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School Climate Multidimensionality and Measurement:

A Systematic Literature Review

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School Climate Multidimensionality and Measurement:

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Abstract

School climate refers to individual perceptions of moral, relational and institutional aspects of school life. A growing body of research has confirmed the importance of studying school climate for developing interventions able to reduce problem behaviours and to promote student and teacher wellbeing. However, the literature shows that research in the field meets some challenges, as it is difficult to empirically capture the nature of such a complex and broad construct. In the current work, we build on the results of previous reviews for addressing in particular two main concerns of researchers, namely school climate multidimensionality and measurement. In particular, we present an overview of empirical research carried out from 2010 and on, with the aim of specifically addressing three issues. First, to describe which measures were actually used in the empirical studies. Second, to explore whether Wang and Degol's (2016) effort to establish a common multidimensional ground was echoed by authors researching in the field. Third, to account for studies that were based on multiple informants and longitudinal data. In the conclusion, we discuss the main limitations in the current literature and suggest areas of future development and intervention.

Keywords: School climate; Quantitative research; Secondary school students; Secondary teachers

School Climate Multidimensionality and Measurement:**A Systematic Literature Review**

1. Introduction

Research into school climate goes back many years. However, it is in the last few decades that the interest toward the construct has grown constantly, overall in the United States and more recently elsewhere (Cohen, McCabe, Michelli, & Pickeral, 2009; Ramelow, Currie, & Felder-Puig, 2015). Beyond the various nuances in which the term has been conceived, authors have come to share a moderate agreement on a definition of school climate as “the quality and character of school life. School climate is based on patterns of people’s experiences of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures” (Cohen et al., 2009, p. 182).

Three additional features should be added to this definition. First, it is a comprehensive and multidimensional construct comprising academic experience, relations, safety and institutional environments (Wang & Degol, 2016). Moreover, it impacts various outcomes, such as academic achievement (Berkowitz, Moore, Avi Astor, & Benbenishty, 2017), students’ and teachers’ psychological wellbeing (Aldridge & McChenney, 2018; Gray, Wilcox, & Nordstokke, 2017; Kutsuruba, Klinger & Hussain, 2015), lower levels of bullying, behavioural misconduct and substance abuse (Reaves, McMahon, Duffy, & Ruiz, 2018; Steffgen, Recchia, & Viechtbauer, 2013). Finally, it is a malleable, viable, data-driven tool potentially changeable via interventions (Voight & Nation, 2016; Wang & Degol, 2016) and able to support both good and unsuccessful schools in promoting student success and wellbeing (Thapa, Cohen, Guffey, & Higgins-D’Alessandro, 2013). By and large, school climate emerges as a useful access route to promote students’ and teachers’ self-reflection that eventually foster school change and improvement.

Within this framework, research in the field comes up against several challenges, as it is difficult to empirically capture the nature of such a complex and broad construct. In the current work, we build on the results of previous reviews for addressing in particular researchers’ two main concerns, namely school climate multidimensionality and measurement (Cohen et al., 2009; Ramelow et al., 2015; Thapa et al., 2013; Wang & Degol, 2016; Zullig, Koopman, Patton & Ubbes, 2010). Having clear, shared definitions and good

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instruments is an essential stepping stone for translating school climate research in usable knowledge for intervention.

1.1 What do we know from previous reviews on school climate domains and measurement?

Domains and dimensions. In Table 1 we provide a synthesis of school climate domains and dimensions identified by previous reviews (Cohen et al., 2009; Thapa et al., 2013; Wang & Degol, 2016; Zullig et al., 2010). While all the authors share a multidimensional view of the construct, there is only a partial agreement on the labels, the number and the specific dimensions of domains.

Insert Table 1

In the most recent of these reviews, Wang and Degol (2016) have provided a thorough assessment of which domains and dimensions correspond to the current construct of school climate. After a systematic process of literature review and coding, and after having consulted experts in the field, these authors reached a classification of school climate into four domains and 13 dimensions (see Table 1 for the complete list of dimensions): *Academic Climate* refers to the various ways in which learning and teaching processes are promoted in the classrooms; *Community* accounts for the quality of relationships between students and teachers and among various members of the personnel; *Safety* comprises both physical and emotional safety as well as the quality of discipline provided by the school; *Institutional Environment* refers to concrete aspects of the school setting, such as the maintenance of the building and the allocation of educational resources. Based on 327 reviewed literature sources, Wang and Degol (2016) provided a breakdown of how these four domains and their related dimensions were defined, varied and overlapped in the various works. However, their review does not report whether and to what extent this multidimensional and comprehensive approach to school climate, with several domains and dimensions, actually constitutes the basic grounds for empirical studies conducted in the field.

Measurement. Three reviews have focused on the currently available instruments to measure school climate (Kohl, Recchia & Steffgen, 2013; Ramelow et al., 2013; Zullig et al., 2010). In Table 2 we provide a synthesis of the measures described in each of these reviews.

Insert Table 2

The main purpose of the review by Zullig and colleagues (2010) was to develop a psychometrically sound measure of school climate. To this aim, they first reviewed five student self-report instruments that met the criteria of having been used consistently since their inception, and analysed whether each of these measures was reliable and able to account for the five school climate domains they considered (see Table 1). The authors concluded that the instruments were incomplete in this regard, and thus developed a new instrument by selecting items from the existing measures.

A few years later, Kohl et al. (2013) provided an overview of student self-report questionnaires to measure school climate, with a specific focus on research studying the link between school climate and aggression. They provided evidence that many authors created their own measure or adapted other instruments, and in both cases the items were often similar. They concluded that, even if adapting a measure may have advantages for developing a new approach or applying it in a specific school context, this practice should be avoided if there are adequate existing measures.

Finally, Ramelow and collaborators (2015) reviewed 12 articles presenting school climate instruments that were validated for students aged 11 years and older and published between 2003 and 2013. The questionnaires were described in terms of contents, psychometric and formal qualities. By and large, this review offered a useful synthesis of the currently available questionnaires, raised critical questions concerning the limitations of such measures, and concluded by stating that it is difficult to find an appropriate and well-validated tool able to capture this broad construct.

In brief, from the literature reviews we know many things about school climate research. However, the issue of measurement is far from being solved, and the limits and problems of the existing measures make research in the field a challenging task. Moreover, how to capture the multidimensional nature of school climate is still an open question for researchers. In particular, there are three gaps that deserve to be addressed, as previous reviews considered articles presenting validated measures that were: (a) published up to 2013, (b) student self-report, and (c) used in cross-sectional studies. Also, as pointed out by Wang and Degol (2016), multi-informant as well as longitudinal studies on school climate have been disregarded by previous reviews.

1.2 Aim

In this article, we build on previous reviews and go forward by analysing the current state of the art concerning multidimensionality and quantitative measurement in the literature research on school climate. This is a task that has never been addressed before, while it is essential to understand what are the current most common practices in the assessment of such a complex construct as school climate, if there are any. This knowledge, in turn, can inform both future research and intervention. In particular, we present an overview of empirical research carried out from 2010 and on, with the aim of specifically addressing three issues. First, to describe which measures were actually used in the empirical studies. Second, to explore whether Wang and Degol's (2016) efforts to establish a common multidimensional ground was echoed by authors researching in the field. Third, to account for measures used in studies based on multiple informants and longitudinal data.

2. Method

This review was informed by the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines. We used PsychInfo and Scopus databases as primary information sources and cross-referenced the studies to find possible further articles to include in our review. We included only articles from peer-reviewed journals written in English, Italian or French, reporting studies with participants from secondary schools (middle and high school, from grade 6th to 12th), either exclusively or as part of broader samples. Consequently, we excluded articles with samples composed only of pre-school, kindergarten, elementary or college students. The decision to focus on research in secondary schools was driven by the consideration that primary and secondary education differ in academic objectives and strategies, and as a consequence school climate dimensions such as relational quality and teaching and learning are intrinsically different.

The only key word for our database search was 'school climate'. This was a deliberate choice driven by the specific intent to identify measures and instruments used to study this specific construct. We are aware that this decision may have led to the exclusion of interesting studies on other related aspects of schools, but that was beyond the scope of the current review. We also applied some restrictions through the use of inclusion criteria. Firstly, we limited our search to the years between 2010 and 2018, thus including all the studies published after the year of publication of the review by Cohen et al. (2009), which can be

considered a milestone in the studies on school climate as it provided a generally accepted comprehensive definition. Moreover, given our focus on quantitative measures, which represent more than 90% of the studies in the field (Wang & Degol, 2016), we excluded the few qualitative studies. Finally, we included studies that considered at least two dimensions of school climate. This choice was informed by an overarching interest toward a multidimensional approach to school climate. As a consequence, we excluded all the articles that accounted for only one dimension of school climate. We also excluded articles with a specific and limited definition of school climate (e.g. authoritative school climate, organizational climate, instructional climate, participative climate), as well as those focused on specific types of school (e.g., boarding schools). We also found a group of studies focused on climate as it is perceived by specific populations, such as sexual or ethnic minorities; as that these studies moved away from the more general definition of school climate, for the purposes of this review we excluded them.

3. Results

Our first search on PsychInfo and Scopus databases yielded 1410 results. We eliminated duplicates and screened all titles and abstracts to identify which articles were consistent with our inclusion and exclusion criteria. After the screening, we identified 158 articles to be assessed for eligibility; of these we obtained the full text and, after a further application of our inclusion and exclusion criteria, we selected 111 articles to be included in our review (Figure 1). Two more articles were then included after hand-searching and cross-referencing the articles, for a total of 113 articles included in the present review.

Insert Figure 1

By and large, the selected articles provide some general information on the diffusion of school climate research. Since 2010, the interest in the study of school climate has steadily increased, with the number of studies per year growing from the 9 eligible articles in 2010 to the 26 eligible articles in 2017. The United States were the main centre of research on the topic, with about 53% of studies conducted there. However, research was also active elsewhere, especially in Canada (about 9%) and Australia (about 8%). Europe, as a whole, covered almost 19% of the studies, mostly conducted in Portugal, Spain and Germany. In Asia, the most active country was China with 7 (about 6%) articles.

3.1 Measures used in school climate research

A substantial number of articles used data from national and international surveys (about 32% of the selected articles, with 11 studies based on international surveys and 25 based on national surveys). The most used international source of data was the *Health Behaviors in School-aged Children* (n=7 studies). This is an international survey conducted in several countries every four years, which encompasses many different aspects of adolescents' life. From this large survey, authors calculated variables related to school climate in two ways: two studies (Farhat, Simons-Morton, & Luk, 2011; Saab & Klinger, 2010) computed only a general factor to measure school climate while the other five studies (Freeman, Samdal, Băban, & Bancila, 2012; García-Moya, Rivera, & Moreno, 2013; Larochette, Murphy, & Craig, 2010; Ottova et al., 2012; Whitehead, Currie, Inchley, & Currie, 2015) computed more than one domain. As the survey comprised the *School Relationships Questionnaire*, reviewed in Ramelow et al. (2015), all five studies included dimensions² related to school relationships quality, even if the definitions varied. Other computed dimensions of school climate from this survey were school pressure (Freeman et al., 2012; Ottova et al., 2012), liking the school (Whitehead et al., 2015), school related stress (García-Moya et al., 2013) and safety (Larochette et al., 2010).

On a national level, many countries, especially the United States, used their own periodic survey to assess various aspects of school life. Such surveys usually involved many schools and large samples of students. The most cited validated national surveys were the *California Healthy Kids Survey* (Benbenishty, Astor, Roziner, & Wrabel, 2016; De Pedro, Gilreath, & Berkowitz, 2016; Lenzi et al., 2017; O'Malley, Voight, Renshaw, & Eklund, 2015; Voight, Hanson, O'Malley, & Adekanye, 2015) and the *Maryland Safe and Supportive School survey* (Bradshaw, Waasdorp, Debnam, & Lindstrom Johnson, 2014; Lindstrom Johnson, Pas, & Bradshaw, 2016; Lindstrom Johnson et al., 2017; Milam, Jones, Debnam, & Bradshaw, 2017). The California Healthy Kids Survey comprised a specific scale for school climate, i.e. the *California School Climate Scale* developed by Furlong et al. (2005), which was described in previous reviews (Kohl et al., 2013; Ramelow et al., 2015; Zullig et al., 2010). From this scale, the reviewed articles quite consistently

² For reasons of clarity, we use the term 'domain' with reference to those identified by Wang and Degol (2016). When labels differ, we use the term 'dimension'.

reported to have obtained the following dimensions of school climate: school connectedness, quality of teacher-students relationship, safety and student meaningful participation in the school decision processes. With regard to the *Maryland Safe and Supportive School Survey*, one of the selected articles (Bradshaw et al., 2014) identified a 3-factor model comprising safety, engagement and environment, while the other articles used different variables depending on the specific study aims: one focused on food environment in the school (Milam et al., 2017), one on delinquency and physical comfort (Lindstrom Johnson et al., 2017), one on parent engagement (Lindstrom Johnson et al., 2016). By and large, all these studies included a dimension related to the relational environment, even if defined in different ways. From our own assessment of the above-cited articles, a critical point in the use of national and international surveys is that variables and dimensions were often created by aggregating items, without using specific scales and subscales. As a consequence, even if different studies computed variables from the same survey, the comparison of results was not possible.

In addition to the difficulties for comparison, also studies that did not use national or international surveys reported a variety of methods and instruments to measure school climate. We found 30 articles (Back, Polk, Keys, & McMahon, 2016; Brault, Janosz, & Archambault, 2014; Brighi, Guarini, Melotti, Galli, & Genta, 2012; Buehler, Fletcher, Johnston, & Weymouth, 2015; Byrd & Carter Andrews, 2016; Collie, Shapka, & Perry, 2011; Collie, Shapka, & Perry, 2012; Connell, El Sayed, Reingle Gonzalez, & Schell-Busey, 2015; Ferrer, Ruiz, Amador, & Orford, 2011; Geller, Voight, Wegman, & Nation, 2013; Gendron, Williams, & Guerra, 2011; Gerard, & Booth, 2015; Guerra, Williams, & Sadek, 2011; Hopson, Schiller, & Lawson, 2014; Hopson, Lee, & Tang, 2014; Karakos, Voight, Geller, Nixon, & Nation, 2016; Lee & Song, 2012; Liu, 2012; Liu & Lu, 2012; López et al., 2017; Malinen & Savolainen, 2016; Martinez, Coker, McMahon, Cohen, & Thapa, 2016; McLean, Abry, Taylor, Jimenez, & Granger, 2017; Peter & Dalbert, 2010; Skinner, Babinski, & Gifford, 2014; Smith, Ito, Gruenewald, & Yeh, 2010; Von der Embse, Pendergast, Segool, Saeki, & Ryan, 2016; Whitaker & Hoover-Dempsey, 2013; Wong & Siu, 2017; Wylie et al., 2010) based on existing and validated measures of school climate that nevertheless authors adapted to the specific aims or reduced to a shorter version (including a subscale or only a few items) of the original measures. Only one study (Dymnicki & Multisite Violence Prevention Project, 2014) combined more than

one existing measure to assess various dimensions of school climate, while 12 articles (Connell, Barbieri, & Reingle Gonzalez, 2015; Luengo Kanacri et al., 2017, Marsh, McGee, & Williams, 2014; Nickerson, Singleton, Schnurr, & Collen, 2014; Pössel et al., 2016; Reynolds, Lee, Turner, Bromhead, & Subasic, 2017; Richard, Schneider, & Mallet, 2012; Sawyer et al., 2010; Segool, Von der Embse, Mata, & Gallant, 2014; Tinsley & Spencer, 2010; Tomczyk, Isensee, & Hanewinkel, 2015; Van Beurden, Van Veldhoven, Nijendijk, & Van De Voorde, 2017) reported the use of items created *ad hoc* or taken from other studies, without specifying from which measure they were originally from. Other 6 articles (Arastaman & Balci, 2013; Denny et al., 2011; Texeira & Alves-Pinto, 2015; Turner, Reynolds, Lee, Subasic, & Bromhead, 2014; Van Eck, Johnson, Bettencourt, & Johnson, 2017; Veiga Simão et al., 2017) were based on instruments specifically created or validated in the same research. Lastly, 27 studies, described in the following paragraph, made use of validated instruments.

3.1.1 Description of validated instruments

We found 18 existing validated measures that were used at least once in our selection of empirical studies. Out of these, four appeared in more than one study, and no measure was used in more than four studies.

Insert Table 3

As reported in Table 3, only five of these validated measures were described in previous reviews. One reason for this is that some instruments were validated after the time-period considered by the authors (e.g. the SCASIM, developed by Lee et al. in 2017) while others were published earlier (it is the case, for example, of two of the most used instruments, that is, the *School climate survey* and *My class inventory*). Moreover, we found measures published in languages not considered in previous reviews (such as the *Social-educational Environment Questionnaire*, developed in French by Janosz & Bouthillier in 2007) and also a teacher-report scale (e.g. the *School level environment questionnaire*).

By and large, all measures are multidimensional. Again, the labels of the dimensions differed to a great extent, even if it is reasonable to suppose (but data are not always available) that the items were similar. The questionnaires were mainly developed in the USA and Australia. Four of the instruments were developed in European countries, namely Spain, Sweden and Portugal.

The mostly used questionnaire was the *School climate survey-revised*, previously described in the review by Kohl et al. (2013). Other three questionnaires, i.e. *My class inventory*, *Perceived school climate scale* and *What is happening in this school*, were used in more than one study and were not described in previous reviews. The first (Fraser, Anderson, & Walberg, 1982) is a multidimensional student-report measure mainly based on relational aspects of the school climate, with dimensions of Friction, Cohesion, Competition and Satisfaction related to life inside the classroom and the school. The second, in a short or extended version (respectively, Bao, Zhang, Li, & Wang, 2013; Bao, Li, Zhang, & Wang, 2015) is a student-report measure developed and used in China, based on the adaptation of the *Inventory of school climate* by Brand, Felner, Shim, Seitsinger and Dumas (2003). The extended version included three dimensions of school climate (Teacher support, Student support and Opportunities for autonomy), while the short version was used to calculate only one general variable of student perceptions concerning school climate. The third student-report measure, developed (Aldridge & Ala'l, 2013) and used in Australia, included dimensions of school climate that belong to the Community and Safety domains.

Among the other measures, a well-described and multi-informant questionnaire is the *Socio-educational Environment Questionnaire* (SEQ), validated in French by Janosz & Bouthillier (2007), which comprised three dimensions to be assessed by students and staff: Practices, School climate and Problems. Each of the first two dimensions included various sub-scales, while the Problems scale assessed the frequency of a series of single items describing behavioural problems in the school context.

Finally, we should note that the *School level environment questionnaire* (developed by Rentoul & Fraser, 1983, and later revised by Johnson, Stevens, & Svoch, 2007) was the only teacher-report measure adopted either as whole or partially. In contrast with other measures, this questionnaire was focused on organizational and leadership aspects.

3.2 *The multidimensional ground of school climate research*

Wang and Degol (2016) provided sharp evidence that school climate is a multidimensional construct comprising four main domains and several dimensions. However, from our own reading of the literature we found that research in the field is far from sharing a common ground for such multidimensionality. On the contrary, various authors referred to a multitude of domains, and even when the dimensions were similar,

the definitions differed. In many cases, which dimensions to consider depended on the aims of the study: some authors, for example, decided to focus on the school climate dimensions that were more closely linked to the outcome variable. More than one study computed dimensions of school climate with a factor analysis after the administration of the survey, especially when data from national and international surveys were used. We also found substantial differences among studies whose respondents were teachers or students, with the first ones more focused on organizational aspects. In the end, what emerges is that, despite the various attempts to converge, school climate research remains a very fragmented field.

A further support to this claim is that we found no studies that adopted the complete set of domains and dimensions proposed by Wang and Degol (2016). A few studies appeared to be more comprehensive than others, but even when the areas of interest represented the four domains, names and definitions differed. Moreover, some studies considered dimensions not explicitly accounted for in Wang and Degol's (2016) proposal. For example, some articles included a dimension related to parent involvement (Bradshaw, Waasdorp, Debnam, & Lindstrom Johnson, 2014; Hendron & Kearney, 2016; Holfeld & Leadbeater, 2017; Lee, 2011; Lindstrom Johnson et al., 2016; Suldo, McMahan, Chappel, & Loker, 2012; Suldo, Thalji-Raitano, Hasemeyer, Gelley, & Hoy, 2013; Van Eck et al., 2017), to school-family relations (Gómez & Gaymard, 2014) or to student support at home (Gage, Larson, Sugai, & Chafouleas, 2016; Gage, Prykanowski, & Larson, 2014). A number of studies (Arastaman & Balci, 2013; Bao, Li, Zhang, & Wang, 2015; Benbenishty, Astor, Roziner, & Wrabel, 2016; De Pedro et al., 2016; Konishi, Miyazaki, Hymel, & Waterhouse, 2017; Låftman, Östberg, & Modin, 2017; O'Malley et al., 2015; Stillman et al., 2017; Voight, Hanson, O'Malley, & Adekanye, 2015; Wang et al., 2017) included a dimension on students' autonomy and meaningful participation in the school decision processes, which in Wang and Degol (2016) was described as being part of the dimension Respect for diversity (in the Community domain). Out of these studies, most adopted either the *California School Climate Survey* in the USA, or the *Perceived School Climate Scale*, in China. Another dimension, i.e. student engagement, appeared to be a controversial element because in one study it was considered to be an outcome (Fatou & Kubiszewski, 2017), while in others as a dimension of school climate (Bear, Yang, Mantz, & Harris, 2017; Bradshaw et al., 2014; Fortin, Marcotte, Diallo, Potvin, & Royer, 2013; Luengo Kanacri et al., 2017; Malone, Cornell, & Shukla, 2017).

Again, in the validated instruments (see Table 3) there is little to no overlapping with the set of domains and dimensions proposed by Wang and Degol (2016). On the contrary, some instruments were based on completely different dimensions, such as *My class Inventory*, while others comprised few dimensions on a single domain (it is the case of the *School Level Environment Questionnaire*, focused on the Leadership and Professional Development dimensions from the Community domain).

The instrument that most closely represented Wang and Degol's proposal is the *School Climate Measure* (SCM), developed by Zullig et al (2010). Indeed, as described above, this measure was developed after a literature review that led the authors to identify five domains of school climate quite similar to the ones proposed by Wang and Degol. The main difference in the proposed set of domains is that School Connectedness was considered by Zullig and colleagues as a separate domain, while Wang and Degol incorporated it as a dimension of the Community domain. Also, the dimensions included in each domain were not always the same. Furthermore, Zullig et al. (2010) combined items from existing measures and tested them, ending up with an eight-domain scale covering all the five domains and further distinguishing some of them. Other two measures, i.e. the national survey *Maryland Safe and Supportive School* and the *Socio-educational Environment Questionnaire*, included many of the identified dimensions but were developed within a different theoretical approach.

The good side of the story is that, by and large, most instruments included at least one dimension from the Community domain and one from the Safety domain. As for Community, more than half of the studies reported a relational dimension, even if the definitions varied: some authors focused more on the general positive quality of relationships, others more specifically on the supportive and caring quality. Further differences were found as far as the subjects of the relationships were concerned: one third of the studies included both measures of student-student relationships and teacher-student relationships, while fewer focused only on student-student relationships and others only on teacher-student relations.

A significant number of studies measured if students felt connected or affiliated (the dimension defined as Connectedness by Wang and Degol) to their school community (Aldridge, McChesney, & Afari, 2018; Batanova & Loukas, 2016; Benbenishty et al., 2016; Bradshaw et al., 2014; Cance, Loukas, & Talley, 2015; De Pedro et al., 2016; Fatou & Kubiszewski, 2017; Fortin et al., 2013; Garnett & Brion-Meisels,

2017; Hopson, Schiller, & Lawson, 2014, Hopson, Lee, & Tang, 2014; Konishi et al., 2017; Larochette et al., 2010; Lee & Song, 2012; Lenzi et al., 2017; Mucherah, Finch, White, & Thomas, 2018; O'Malley et al., 2015; Richard et al., 2012; Riekie, Aldridge, & Afari, 2017; Van Eck et al., 2017; Voight et al., 2015; Wylie et al., 2010; Zaykowski & Gunter, 2012, Zullig, Huebner, & Patton, 2011), and other studies also explored the dimension Respect for Diversity (Aldridge, Ala'l, & Fraser, 2016; Aldridge, McChesney, & Afari, 2018; Gage et al., 2016; Gage et al., 2014; Konishi et al., 2017; Nickerson et al., 2014; Riekie et al., 2017; Schneider & Duran, 2010), mostly with the *What's happening in this school* questionnaire (Aldridge, Ala'l, & Fraser, 2016; Aldridge, McChesney, & Afari, 2018; Riekie et al., 2017) or the *Meriden School Climate Survey* (Gage et al., 2016; Gage et al., 2014), a school district survey. Overall, and beyond the differences, the Community domain can be considered as the most shared ground in school climate research.

Dimensions comprised in the Safety domain were found less often but still consistently. However, while Wang and Degol (2016) proposed two different dimensions for Physical and Emotional Safety, these were generally not clearly distinguished and often appeared intertwined in the same dimension. In detail, we found studies that included a variable specifically related to the prevalence of bullying and aggression inside the school (Bear et al., 2017; Bradshaw et al., 2014; Gage et al., 2016; Gage et al., 2014; Gaymard, Andrés, & Fernández, 2002; Malone, et al., 2017; Milam et al., 2017; Van Eck et al., 2017), to the order and discipline dimension (Bradshaw et al., 2014; Fan, Williams, & Corkin, 2011; Gerard & Booth, 2015; Gómez & Gaymard, 2014; Hendron & Kearney, 2016; Hung, Luebbe, & Flaspohler, 2015; Konishi et al., 2017; Kotok, Ikoma, & Bodovski, 2016; Lee & Song, 2012; Lindstrom Johnson et al., 2016; Lindstrom Johnson et al., 2017; Liu & Lu, 2012; López et al., 2017; Malone, et al., 2017; Suldo et al., 2012; Suldo et al., 2013; Veiga Simão, et al., 2017; Wang et al., 2010; Wylie et al., 2010; Zullig et al., 2011), or more specifically declined as the perception of school rules fairness (Bear et al., 2017; Holfeld & Leadbeater, 2017; Karakos et al., 2016; Kotok et al., 2016; Yang et al., 2013; Zaykowski & Gunter, 2012) and clarity (Aldridge, Ala'l, & Fraser, 2016; Aldridge, McChesney, & Afari, 2018; Fortin et al., 2013; Låftman, Östberg, & Modin, 2017; Riekie et al., 2017).

The other two domains were less represented. As for the Academic Climate domain, the considered dimensions varied to a great extent. Overall, many studies included a dimension at least loosely related to

the Teaching and Learning dimension of this domain, but with various nuances: some referred to a general learning or instructional climate (Buehler et al., 2015; Collie et al., 2011; Fatou & Kubiszewski, 2017; Gerard & Booth, 2015; Kotok et al., 2016; Malinen & Savolainen, 2016; Nickerson et al., 2014; Stillman et al., 2017; Van Eck et al., 2017), others investigated the value placed on academic success (Lee, 2011; Maxwell, Reynolds, Lee, Subasic, & Bromhead, 2017; Van Eck et al., 2017; Wang et al. 2010) or on academic support (Turner et al., 2014; Wang & Dishion, 2012; Wong & Siu, 2017; Zullig et al., 2011), and fewer considered academic self-regulation (Nickerson et al., 2014), school pressure (Freeman et al., 2012; Ottova et al., 2012, Richard et al., 2012), perceived competence and satisfaction (Wong & Siu, 2017; Zullig et al., 2011) and learning interests (Wong & Siu, 2017). As a result, even though all of these studies apparently measured the Teaching and Learning dimension of the Academic Climate domain, their scope, definitions and instruments varied to a great extent. The other two dimensions of the Academic Climate domain, i.e. Leadership and Professional development, were considered when teachers or administrators were involved in the research (Aldridge & Fraser, 2016; Collie et al., 2011; Collie et al., 2012; Dymnicki et al., 2014; Malinen & Savolainen, 2016; McLean et al., 2017; Richard et al., 2012; Skinner et al., 2014). For these dimensions, the mostly used instrument was the *School level environment questionnaire* (see paragraph above and Table 3 for a description).

A limited number of studies included a dimension for the Institutional Environment domain. Some considered the adequacy dimension, declined as the physical environment or building appearance (Bradshaw et al., 2014; Liu, 2012; Suldo et al., 2012; Texeira & Alves-Pinto, 2015; Van Eck et al., 2017; Zaykowski & Gunter, 2012; Zullig et al., 2011), others the availability of resources (Aldridge & Fraser, 2016; Collie et al., 2011; Collie et al., 2012; Liu, 2012; Van Eck et al., 2017) or the sharing of resources (Hendron et a., 2016; Suldo et al., 2012; Suldo et al., 2013), and a single study considered this domain in general (Martinez et al., 2016).

Lastly, in our selection of empirical studies we also found studies that, even if they considered multiple aspects of school climate (as required by our inclusion criterion), computed only one general indicator of school climate (Back, Polk, Keys, & McMahon, 2016; Brault, Janosz, & Archambault, 2014; Brighi et al., 2012; Connell, Barbieri et al., 2015; Connell, El Sayed et al., 2015; Denny et al., 2011;

Doumas, Midgett, & Johnston, 2017; Farhat et al., 2011; Gendron et al., 2011; Guerra et al., 2011; Innamorati & Maniglio, 2015; La Salle, Wang, Parris, & Brown, 2017; Li, Zhou, Li, & Zhou, 2016; Marsh et al., 2014; Reynolds et al., 2017; Saab & Klinger, 2010; Sawyer et al., 2010; Smith et al., 2010; Sznitman et al., 2012; Tinsley & Spencer, 2010; Tomczyk, et al., 2015; Van Beurden et al., 2017; Varela et al., 2018; Whitaker & Hoover-Dempsey, 2013). In these articles, school climate was often assessed through a small number of items.

3.3 Multiple informants and longitudinal research

In more than 80% of the studies, students were the only respondents, while fewer studies involved exclusively teachers' (Aldridge & Fraser, 2016; Back et al., 2016; Brault et al., 2014; Collie et al., 2011; Collie et al., 2013; Dymnicki et al., 2014; Malinen & Savolainen, 2016; McLean et al., 2017; Pössel et al., 2016; Skinner et al., 2014; Van Beurden et al., 2017; Von der Embse et al., 2016) or parents' (Goldkind & Farmer, 2013; Whitaker & Hoover-Dempsey, 2013) perceptions of school climate. The measure more commonly used to investigate teachers' perceptions was the *School Level Environment Questionnaire*, which in some studies was used in its complete version while in others reduced to a single scale or a few items. In other studies, items were taken from validated measures, such as the *Delaware School Climate Survey – Teacher/Staff* (Bear, Yang, Pell, & Gaskins, 2014) or the *Socio-educational Environment Questionnaire* (Janosz & Bouthillier, 2007), from national surveys, or developed ad hoc.

Only seven studies (Galanti et al., 2016; Gómez & Gaymard, 2014; Kotok et al., 2016; Maxwell et al., 2017; Richard et al., 2012; Sawyer et al., 2010; Stillman et al., 2017) considered multiple perspectives (students and staff), and out of these, three (Gómez & Gaymard, 2014; Maxwell et al., 2017; Stillman et al., 2017) collected data from different informants on the same measure of school climate, thus allowing the comparison of results. They all relied on validated measures, i.e. the *Educational Vital Signs*, the *School Climate and School Identification Measurement Scales* and the *School Climate Questionnaire* (see Table 3). Each of these measures focused on different objects of comparison: for example, the *School Climate questionnaire*, developed in Spain by Gaymard, Andrés and Fernández (2002), allowed to compare students' and teachers' perceptions of the frequency and quality of conflict and aggression in the school and in the classroom. Instead, in the *School Climate and School Identification Measurement Scales*, developed in

Australia by Lee et al. (2017), the mirroring dimensions for staff and students were Academic emphasis, Student-staff relations, Student-student relations and Shared values and approach.

As far as the research design was concerned, the vast majority of the studies were cross-sectional, with participants asked to complete self-report surveys on their perceptions of school climate, along with many other variables, in a single point of time. Only 17 articles reported longitudinal data (Batanova & Loukas, 2016; Benbenishty et al., 2016; Gage et al., 2014; Gendron et al., 2011; Gerard & Booth, 2015; Guerra et al., 2011; Holfeld & Leadbeater, 2017; Kotok et al. 2016; Luengo Kanacri et al. 2017; Malinen & Savolainen, 2016; Pössel et al., 2016; Sawyer et al., 2010; Schneider & Duran, 2010; Tomczyk et al., 2015; Turner et al., 2014; Wang & Dishion, 2012; Wang et al., 2010). Among these, four studies (Gendron et al., 2011; Guerra et al., 2011; Holfeld & Leadbeater, 2017; Malinen & Savolainen, 2016) relied on data collected in two or more waves during the same academic year, while the others used data from two or more (with a maximum of six) academic years, in most cases consecutive.

In 13 of these studies, data on school climate were based on students' perceptions, in three teachers were the only respondents (Malinen & Savolainen, 2016; Pössel et al., 2016; Sawyer et al., 2010), and one study involved students and parents (Luengo Kanacri et al. 2017). No article provided a comparison of multiple points of view on the same dimensions of school climate.

As for the aims, five studies (Gage et al., 2014; Gendron et al., 2011; Guerra et al., 2011; Holfeld & Leadbeater, 2017; Wang & Dishion, 2012) investigated the predicting role of school climate dimensions on bullying, victimization, cyberbullying and aggression and one study (Batanova & Loukas, 2016) considered school climate as a possible mediator between social awareness and self-management and aggression. Others (Kotok et al. 2016; Tomczyk et al., 2015; Wang & Dishion, 2012; Wang et al., 2010) focused on various developmental risks, such as problem behaviour, substance abuse and dropping out of school, or investigated the association between school climate and depression (Gerard & Booth, 2015; Pössel et al., 2016; Sawyer et al., 2010). Only one study investigated the associations of school climate dimensions with a desirable outcome, i.e. positivity and prosocial behaviours (Luengo Kanacri et al. 2017). A study investigated the impact of ethnicity, background, gender and age on school climate perceptions (Schneider & Duran, 2010) and another the role of academic achievement as a positive antecedent for school climate

School Climate Multidimensionality and Measurement (Benbenishty et al., 2016). Lastly, while most studies focused on student outcomes, only one study included a teacher variable in the outcomes, namely job satisfaction (Malinen & Savolainen, 2016).

4. Discussion and conclusion

In the present article, we have built on the conclusions of previous reviews for advancing in the understanding of how research on school climate meets the challenges raised by the issues of multidimensionality and measurement of such a broad and complex construct. For this purpose, we conducted a systematic overview of more than one hundred empirical studies carried out from 2010 onwards.

We started by examining which quantitative instruments were actually used to study school climate. Our results show that scholars made use of a surprisingly wide array of instruments, ranging from surveys to validated measures. Unfortunately, we also found out that, with just a few exceptions, most validated measures were used only in a single study. In our view, this constitutes a severe limit of research in the field, for at least two reasons. First, such a fragmentation in terms of instruments does not offer researchers willing to enter the field a coherent picture of the measures they could rely on for their data collection, with the consequence of somehow legitimating every single author to build their own measure or to select items from various scales. Secondly, it makes a comparison of results from different studies very difficult, if not impossible, while this should instead be a major goal for researchers as it could open multiple lines of reflection for intervention and prevention that are surely needed in the schools. This limitation is particularly striking because it highlights that, notwithstanding the vast number of studies that have been published on school climate in the last few decades, we still cannot base our data collection on reliable and widespread measures.

The same limit is further amplified by the results of our analysis on the multidimensionality of the construct. To reach the second aim of our work, we explored whether and to what extent researchers refer to the four domains clearly identified by Wang and Degol (2016) through a systematic process of literature review and coding. Our findings reveal that authors hardly adhere to this multidimensional picture of school climate. On the contrary, after our overview of empirical works we can conclude that the operationalization of school climate is still as diversified as the instruments adopted to measure it. We could find some

commonalities among the studies in the interest concerning relationship quality and school connectedness, along with the reference to the dimensions of safety and order in school. All the other domains and dimensions described by Wang and Degol (2016) have actually appeared in a limited number of studies. In this regard, we point out that particularly the dimensions pertaining to the academic domain, albeit still overlooked by researchers, can be considered a promising area for future studies on school climate. By and large, these results highlight that, notwithstanding the fact that previous reviews have provided a solid theoretical base for the study of school climate, the many authors working in the field have not reached consensus on a common picture. We encourage future studies to strive for converging toward a shared definition of the construct, in order to take full advantage of its multidimensional nature.

The present review also investigated the state of the art of the literature concerning two methodological concerns that have never been addressed before in the reviews, namely the multi-informant nature of the studies and the use of a longitudinal approach. With regard to the first issue, besides confirming that the vast majority of the studies relied on a student-report measure, we also found a limited number of studies that involved only teachers, and just two articles studying school climate in parents' perceptions. A major limitation in this field of study is thus that scholars turned out to be far more interested in collecting perceptions from a specific group of participants than to employ a multi-informant research design. Indeed, our findings reveal that a minimal percentage of the considered articles (6.1%) accounted for multiple perspectives (students and teachers) and even less (2.6%) collected data from different informants on the same measure of school climate, a particularly important procedure that allows for comparison between students' and teachers' perspectives on the same variables. On a side note, we highlight that, among the validated measures for the study of school climate, the *Socio-educational Environment Questionnaire* and the *Delaware School Climate Survey* comprise scales for students and teachers (and also parents, for the second measure) based on mirroring items. The adoption of such scales in different school contexts and countries would constitute an important step forward in research by fostering result comparisons capable of offering a multi-faceted picture of the climate in the schools. The very few studies pursuing the aim of mirroring students' and teachers' perspectives on the same dimensions confirm the importance of such an approach, which we hope will constitute an area of research development in the field.

Finally, our review highlights that the adoption of a longitudinal approach was rarely found in empirical works and, in these cases, the authors were interested in the analysis of the role played by school climate in predicting negative outcomes, such as bullying and maladjustment. This is indeed another weakness for school climate research that needs to be remedied in the future, with studies tracking adolescents in time in order to understand not only the negative outcomes of school climate but also its antecedents and desirable outcomes. In this direction, longitudinal research would contribute to informing the interventions and to improving the school context, a purpose definitely aspired to by scholars.

Some gaps of the literature are reflected in limitations of the present review. As the vast majority of studies considered secondary school grades in aggregated forms, it was not possible to search for differences and distinctions among grades. Moreover, it should be noted that the literature is not yet clear on the distinction between school and classroom climate. The two terms are used differently for referring to the level of interest (classroom or school), but to our best knowledge there is neither a clear conceptualization nor specific measures that could account for differences between the two constructs. For the purposes of this review, we specifically focused on school climate. However, future studies would greatly improve the current knowledge on the topic by trying to tackle this important distinction.

In conclusion, we argue that future research should consider that there is a call for a convergence on measures that are comprehensive and allow for a comparison of results. This would in turn provide results that respect the multidimensional nature of school climate, on one side, and the need for interventions aimed at improving schools, on the other. In this direction, research on school climate will be able to offer schools and teachers truly usable knowledge, eventually transferable to concrete actions and good practices. With this review, we took a step in that direction, by providing a synthesis of definitions, methods and instruments that can be used as a point of reference for future research capable of offering, in the long term, a better understanding of the school climate.

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Table 1.
Summary of school climate domains and dimensions identified by previous reviews

Authors	Year	n° of articles included	Identified domains (and dimensions for each domain)
Cohen, McCabe, Michelli, & Pickerall	2009	not specified	Safety (Physical, Socio-emotional); Teaching and learning (Quality of instruction, Social emotional ethical learning, Professional development, Leadership); Relationships (Respect for diversity, School community and collaboration, Morale and connectedness); Environmental-structural
Zullig, Koopman, Patton, & Ubbes	2010	not specified	Order, safety discipline (Perceived safety, Respect for peer and authority, Knowledge and fairness of disciplinary policies, Presence of gangs); Academic outcomes (Accomplishment and recognition, Sense of academic futility, Academic norms, Academic instruction, Overall satisfaction with classes, evaluations of performances); Social relationships (Teacher-relationships, Interpersonal relationships, Student-peer relationships, Helpfulness of school staff); School facilities (School temperature, Classroom arrangement, Ambient noise, School condition, School decorations); School connectedness (Engaged learners, Feelings about school, Students feel valued for their input)
Thapa, Cohen, Guffey, & Higgins-D'Alessandro	2013	206	Safety; Teaching and learning; Relationships; Institutional Environment; School Improvement Process
Wang & Degol	2016	327	Academic climate (Leadership, Teaching and Learning, Professional development); Community (Quality of interpersonal relationships, Connectedness, Respect for diversity, Community partnership); Safety (Physical, Emotional, Order and Discipline); Institutional Environment (Adequacy, Structural organization, Availability of resources)

Table 2. Summary of student-self report instruments described by previous reviews

Instrument name	Authors	Country	Dimensions
Zullig et al. (2010)			
San Diego Effective Schools Student Survey (ESSS)	San Diego County (1984)	United States	Safety and order; academic outcomes; relationships; environmental-structural; school connectedness
National Education Longitudinal Study (NELS)	U.S Department of Education (1988)	United States	Safety and order; academic outcomes; relationships
California School Climate and Safety Survey (CSCS)	Furlong et al. (2005)	United States	Safety and order; relationships
Comprehensive Assessment of School Environment (CASE)	Not specified	Not specified	Safety and order; academic outcomes; relationships; environmental-structural; school connectedness
School Development Program (SDP)	Haynes Emmons, & Ben-Avie (2001)	Not specified	Safety and order; academic outcomes; relationships; environmental-structural; school connectedness
Kohl et al. (2013)			
Adaptations from the School Climate Survey (SCS)	Various	Not specified	Not specified
School connectedness scales from the Add Health interview	Various	Not specified	School connectedness
Adaptations from the California School Climate Survey (CSCS)	Various	United States	Not specified
Adaptations from the Psychological Sense of School Membership Scale (PSSM)	Various	Not Specified	School connectedness
Adaptations from the Effective school Battery (ESB)	Various	Not specified	Various subscales
Adaptation from the Questionnaire sur l'Environment Socioeducatif (QES)	Pfetsch (2010)	Germany	Relationships among students; student-teacher relationships; support
School culture scales	Various	Not specified	Various subscales
Other school climate scales	Various	Not specified	Various subscales
Ramelow et al. (2015)			
What is Happening In This school (WHITS)	Aldridge & Ala'i (2013)	Australia	Safety; relationships
Classroom Environment Scale (CES)	Boren, Callahan, & Peugh (2011)	Not specified	Safety; relationships
Inventory of School Climate (ISC-S)	Brand, Felner, Shim, Seitsinger, & Dumas (2003)	United States	Safety; Teaching and learning; relationships
Un-named	Cemalicular (2010)	Turkey	Safety; relationships; environmental-structural
Questionnaire of School Climate Connected to Assessment (QSCCA)	Cocorada & Cliniciu (2009)	Romania	Safety; teaching and learning; relationships
Health Behavior in School-aged-Children - School relationship Questionnaire (HBSC-SRQ)	Dong, Liu, & Ding (2012)	China	Teaching and learning; relationships
California School Climate and Safety Survey_ Short Form (CSCSS-SF)	Furlong et al. (2005)	United States	Safety; relationships
School Violence Survey (SVS)	Hurford et al. (2010)	United States	Safety; relationships
Inviting School Survey-Revised (ISS)	Smith (2005)	Australia	Teaching and learning; relationships; environmental- structural
Unnamed	Soderstrom & Elrod (2006)	United States	Safety; relationships
Modified Delaware School Climate Survey. Student (M-DSCS-S)	Yang et al. (2013)	United States/China	Safety; relationships
School Climate Measure (SCM)	Zullig, Koopman, Patton, & Ubbes (2010)	United States	Teaching and Learning; relationships; environmental. structural

Figure 1. Flow chart of the selection process

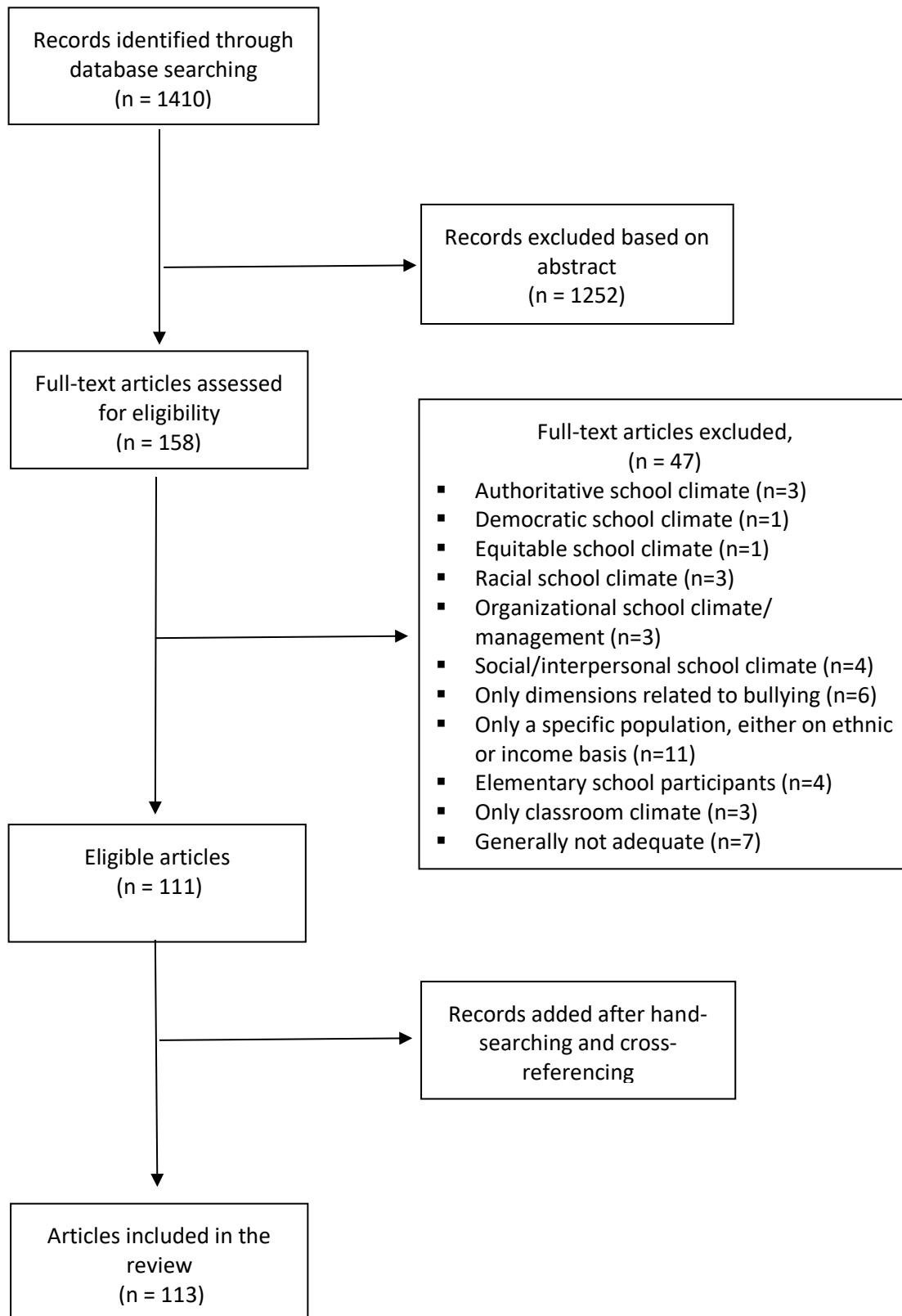


Table 3. Validated instruments used in at least one study

Instrument name	Study	Described in previous reviews	Informants	Creators	Country	Domains
My Class Inventory (MCI)	Batanova et al., 2016; Cance et al. 2015; Mucherah et al., 2018		Students	Fraser, Anderson, & Walberg (1982)	USA	Friction, cohesion, competition, satisfaction
Perceived School Climate Scale	Bao et al., 2015; Li, et al., 2016; Wang et al., 2017		Students	Bao, Zhang, Li, & Wang (2013); Bao, Li, Zhang & Wang (2015)	China	Teacher support, student support, opportunities for autonomy
Social-educational Environment Questionnaire (SEQ)	Fatou & Kubiszewski, 2017		Students Staff	Janosz & Bouthillier (2007)	Canada	Practices (Rules clarity and enforcement, student support, participation, family-school communication, pedagogical practices), School climate (relational, safety, justice, educational, connectedness), Problems
What is Happening in This School (WHITS)	Aldridge, Ala'l & Fraser, 2016; Aldridge & McChesney, 2018; Riekie et al., 2017	Ramelow et al.	Students	Aldridge & Ala'l (2013)	Australia	Teacher support, peer connectedness, school connectedness, affirming diversity, rule clarity, reporting and seeking help
Educational Vital Signs	Stillman et al. 2017		Students Teachers	Not specified	Not specified	Learning, Safety, involvement, thriving
School Climate and School Identification Measurement Scales (SCASIM)	Maxwell et al., 2017		Students staff	Lee, Reynolds, Subasic, Bromhead, Marinov et al. (2017)	Australia	Academic emphasis, staff-student relations, student-student relations, shared values
School Level Environment Questionnaire (SLEQ)	Aldridge, & Fraser, 2016		Teachers	Rentoul & Fraser (1983); revised by Johnson, Stevens, & Zvoch (2007)	Australia	Affiliation, work pressure, staff freedom, resource adequacy, goal consensus, principal support
School Climate Survey-Revised (SCS)	Hendron et al. 2016; Holfeld et al., 2017; Suldo et al., 2012; Suldo et al., 2013	Kohl et al.	Students	Haynes, Emmons, & Comer (1994); Haynes Emmons, & Ben-Avie (2001); Emmons, Haynes, & Comer (2002)	USA	Fairness of rules, Sharing of resources, order and discipline, parent involvement, student-student relations, teacher-student relations
Pedagogical and Social Climate of a School (PESOC)	Galanti et al. 2016		Students Teachers	Not specified	Sweden	Not specified
Questionnaire to Assess School Social Climate	Zorza, Marino, & Mesas, 2015		Students	Trianes, Infante, Mena, De la Morena, Raya, & Muñoz (2006)	Spain	Helpful behavior, safety and respect, teacher-student relations
Unnamed	Borges, 2015		Students	Texeira (2008)	Portugal	Relations (with peers, teachers class director); equity; safety; working conditions

School Climate Multidimensionality and Measurement

Tool kit from CASEL	Hung et al. 2015		Students	Not specified	Not specified	Authoritative structure, student order, student support
School climate questionnaire	Gómez & Gaymard, 2014		Students teachers	Gaymard, Andrés, & Fernández (2002)	Spain	School level: student-student relations; student-teacher relations; teacher-teacher- relations; school-family relations; family-family relations Classroom level: student-student relations; student-teacher relations; rules and discipline
Delaware School Climate Survey Student (DSCS-S)	Bear et al., 2017	Ramelow et al.	Students	Bear, Gaskins, Blank, & Chen (2011)	USA	Teacher-student relationships, student-student relationships, fairness of rules, clarity of expectations, school safety, school-wide engagement, school wide bullying.
Modified Delaware School Climate Survey (M-DSCS-S)	Yang et al. 2013	Ramelow et al.	Students Teachers parents	Yang et al. (2013)	USA/China	Student-teacher relations; student-student relations; school liking; fairness of school Rules
Classroom Environment Scale (CES)	Fortin et al. 2013		Students	Moos & Trickett (1987)	USA	Engagement; affiliation; teacher support; task orientation; competition; order and organization; clarity of rules; teacher control; innovation
School Climate Measure (SCM)	Zullig et al. 2011	Ramelow et al.	Students	Zullig et al. (2010)	USA	Student-teacher relations; school connectedness; academic support; order and discipline; physical environment; social environment; perceived exclusion/privilege; academic satisfaction
Character in Action	Schneider & Duran, 2010		Students	Davidson & Khmelkov, personal communication (2006)	Not specified	Safety; adult support; acceptance of diversity; personal and collective responsibility; prosocial behavior; experiences of character development