). This activity led to refinement and expansion of the draft coding frame to capture a large grained, comprehensive set of methodology indicators present across the four studies. Third, the initial included records ($N = 105$) were divided between the authors for data extraction. In Excel, columns were created next to each record, with a separate column used to extract data on each data type (e.g., sample *N*). Data were summarized by the authors as they were extracted. Finally, the three sets of data extracted by the different authors were combined into the same Microsoft Excel workbook. Of the initial 105 included records, a further four were discarded after data extraction because they did not meet inclusion criteria, resulting in 101 records with extracted data.

Data Synthesis

The main types of extracted data (study demographics, study focus, study methodology, conceptualization of engagement, and theoretical perspective on development) were synthesized in Microsoft Excel, using a standardized process. First, open-ended data (e.g., names of theories) were reviewed to correct any inconsistencies in spelling and abbreviation across the authors. Second, all data types were sorted using the filter function into categories within data types (e.g., yes or no). Third, the number of records in each category was summed to create category totals that are displayed next to the data types in the Tables in the results section. Fourth, the results of the sorting and quantitative synthesis were summarized as a qualitative narrative in the results section.

RESULTS

A total of 101 articles (containing 104 separate studies conducted with separate or same samples) were identified as meeting the inclusion criteria of (1) empirical analyses of data collected on student engagement on two or more occasions (longitudinal) that were carried out (2) with samples aged between 10- and 18 years (early to late adolescence). Of the total number of student engagement papers identified during the decade 2010–2020 (Figure 1) these papers comprised about 1%. Figure 3 also shows the incremental growth in the rate of longitudinal studies of student engagement being published across the decade reviewed. A table (Table S2) detailing the main characteristics of all studies can be found in the Supporting Information. We present summary tables in the results section.

Study Demographics

Together, the samples of the 104 studies comprised a total of 104, 304 adolescents. Out of the 104 studies most (53%) included over 500 participants, and only eight had fewer than 100 participants (Table 2). The average amount of participants across studies was 1,002 (Table 2). Eight studies did not report students' gender. Based on the available data, the gender distribution was 50% male and 50% female. A few studies had demographic information partially missing, or the information lacked in clarity. However, all available information on the study demographics was extracted and analyzed in this review.

Some longitudinal studies were of participants who had first entered the study in childhood but still met inclusion criteria because they reported on a separate analysis of engagement when the participants were adolescents. Thus, at the beginning of the studies, the participants were between 6-year-old and 17-year-old, whereas at the end of the studies they were typically between 11-year-old

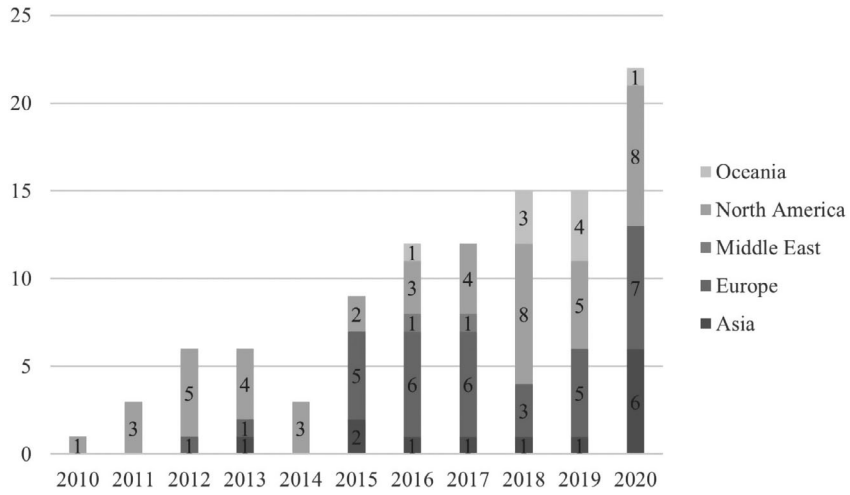

FIGURE 3 Timeline of study publication date by geographic area.

TABLE 2
Number of Participants and Demographics Across Studies

Participants N	*Study* N	%		*Mean*	SD	*Min value*	*Max value*	*Total*	%
5–100	8	8	Study *N*	1,002.92	1,758.20	5	12,302	104,304	100.00
101–500	40	39	*N* of males	452.62	874.10	0	6,217	43,904	42.09
501–1,000	26	25	*N* of females	459.24	830.68	5	6,274	44,087	42.27
>1,001	29	28	Min age	12.29	2.03	6	17		
Total *N*	103	100	Max age	15.39	2.16	11	19		
			Mean age	13.20	1.53	9.4	15.98		
			Start grade	6.83	1.90	1	11		
			End grade	9.11	2.00	5	12		
			N of waves	3.10	2.21	1	17		

and 19-year-old. Similarly, the beginning and end grades varied between 1-11 and 5-12.

Most studies examined data from one country, and two studies had data from both USA and China. The number of studies conducted in different continents and countries showed that the largest number of studies (43%) was conducted in North America, followed by Europe (32%), Asia (13%), Oceania (9%), and the Middle East (3%) (Table 3, Figure 3). After the United States (41% of the studies), a relatively large number of studies were conducted in Belgium (9%), China (8%), and Australia (8%). See Figure S1 for the cumulated trend of studies per countries during the past decade.

The time scale of most of the studies was mid-term (e.g., a duration of months to one year, 23% of the studies) or long term (e.g., longer than one year, 54%) (Table 4). Seven studies measured engagement using interval data, and only five studies measured engagement at momentary timescales. The number of waves in the examined studies varied from 1 to 17.

Study Focus

The focus of the studies on antecedents or outcomes of engagement, or on methods of researching engagement (e.g., measure development papers) were mapped and analyzed across the 104 studies (see Table 5). Most studies ($N = 97$; 93%) focused on the antecedents of engagement, whereas 38% of the studies examined the outcomes of engagement (often at the same time as examining antecedents, e.g., in cross-lagged or path models). In comparison, very few studies ($N = 2$; 1.92%) focused on methods of researching engagement.

To further understand the focuses of the studies, we categorized the antecedents and outcomes into 14 categories (see Table 6; for detailed descriptions, see Table S1). The categories were informed by the

TABLE 3
Description of the Countries and Continents

Continent/Country	N	%
North America		
Canada	2	1.92
USA	43	41.35
Total		43.27
Europe		
Belgium	9	8.65
Finland	6	5.77
German	2	1.92
Greece	1	0.96
Iceland	2	1.92
Ireland	1	0.96
Italy	1	0.96
Lithuania	1	0.96
Netherlands	2	1.90
Portugal	3	2.88
Romania	1	0.96
Spain	1	0.96
Switzerland	1	0.96
UK	3	2.88
Turkey	1	0.96
Total		33.65
Middle East		
Israel	2	1.92
Total		1.92
Asia		
China	7	6.73
Japan	1	0.96
Philippines	2	1.92
South Korea	3	2.88
Total		12.50
Oceania		
Australia	8	7.69
Fiji	1	0.96
Total		8.65
Total N = 24 countries	104	100.00

TABLE 4
Study Timescales

Type of study	N	*Percentage*
Interval	7	6.7
2 intervals	2	1.9
3 intervals	1	1.0
4 intervals	1	1.0
7 intervals	2	1.9
10 intervals	1	1.0
Continuous	1	1.0
Momentary	5	4.8
Short term	8	7.7
Mid-term	29	27.9
Long term	68	65.4

Note. Continuous = constant measurement across time; momentary = measured across seconds or minutes; short term = measured across days or weeks; mid-term = measured across months to one year; long term = measured across more than one year.

TABLE 5
Study Focus Summary

Study Focus	N	%
Antecedents (including moderators) of Engagement	97	93.27
Outcomes of Engagement	40	38.46
Method paper of Engagement	2	1.92

Note. Numbers calculated from 104 studies.

bioecological model of human development (Bronfenbrenner & Morris, 2006). At the individual level, we included personal characteristics (e.g., age, gender), behavior (e.g., violence, delinquency), psychology (e.g., self-esteem, depression), physiology (e.g., physical activity, sleep quality), and achievement (e.g., GPA, academic performance) categories. At the level of proximal social influences, we included peers (e.g., popularity; peer supports), families (e.g., SES, parent support, parent–children relationship), and teachers (e.g., teacher support, teacher–student relationship). We then included indicators of proximal to distal social systems which were classrooms (e.g., class activities, class size), schools (e.g., school curriculum, school climate), communities (e.g., violence in community), and societies (e.g., state poverty). Finally, we included two activity-oriented indicators of digital (e.g., video game), and intervention. When coding into this framework, we coded for (1) antecedents, (2) outcomes, and (3) covariates which were the authors' use of control variables in linear models.

The most frequently studied antecedents of engagement were psychological factors (N = 47; 45%), followed by peers (32%), teachers (30%), personal characteristics (25%), and family-related factors (21%). In comparison, very few studies focused on classroom (8%), community (5%), society (5%), digital (3%), and physiological (2%) antecedents.

For studies that examined engagement outcomes of engagement (see Table 6), psychological factors (N = 21; 20%) were also the most often studied. Achievement (10%), peers (10%), and teacher-related factors (9%) were next three popular outcomes. In contrast, the outcomes of family (2%), physiology (1%), classroom (1%), school (1%), community (1%), and digital (1%) were rarely examined. Society and interventions were not studied as outcomes.

Studies that included covariates as control variables most often focused on personal factors (49%)

TABLE 6
Study Focus Themes

	Antecedents (including Moderators)		*Outcomes*		*Covariates*	
	N	%	N	%	N	%
Personal	26	25.00	1	0.96	51	49.04
Behavioral	17	16.35	5	4.81	3	2.88
Psychological	47	45.19	21	20.19	6	5.77
Physiological	2	1.92	1	0.96	2	1.92
Achievement	19	18.27	10	9.62	13	12.50
Peers	33	31.73	10	9.62	1	0.96
Family	22	21.15	2	1.92	30	28.85
Teacher	31	29.81	9	8.65	3	2.88
Classroom	8	7.69	1	0.96	3	2.88
School	11	10.58	1	0.96	2	1.92
Community	5	4.81	1	0.96	0	0.00
Society	5	4.81	0	0.00	2	1.92
Digital	3	2.88	1	0.96	0	0.00
Intervention	10	9.62	0	0.00	0	0.00

Note. Numbers calculated from 104 studies.

of mostly gender and age, family factors (29%) mainly family socioeconomic status, and individual student achievement (12%).

Study Methods

Across the 104 studies, survey was the dominant method used to measure student engagement ($N = 96$; 92.31%). Other methods, such as observations of engagement ($N = 7$; 6.73%), semi-structured interviews ($N = 3$; 2.88%), physiological measures ($N = 1$; 0.96%), and behavioral tracking ($N = 1$; 0.96%), were seldom used. Within survey studies, self-reporting ($N = 90$; 93.75%) was the most often used, whereas teacher report ($N = 5$; 5.21%), peer nomination ($N = 3$; 3.13%), and parent report ($N = 2$; 2.08%) were less often used. In, terms of study designs, 10 studies (9.62%) were identified as intervention studies.

Throughout the studies (Table 7), Skinner's Engagement and Disaffection Scale (latest version and earlier version; Skinner, Marchand, Furrer, & Kindermann, 2008; Skinner, Zimmer-Gembeck, Connell, Eccles, & Wellborn, 1998) was the single most popular scale used ($N = 23$; 22.12%), followed by the Fredrick's School Engagement Scale ($N = 7$; 6.73%; Fredricks, Blumenfeld, Friedel, & Paris, 2005), the Schoolwork Engagement Inventory ($N = 4$; 3.85%; Salmela-Aro & Upadyaya, 2012), the Student Engagement Instrument ($N = 4$; 3.85%; Appleton, Christenson, Kim, & Reschly, 2006), and the Behavioral-Emotional-Cognitive School Engagement Scale ($N = 4$; 3.85%; BEC-SES; Li & Lerner, 2013). Close to one-third of studies ($N = 30$; 28.85%) used a self-designed scale (e.g., see Shin, 2020) or a scale that was used only once across the studies. More importantly, nearly one-third of studies ($N = 27$; 25.96%) used items from scales that were not designed specifically for capturing indicators of engagement (e.g., Goal Orientation and Learning Strategies Survey; see Qu & Pomerantz, 2015). See Table 7 for a full list of the scales that had been used across the studies.

Regarding the analytical models, three types of modeling were the major choices. Path models (e.g., hierarchical linear model, SEM mediation model) were the most frequent models used ($N = 38$; 36.54%). Growth models (e.g., growth curve model, latent change model) were the second most frequent models ($N = 32$; 30.77%). Cross-lagged models occupied another third of studies ($N = 28$; 26.92%). Innovative analytical methods such as random intercept cross-lagged modeling, and time series analysis, were used once across studies. Most of the studies were variable-oriented, and only 6.73% ($N = 7$) were person-oriented studies. Across the studies, two (1.92%) were identified as qualitative studies in which interview and content analyses were conducted.

Conceptualization of Student Engagement

To extract data on how student engagement was conceptualized in the 104 studies, the authors used a predetermined framework with two components: the engagement object (i.e., the activity that the person is engaging in, e.g., an algebra equation, or engaging in math classrooms), and the engagement dimension (e.g., cognitive, behavioral, or emotional). Our analytic framework was based on the concept of engagement grain sizes (e.g., Sinatra et al., 2015), the model of student engagement occurring within nested types of tasks (Skinner & Pitzer, 2012), and on the conceptualization of engagement as a multidimensional construct (Fredricks et al., 2004). The engagement dimensions used in the studies were identified based on the terms used by the authors, or if these terms were missing, we examined the content of items used in the measurements (which often involved researching and retrieving the original measurements) to determine if the measures regarded to emotional, cognitive, or behavioral aspects of engagement. Open-ended codes for "other" ensured that data not fitting this framework were also analyzable. See Table 8 for the summary of the findings.

TABLE 7
Measurement Scales

	N	%
Self-designed items/scale	30	28.85
Related items from other measures	27	25.96
Engagement and Disaffection Scale (Skinner et al., 2008) and earlier versions (Skinner et al., 1998)	23	22.12
Wellborn's (1991)	3	2.88
Behavioral Engagement and Disaffection scales		
School Engagement Scale (Fredricks et al., 2005)	7	6.73
Schoolwork Engagement Inventory (Salmela-Aro & Upadyaya, 2012)	4	3.85
Student Engagement Instrument (Appleton et al., 2006)	4	3.85
Behavioral-Emotional-Cognitive School Engagement Scale (BEC-SES; Li & Lerner, 2013)	4	3.85
Classroom Assessment Scoring System (Pianta, Hamre, & Allen, 2012)	3	2.88
Dimensions of School Engagement Scale (Archambault & Vandenbossche-Makombo, 2014)	2	1.92
Agentic Engagement Scale (Reeve & Tseng, 2011)	2	1.92

Note. Numbers calculated from 104 studies.

Classrooms were the most commonly studied object of adolescents' engagement (53.85 % of studies). For studies to receive this code, there needed to be explicit reference to 'class' or 'classrooms' in the measured items. The high prevalence of classroom engagement occurred because of the frequent use of (1) scales specifically designed to measure classroom engagement (e.g., Skinner et al.,'s 2008 Engagement Versus Disaffection with Learning Student-Report), and (2) multilevel scales of school, classroom, and schoolwork engagement (e.g., Fredricks et al., and and's (2005) School Engagement Scale). The next most prevalent objects of engagement were school (45.19%) (e.g., When I do well in school it's because I work hard; Appleton et al., 2006), and schoolwork (42.31 %) (e.g., My schoolwork inspires me, Salmela-Aro & Upadyaya, 2012) again owing to the frequent use of multilevel engagement scales.

TABLE 8
Approach to Studying the Engagement Construct

Engagement construct	N	%
Engagement object		
School	47	45.19
Classroom	56	53.85
Schoolwork	44	42.31
Subject	11	10.58
Task	6	5.77
Engagement dimension		
Behavioral	73	70.19
Emotional	63	60.58
Cognitive	36	34.62
Other	8	7.69

Note. Numbers calculated from 104 studies.

A smaller proportion of studies focused on engagement in specific school subjects (10.58 %). Of these 11 studies, math was the most common subject researched (n = 8). Science and French engagement were researched by two studies each, and English, German, and physical education engagement were researched by one study each. Finally, six studies (5.77%) researched task engagement. Four of these studies used the experience sampling method to capture students' experiences of momentarily doing academic tasks in classrooms, one study used interval assessments of students' task engagement before, during, and after the task, and one study used systematic observation to assess students' on/off-task behavior during an academic task.

Behavioral engagement was the most prevalent engagement dimension coded (in 70.19% of studies). This was closely followed by emotional engagement (60.58%). Cognitive engagement was only captured by around a third of studies (34.62%). Eight studies researched other engagement dimensions. Three of these concerned engagement in general academic activities, two captured agentic engagement, two studied social aspects of engagement (nominations of peer engagement, and engagement in teacher–student relationships), and one researched motivational engagement.

Theoretical Perspective on Engagement Development

The introductions of the studies were read to establish which theories of psychological development were used to frame the longitudinal analyses. All developmental theories cited in the introduction

sections were coded (see Table 9). To clarify our position on theory, we distinguish between psychological constructs (e.g., self-efficacy; Bandura, 2000) and theories of psychological development (e.g., social cognitive theory; Bandura, 2012). In this review, we use one citation for each theory to simplify the reporting, although each theory was supported by a variety of citations across the included studies.

A total of 28 theories were cited by the studies. The full list of theories can be found in Table S2. Fourteen theories were cited by one study each, whereas the other 14 theories were cited by multiple studies. The three most prevalent theories were self-determination theory (Ryan & Deci, 2020) (cited in 15.38% of studies), ecological systems theory (Bronfenbrenner & Morris, 2006) (14.42%), and stage-environment fit theory (Eccles & Roeser, 2009) (13.46%). Next most prevalent were expectancy-value theory (Eccles & Wigfield, 2020) (7.69%), self-system theory (Connell & Wellborn, 1991; Skinner & Pitzer, 2012) (5.77%), and broaden and build theory (4.81%) (Fredrickson, 2001). Developmental contextualism (Lerner, 1995), the participation-identification model (Finn, 1989), and references to feedback loops (e.g., Fredrickson's, 2013 upward spiral hypothesis) were cited in three studies each. Then, life course theory (Elder & Shanahan, 2006), social cognitive theory (Bandura, 2012), positive youth development (Lerner, Lerner, Bowers, & Geldhof, 2015), and motivational resilience (Skinner, Graham, Brule, Rickert, & Kindermann, 2020) were cited in two studies each. Around a third of studies did not cite any developmental theories (28.85%).

TABLE 9
Developmental theories

Developmental theory	N	%
No developmental theory	30	28.85
Self-determination theory	16	15.38
Ecological systems theory	15	14.42
Stage-environment fit	14	13.46
Individual theories	14	13.46
Expectancy-value theory	8	7.69
Self-system theory	6	5.77
Broaden and build theory	5	4.81
Developmental contextualism	3	2.88
Participation-identification model	3	2.88
Feedback loops	2	1.92
Life course theory	2	1.92
Social cognitive theory	3	2.88
PERMA	1	1.92
Positive youth development	2	1.92
Motivational resilience	3	2.88

Note. Numbers calculated from 104 studies.

DISCUSSION

The current scoping review mapped the longitudinal research on adolescent student engagement published between 2010 and 2020. Using systematic methods, the authors identified 104 studies that met inclusion criteria. These studies involved 104,304 adolescents, were balanced in gender, and examined all stages of adolescence. To perform the mapping, data were extracted on study demographics, study focus, study methods, the conceptualization of student engagement, and theoretical perspectives used to explain engagement development. By analyzing these data, we identified several trends that we overview and discuss below.

First, the longitudinal research on student engagement research is rapidly expanding internationally, with the most growth occurring in Europe in the past decade, following a predominance of research generated within the United States. The greater number of studies in North America and Europe signals that the longitudinal evidence base on adolescent student engagement is Western-centric, with more research needed in non-Western contexts to both test and expand our knowledge. Of the 104 studies, those conducted in China, Japan, South Korea, the Philippines, Turkey, and Israel, warrant further examination to investigate the suitability of the engagement measures and cross-cultural comparison of the pattern of results to Western studies.

Second, most of the research measured engagement across two or more waves spread across months or years, with very limited research studying engagement across momentary timescales. Among the longitudinal studies, more than half were long term (e.g., longer than one year), whereas about one fourth of the studies were midterm (e.g., measuring engagement across months up to one year). A momentary approach (measuring engagement across seconds and minutes; D'Mello, Dieterle, & Duckworth, 2017) was used only in five studies. Data captured by momentary approaches have often been analyzed in cross-sectional designs, and more studies are needed to examine the short-term longitudinal development (e.g., across lessons or school week) of engagement as well as interaction between momentary engagement and other momentary variables.

Third, most studies focused on antecedents of engagement, whereas fewer studies examined

outcomes of engagement. The outcomes and antecedents primarily regarded the interaction of engagement with individual psychological functioning or the socializing impact of peers, teachers, and families. Very few studies examined the interaction of more complex and distal social structures (e.g., classrooms, schools, communities, and societies) with engagement. Accordingly, the decade evidence base is limited to explaining student engagement in relation to microlevel individual processes and face-to-face interactions, with less consideration of the macrolevel processes which shape and are shaped by student engagement, including cultures and social structures (Pettigrew, 2018).

Fourth, there was a predominance of student self-report surveys and very few observational, physiological, trace (engagement product), or multi-informant studies. Among the 104 studies, most (~87%) used student self-report surveys. Other methods such as observations, interviews, or behavior tracking were seldom used. Although students' views on schooling are suitably captured through self-report, their engagement behaviors (including attention, on/off-task behavior, activity participation, and school attendance) could be more rigorously examined using observation and trace methods that do not allow for students' subjective biases about their own behavior to influence the results.

Fifth, the analysis methods were limited to three main methods (path/HLM, cross-lagged panel, growth) and were typically variable-oriented. Each analysis method was used in about one-third of the papers. Innovative analytical methods, such as random intercept cross-lagged models and time series analysis, were both used only once. Nearly all studies used variables centered methods and very few were person-oriented. Therefore, we know more about how engagement develops on average than we do about individual diversity in engagement development. This is problematic, on account of several recent person-oriented analyses of student engagement showing diverse trajectories and profiles of engagement occurring within different samples and timescales (e.g., Archambault & Dupéré, 2017; Schmidt et al., 2018; Symonds, Schreiber, & Torsney, 2020).

Sixth, engagement was measured primarily using the Engagement and Disaffection Scale (Skinner et al., 1998, 2008) and the School Engagement Scale (Fredricks et al., 2005). Nearly one-third of studies attempted to examine engagement by using scales that were not named as engagement or were not originally meant for engagement. The review found that most studies used one of two scales to measure engagement: Skinner's (1998, 2008) Engagement and Disaffection Scale and Fredricks et al., (2005) School Engagement Scale. The first scale measures behavioral and emotional engagement in classroom activities, while the second measures cognitive, behavioral, and emotional engagement across the levels of schoolwork, classrooms, and school. Researchers' choices of what scales to use are ideally guided by their research questions. Therefore, the commonplace of these scales suggests that researchers are not focusing their studies on individual engagement dimensions (e.g., how does cognitive engagement develop across time, within the different levels of task, schoolwork, classroom, and school) and are not systematically exploring and explaining student engagement as it develops across time in relation to individual tasks, schoolwork, subjects, and schooling.

Interestingly, around a third of studies used a self-designed scale (e.g., see Shin, 2020) or scales that were not designed to measure engagement. These results indicate that the longitudinal research on student engagement suffers from a "jingle-jangle" problem in that the terms and concepts are used in a confusing way; the same terms referring to different constructs or different terms referring to same constructs (Reschly & Christenson, 2012; Schmidt et al., 2018).

Seventh, most research was generated on classroom engagement and behavioral engagement, owing to the wide use of Skinner's (1998, 2008) Engagement versus Disaffection scale which does not capture cognitive engagement. Cognitive engagement was only researched by a third of the studies. It is also possible that behavioral engagement was studied more often because it is a construct that is easier to define (e.g., participation, involvement) and capture (using previously established or researcher designed scales) than cognitive engagement which often reflects factors which can be more challenging to define, such as mental effort and willingness to invest in schoolwork. Moreover, it is possible that cognitive engagement is a factor which partially predicts behavioral engagement, as to be involved in schoolwork and participating in the classroom (behavioral engagement) students also need to put in some mental effort or need to be willing to get more involved. In the future, it would be important to develop new measures which would consider different types of engagement simultaneously, capturing

also dimensions which have had less attention (e.g., cognitive engagement) in the past.

Eighth, the most common developmental theories underpinning the longitudinal research were self-determination theory (Ryan & Deci, 2020), ecological systems theory (Bronfenbrenner & Morris, 2006), and stage-environment fit theory (Eccles & Roeser, 2009). Self-determination theory provides a useful framework for engagement research because it explains engagement in relation to students' individual needs and conditions of the environment (Mitchell, Gray, & Inchley, 2015). Similarly, ecological systems theory considers proximal development (microsystem) and relationship between students, peers, and teachers, who are also important sources of emotional support in the school context (Bakadorova & Raufelder, 2017). Stage-environment fit theory is often used to examine students adjusting to new environments during school transitions and gives deeper insights on changes that occur in students' engagement, sense of belonging, and relationships with peers, teachers, and academic environment (see also Ulmanen, Soini, Pietarinen, & Pyhältö, 2016).

Other developmental theories used were expectancy-value theory (Eccles & Wigfield, 2020), self-system theory (Connell & Wellborn, 1991; Skinner & Pitzer, 2012) and broaden and build theory (Fredrickson, 2001). Expectancy-value theory highlights the role of competence beliefs, which are often affected by teachers' feedback and peer comparisons, as a source of student engagement (Lemos, Gonçalves, & Cadima, 2020; McKellar, Cortina, & Ryan, 2020). Similarly, self-system theory emphasizes the role of motivation in engagement which occurs in the social learning context (see also Engels, Phalet, Gremmen, Dijkstra, & Verschueren, 2020). Broaden and build theory, in turn, describes the accumulation of positive academic experiences (e.g., teacher–student interaction) and students' skills, personal resources, and engagement (see also Martin & Collie, 2019). These theories describe multiple factors deriving to student engagement, and consider the role of social interaction, academic context, and changes in environment. The decision to use these developmental theories as a conceptual framework of student engagement reflects the longitudinal nature of the studies included in this scoping review.

Finally, nearly a third of studies had no specific developmental theory underpinning them. This presents a gap for theoretical development concerning student engagement. In addition, even though the developmental theories were often used to premise engagement studies; they were rarely tested. These results indicate that the engagement literature is not currently contributing a vast amount to theoretical development. Although a recent theoretical synthesis has resulted in a model of engagement development in sociocultural context (Wang, Fredricks, et al., 2019; Wang, Degol, et al., 2019), theory refinement and generation needs to continue and should consider the different levels of engagement (e.g., engagement in tasks, subjects, and classrooms) to refine more our models of individual levels or to attempt to bridge the levels in a holistic conceptualization of student engagement development.

Limitations

The current review was a scoping review of longitudinal studies on student engagement during the last decade 2010–2020. Thus, many studies using a cross-sectional design were not included in the review and including these studies in the review might have given a different picture on how engagement has been studied across the past decade. For example, several studies focusing on momentary engagement using cross-sectional designs have been published during the past 10 years and were not included in this review due to their cross-sectional design. However, the present review addressed the need to review the longitudinal research on adolescent student engagement which presents a first appraisal of the evidence base that can be further developed.

CONCLUSIONS

Through conducting a scoping review of the longitudinal research on adolescent student engagement, we found many consistencies in the literature regarding how the topic is conceptualized and studied across time. In summary, the main message from these results is that more diversity is needed to extend the evidence base to generate new and potentially important findings that are currently outside of the scope of the traditional study methods. The following recommendations are given to address this point. First, student engagement constructs should be tested in indigenous and non-Western samples to avoid an overly Western bias in how engagement is conceptualized and measured. Second, studies should use multiple informants and multiple methods in both longer-term and momentary designs, to increase methodological rigor and the reliability of results. Third,

more person-oriented and individual variance analyses are needed to expand knowledge on engagement development. Fourth, the development of new measures and use of less commonly known measures can expand the field to consider different levels (e.g., task, schoolwork) and dimensions (e.g., cognitive) of engagement. Fifth, further theory development is needed to consider different levels and dimensions of engagement and how these develop and interact across time. Also, existing developmental theories should be tested rather than simply used as a worldview in study introductions. A key finding of this review is that there is a need to construct a specific theory of how engagement develops. Sixth, further systematic work is needed to map and strengthen the field of longitudinal research on adolescent student engagement. For example, this scoping review has provided part of the foundational work necessary for informing future meta-analyses of student engagement development. Finally, we encourage researchers to think carefully about how to systematically advance knowledge on adolescent student engagement using longitudinal designs, which may require moving away from what is commonly tried and tested. We hope that this scoping review will give them a starting place for identifying what needs to be done.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Supplementary Material