How can anyone learn or teach? Experiences of autistic people with sound in schools and universities

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How can anyone learn or teach? Experiences of autistic people with sound in schools and universities

Carmen Rosas-Pérez
School of Energy, Geoscience, Infrasctructure and Society, Heriot-Watt University, Edinburgh, Scotland, EH14 4AS, UNITED KINGDOM; mr2008@hw.ac.uk

Laurent Galbrun and Mary E. Stewart
Heriot-Watt University, Edinburgh, Scotland, UNITED KINGDOM; l.g.u.galbrun@hw.ac.uk, m.e.stewart@hw.ac.uk

Sarah R. Payne
University of Surrey, Surrey, England, UNITED KINGDOM; sarah.payne@surrey.ac.uk

An inadequate sound environment in schools and universities can lead to poorer learning, higher levels of stress and worse overall well-being, ultimately affecting people's careers and opportunities. These short- and long-term impacts can be more accentuated in autistic students, teachers, and lecturers, as autistic and other neurodivergent people tend to have significant perceptual and sensory processing differences. This paper presents the data from our study on the experience of autistic people in daily life acoustic environments related to this topic. The study explored the experiences of 12 autistic adults through reflective thematic analysis of semi-structured interviews, providing much-needed first-hand perspectives on main challenges, impact, and common coping strategies. The results highlight the crucial importance that good acoustics has for the participants, some of whom are or have been teachers and lecturers. They also illustrate how the lack of better acoustic practices and understanding of their experiences, together with some trends like open-plan schools and offices, have had a disabling impact throughout their life since childhood.

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1. INTRODUCTION

An adequate acoustics is of great importance in schools and other educational settings, and arguably one of the most important aspects to consider in the design and building process. Research on the effects of noisy classrooms and environmental noise in students is extensive, and they go from lower intelligibility of lectures, to lower cognitive performance, slower development of working memory and attention, annoyance, stress, and reduced perception of enjoyment and well-being (Astolfi et al., 2019; Camacho-Montano et al., 2019; Foraster et al., 2022; Mealings, 2022a, 2022b; Shield and Dockrell, 2003),

These effects can be more pronounced in some students, for example those who have sensory or speech processing differences, those who perceive sounds in a more intense way, or those who notice more easily sensorial stimuli. Many of these students can be neurodivergent, including children with ADHD and/or autistic, and for whom an adequate sensory environment can be of even greater importance to be able to learn and thrive in comfortable and appropriate conditions (see, e.g., Caldas et al., 2023; Wilson et al., 2019).

Several studies show that autistic students' performance and well-being can be significantly impacted by noisy classrooms (James et al., 2022; Mcallister and Maguire, 2012), and that, in turn, interventions to improve classrooms' acoustics have a greater positive impact for them, with a higher degree of improvement in their performance when the conditions are enabling (McAllister and Sloan, 2016). Autistic people also often find it harder to be in noisy common areas like canteens and sports venues (Cage and Howes, 2020), which often are not adequately designed acoustically.

The significant negative impact of disabling acoustic environments is also reported in recent studies exploring the experiences of autistic students in universities (Cage and Howes, 2020; Goddard and Cook, 2022; O'Connor et al., 2022). Although these studies are not exclusively focused on the impact of noise, in every case it is one of the main sensorial factors, often being the most important and most mentioned. It is not rare that autistic students think about dropping out (and do it) due to numerous distressful aspects of going and/or living on campus, including the sound environment (Cage and Howes, 2020).

As it is to be expected, exposure to noisy environments has negative effects as well in educators' health and well-being, leading, among others, to higher levels of annoyance (Mogas Recalde et al., 2021) and hearing-related symptoms (Fredriksson et al., 2019) and voice conditions (Cutiva and Burdorf, 2015; Lyberg Åhlander and Rydell, 2010). However, the effects in autistic educators have not been considered in research as much as effects in autistic students (mostly in children), resulting in a need to investigate these to a greater extent. The perspective of autistic educators is often not included in research about schools and neurodiversity, where the focus tends to be on students' experiences. One of the possible reasons for this may be the common misassumption that autistic adults are not part of the active population in a community and that they do not work in all kinds of jobs, including education and research, which can lead in practice to a further invisibility of their perspectives. Although some statistics show that the employment rate of autistic people in the UK is low (Office for National Statistics, 2020), there is data showing higher levels in other countries using different methods (Frank et al., 2018; Ohl et al., 2017), and a recent report estimates that the majority of autistic people do not know that they are autistic (Royal College of Psychiatrists, 2020), suggesting that the real number of people who are autistic and are employed is much higher than what can be currently determined.

Although there has been recent progress in research on the importance of good acoustics and other sensorial factors for autistic and other neurodivergent people (Bettarello et al., 2021; Brand and Gaudion, 2012; BSI, 2022; Mostafa, 2014; Newton et al., 2021), the application of recommendations and measures in non-specialised spaces remains still very limited, as reports and testimonials illustrating the frequency and impact of sensory challenges indicate (Doherty et al., 2022; MacLennan et al., 2022). At the same time, mainstream acoustics guidelines and common practices often fail to guarantee enabling conditions for the general population as well (Astolfi et al., 2022; Astolfi and Pellerey, 2008; Shield and Dockrell, 2003). This lack of enabling conditions in society is what constitutes the origin of disability in neurodivergent people and others according to the social model of disability, which considers that the external barriers present in a society are the elements that disable a person, not their differences (Dwyer, 2018). Thus, removing these barriers in a systemic form would enable people at different levels.

In addition, there is a need for studies including lived experiences of autistic people, especially autistic adults (Pellicano et al., 2014), since the literature related to sensorial perception, challenges due to sounds and inadequate acoustics has mostly focused in children.

This paper introduces part of the findings of a study exploring the experiences of 12 autistic people with daily life acoustic environments through semi-structured interviews. The findings presented here are the accounts related to sounds and acoustics in schools and universities reported by participants. Although the interviews explored multiple aspects of daily life, and the thematic analysis was performed including all these aspects, most of the participants brought up their experiences at school when they were children and the impact that "acoustic hostility" and other people's attitudes towards their perception had on them, illustrating the fundamental role that educational environments can have in autistic people's lives.

Moreover, several participants coincidentally had or currently have a career in education, as primary or secondary school teachers, or as university professors and researchers, and they shared important aspects of their experiences with acoustic environments as adults.

2. METHODOLOGY

The study aimed to provide an overview of individual lived experiences of a group of autistic people. For this, semi-structured online interviews were carried out using Microsoft Teams, and had an average duration of 1 hour. Participants were offered the option of having the conversation through video and audio, audio only, or by chat or text, and taking breaks at any point during the session. Participants were sent the questionnaire a few days before the interview, so they could know in advance what were the topics and specific questions, and also have the questions available for reference during the session.

A. PARTICIPANTS

A total of 12 autistic adults living in the UK participated in the study (seven women, four men and one agender person, age range 25-64 years old). Half of the participants were over 45 years old.

Participants were included if they were formally diagnosed (eleven of them were) or if they self-identified as autistic (one participant was in a waiting list to start the diagnosis process). While data about education and sectors of employment was not collected, several participants mentioned during the interviews working or having worked in education and higher education.

B. INTERVIEW QUESTIONS

The questions were developed with the intention of providing an opportunity for participants to reflect about their individual lived experiences in relation to acoustic environments, their individual perception of sound and its effects on their life, taking into account both negative and positive elements.

Participants were asked about their experiences in common daily life settings –at home, at work, outdoors and in indoor leisure environments– investigating which sounds and situations they considered having a negative impact on their life and well-being, and which ones they considered having a positive effect.

The questions aimed to identify common challenges that may not be addressed by current research in acoustics and perception in the general population, as well as common coping strategies, and potential actions that could improve their experiences. The dataset from the interviews was analysed through reflective thematic analysis (Braun and Clarke, 2021).

Ethical approval was granted by the School of Energy, Geoscience, Infrastructure and Society at Heriot-Watt University.

3. RESULTS

Below there is a compilation of experiences with sounds and acoustics in schools and universities reported by the participants.

Schools can be a "sensory hell"

Many participants described their experiences in schools as highly distressful and traumatising due to the high amount of intense sensory stimuli. They mentioned noisy environments like classrooms and big halls, sounds like bells, other children's voices and things like dragging chairs, central heating or toilets' sounds nearby, and architectural features such as hard surfaces, as some of the most distressing sound sources, sometimes due to the loudness of the sounds, sometimes due to the unpredictability or "suddenness", sometimes due to a combination of both, like in the case of alarms. Some other sensorial aspects, like fluorescent lights and strong smells were also noted as sources of distraction and sometimes discomfort.

"I realise now that being in a class with thirty others, in an open-plan quarter of school with two other classes, means I was exposed to the sounds of ninety other people shuffling, sneezing, sniffing, talking, whispering, rustling, clanking and all the other noises people make, in a bare environment with linoleum floors and hard chairs/tables, running water, central heating. The school building was new so the smells of paint and linoleum and plaster and carpet glue and all the other fittings were still fresh. Also there were fluorescent lights in the ceiling, my principal visual trigger and distraction." (Participant 11)

Participants remembered feeling tired and disturbed and not being able to learn much when they were children or to teach in a classroom without feeling overwhelmed by the noise in the case of those who have experienced teaching. The impossibility to "filter out" sounds around them, like they thought other people could do, was very common. A participant mentioned that at the beginning of their teaching career they thought their anxiety was due to their worry about what other people could think about the level of noise in their class, until they discovered those people were "fine with it". These effects were significantly disabling, as a participant expressed:

"When I was at school, I would sit terrified through every lesson, waiting for the bell to go off every 40 minutes. What did I learn? Not a great deal. Yeah, not a great deal. I was just terrified all day every day." (Participant 10)

Not knowing they were autistic

One of the most common experiences shared by the participants was not being aware that they were autistic when they were at school. They described being highly impacted by sounds and other sensorial stimuli, as explained above, but at the same time not understanding well why these things had such a negative impact on them, or how others could cope with this. The thought that others had the same perception but were able to somehow handle things better was common (albeit not only in childhood), which made them feel "different" in their capacity to endure certain situations. They were encouraged to ignore their perception and the impact that sensory stress had on them and to keep working on their tasks.

"When you were a child you're just told to kind of get on with stuff, and other people denying what you need makes you deny it for yourself, doesn't it? It makes you go 'well if everyone's saying I should be alright with this then I just need to get on with it.'" (Participant 9)

Dismissal and accusations

Far from being understood and supported by educators, or even by their families in some cases, participants remembered being accused of exaggerating, "making a fuss" and wanting attention, while in reality they were trying to cope and mask their struggles as much as they could without wanting to be noticed.

"They just think it's ridiculous or I'm being a toddler on being over dramatic. […] I think they just think that people like me are just being hypersensitive, silly and ridiculous. But the attitude that you often get is, 'Well, it doesn't bother me and I can't see it, so it doesn't exist and I don't need to do anything about it.'" (Participant 10)

This habitual external denial became internalised, with participants not thinking there is a real need to ask for adjustments or changes. This led to a learned "reflex" of denying their own perception and needs, and at the same time thoughts of being "weaker" or less adequate. Many participants expressed fear to talk about their experiences due to the repercussions it may have on their personal and professional life, since they have suffered these repercussions numerous times since childhood.

"If I had to try and control that in a different situation, I'm not sure how that would go. I don't feel confident. Even if people were outwardly receptive and understanding, I would worry they would talk about me behind my back, and they wouldn't actually understand and all they thought was I was making a big fuss." (Participant 5)

Even when people recognise and accept their own needs, the challenges due to dismissive and defensive attitudes are too frequent, as all participants highlighted. A common reflection shared during the interviews was that lack of awareness or financial resources are not necessarily the major problems preventing positive changes, but that there is also a strong rejection of what does not seem "normal". In this sense, measures that could improve students' and educators' experiences are often deemed as troublesome. For example, an argument to reject accommodations in schools that some participants found particularly frustrating was that it would not be fair for others, or that it would be then requested by more students, somehow implying that this would be disruptive or not possible. They found this contradictory to the message of acceptance and adaptation to individual needs, and a (too common) attitude that prevented them to do certain activities under the same level of comfort than everybody else.

"They won't let my daughter wear headphones in her classroom, because they don't want they're all wearing headphones and it's like, no, let her have one earbud in so she can still hear the teacher if the teacher calls her name. […] We need her to lose herself in her piece of work for you to get a piece of work out of her, so that she can actually stay in her classroom. But oh no, we can't have her headphones on in the classroom, because then everybody will want to wear them." (Participant 11)

Trying to cope as teachers

The struggles of most participants continued in adulthood. Those participants who chose a career in education did not know they were autistic when they started, and they expressed having felt overwhelmed on many occasions due to challenging situations in disabling environments, like echoey classrooms or open-plan schools, which are highlighted as especially challenging and inadequate spaces with little perceived benefit for students or teachers.

"It was like just a huge room. And there were six classes round the walls and we were just basically all in this giant hall. […] It almost put me off teaching for life, because I just thought I was rubbish and I couldn't do it. And I realise now that it was absolutely not the workplace environment for me because even as a brand new straight out of college. Teacher and me trying to focus on what's going on with my 30 kids in my square metres of space that I had, I could hear every other teacher teaching. How to deliver a lesson on the Jacobites or the Romans or cloud formation, when you're hearing somebody talking about equilateral triangles. It was absolutely horrendous, and I just think now, you know, what a ridiculous invention to have." (Participant 11)

Many participants developed strategies while they were teachers to cope with their acoustic environment, and that provided them some control and respite. Some of these actions were playing music in the classroom during certain activities, and exchanging some tasks, like school trips and ceremonies, with other teachers or lecturers who did not mind doing them.

"I think to calm my own nervous system, I would have this track playing through the laptop speakers as the kids were coming in through the doors. I was in a new city, I was in a new school, I was in new classrooms with kids. I didn't really know... There was a level of control over the sounds. I love hearing their chatter, I love hearing them working, but partly to cope in new and unfamiliar situations, after having been away from teaching for a while." (Participant 11)

Leaving education as students or teachers

Not all the participants could continue with their studies, even if they would have liked it. Several participants reflected as well on the impact that the disabling school had on their life and professional prospects. Some of them did not obtain the required grades to go to university, and think that this may have been different if they could have been in a better learning environment. Others found that their experience at university was similar in terms of disabling acoustic environments.

"Not conducive for learning, and it didn't change at university. I would love a learning environment that I could cope with. I would love to be able to do a masters and a PhD, but for my own mental health with that kind of environment, it's not going to happen. Very hostile environments for people like me. But there's lots of people like me." (Participant 10)

The outcome for those participants who continued in education was not much better. All the participants who worked in schools ended up leaving their job as teachers. Despite their attempts to cope with the challenges produced by disabling spaces, they noted that the impact of noisy environments was an important factor in this decision. Some of these participants have tried to stay in education in other ways, like becoming education consultants or academics.

"I used to get so exhausted by being in the classroom. I did it for about 8 years. I think there were all sorts of things that eventually made me move, but I think looking back, a lot of it was the noise." (Participant 9)

"Who design them?"

According to the participants' answers, it is apparent that the lack of understanding of auditory differences leads to lack of support, consideration, and adaptations, whether they are requested or not, and that this has significant consequences for autistic people. This lack of understanding translates in their view of many environments like schools and universities being inadequate. They questioned whether designers are given the required training to meet not only autistic people's needs, but the rest of students and staff's needs as well.

"I kind of think back now to certain places that I've worked and there was absolutely no sound science or no acoustic planning. No appreciation for the acoustics of a working environment there. There can't have been... Using internal walls like… Who designed them? It's just an awareness of the impact that acoustics can have on

workplace, not just schools, but you know… And especially with some of these multi-million pound new schools that are being built." (Participant 11)

Autistic educators can improve the experience of autistic children

Several participants remarked that the deeper level of understanding of their own differences and needs provided by the knowledge that they are autistic made them more aware and accommodative of differences and needs of other people, like family members and colleagues. A participant reflected on the beneficial impact that this knowledge can have also for children they may teach.

"Neurodivergent teachers, who maybe don't realise it yet, have to be able to support divergent children. They have to be able to work out how to support their sensory needs if that's what's actually causing them stress without realising it. That's been the biggest revelation for me." (Participant 11)

4. DISCUSSION

The findings of this study could be considered, firstly, as providing an insight into the present of many autistic students that are forced to try to learn in disabling acoustic environments while facing dismissal of their experiences, and secondly, as an illustration of some of their potential personal and professional outcomes in the future, their self-image, and how they will feel about certain experiences and the attitudes of society, educators and designers.

Participants' experiences show the direct and indirect impact that sounds and inadequate acoustics in educational settings can have, as well as some of the challenges and distress caused by these. They also give an insight into the great amount of energy involved in blocking out sounds and other sensorial elements, which is not employed in learning or teaching as they would like to do.

Acousticians focus on the quantifiable acoustical aspects of the physical environment, which are important to regulate, to fulfil and to control. But as seen in the interviews, the lack of understanding and acceptance of people's sensorial differences can be a fundamental barrier for a positive educative experience. In turn, the overlook of some of these differences and aural diversity in society is manifested in how perception-related research defines "normal hearing", and how acoustics standards are designed and based on it (Drever et al., 2023; Rosas-Pérez and Galbrun, 2023).

Acoustical and non-acoustical barriers

The importance of adequate acoustic environments in schools and educational settings is widely recognised in the literature, as mentioned earlier. However, not every building follows the basic recommendations found in guidelines, and some of these guidelines may not guarantee the adequacy required by every person.

Additionally, many of the arguments used to not provide adjustments or changes are rooted in the social perception of what is "normal" and "good" more than in a lack of resources, denoting how important these values are in the conversation about accessible and inclusive spaces. The preconceptions of what constitutes an adjustment is strongly associated with how normalised a feature or tool is in certain contexts, and possibly, but not always, with how many people make use of them. Many of the designs and characteristics of daily life environments that cover specific needs are not considered adjustments due to being used by a majoritarian group of people, or due to being considered "normal" in a specific culture and time in history. Chairs, tables, cutlery, or PA systems could be considered examples of these socially accepted adjustments that educators or employers would consider "unreasonable" not to have.

While financial resources are not unlimited, and education faces financial issues in many parts of the world, many of the changes needed are social and attitudinal. Participants highlighted that many of the actions that can represent a significant improvement do not necessarily involve any additional cost, and that these can be equally or even more important than those associated with additional costs. Most of these actions are oriented to provide a higher degree of agency and flexibility in tasks, more time to do and recover from activities, more information related to spaces available and events that can be loud (like alarms and fire drills), and greater understanding of elements and circumstances that can be distressful for different people. Additionally, many participants expressed their preference for outdoors environments, which can provide a "sensory break" if they are adequate (schools situated nearby busy roads will probably have inadequate levels of air and noise pollution), and if there is flexibility and choice in the provision of the option. This is in line with the extensive literature supporting the benefits of more outdoor time in pre-school and schools (see, e.g., Humberstone and Stan, 2011; Waite, 2010).

With respect to "quiet rooms", several participants believed that these could be beneficial in providing quiet spaces in schools and other public buildings, being available for everyone to use. But it is important to note that they should not be understood as seclusion or isolation rooms where autistic children are brought without consent when they show what it is usually called "challenging behaviour" (which is usually a response to a distressful situation). This, unfortunately, has been the case in some schools (Equip for Equality, 2020). Quiet spaces need to provide a positive experience where students and educators can be in control of their sensory environment (Selke, 2020).

With respect to the "getting over it" discourses that participants were exposed to since early on, the experiences shared in the interviews consistently show a lack of habituation to sounds in the short and long term. This experience is consistent with the results in studies on sensory sensitivity in autistic people, who show a lower level of adaptation to loudness (Lawson et al., 2015), suggesting that desensitisation does not occur at the same level than in non-autistic people. So-called exposure therapies use distressing, loud sounds that can lead "patients", often children, to enter in a state of irresponsiveness or "shutdown" due to the sensorial stress, which is often misinterpreted as a reduction of distress and a validation of the success of the therapy (Fodstad et al., 2021). Many autistic children and adults are still encouraged to not protect themselves from hostile stimuli that provoke them distress and even physical pain, and increase exposure instead. But this hypothesis is not supported by evidence, and it can lead to sensory trauma (Fulton et al., 2020) and therefore potentially increasing sensitivity and sensory distress in the short and long-term, as researchers and the autistic community have warned (Botha et al., 2021).

The importance of enabling educational environments for everyone

As several participants noted, even when autistic people's challenges due to certain environments can be more numerous, and the impact of inadequate acoustics higher, improving the conditions for autistic people (children or adults) would most probably have a positive impact on everyone, since these improvements involve a higher level of adaptation to different sensorial needs. It can be argued that creating more inclusive environments that consider temporary or permanent differences in perception and needs is a more inclusive approach than only relying on individual "special" measures. Some participants stressed, for example, that they would like to not have to wear ear defenders or headphones because they are uncomfortable for them, and there are also financial barriers. Notwithstanding, facilitating adjustments and individual accommodations when they are requested is important, and, as highlighted by the findings, educators and employers should not represent an added barrier to the ones constituted by inadequate environments.

Some participants have been granted accommodations after their diagnosis, since organisations are legally obliged to it, as participants noted (although not all comply with this obligation). But the need of a formal diagnosis to obtain accommodations raises, among others, equity issues, since access to it is limited and privilege-dependent (Mandy, 2022), and disclosure in school and the workplace often has negative impacts (Lindsay et al., 2021; Romualdez et al., 2021). This negative impact is currently too common for children and adults, and it involves discrimination, mistreatment, judgment and doubts about skills and capacity to do certain tasks, or infantilisation (Doyle et al., 2022; Price, 2022; Romualdez et al., 2021).

There are further reasons for which the availability of certain adjustments should not be restricted to people who have a formal diagnosis, in this case of autism. Firstly, access to diagnosis (or, outside the medical model, formal identification) can be highly limited in many regions and depend on the knowledge of professionals, that can also be outdated and based on stereotypes. As a result, there are many people who do not have access to a formal diagnosis due to financial and social barriers, existing yet significant gaps related to gender, ethnic and age biases (Guthrie et al., 2019; NHS England, 2022; Wiggins et al., 2020). Secondly, in the present most autistic people do not know that they are autistic or have sensory processing differences (Royal College of Psychiatrists, 2020), possibly experiencing daily negative consequences due to inadequate schools and other environments, and without the confidence or justification to request adaptations that may result in a significant improvement in their lives. Moreover, temporary or permanent life events, like stress, health conditions or medical treatments, can lead to sensorial and neurological changes, increasing sensitivity or challenges with speech processing under noisy conditions (Drever and Hugill, 2022; Landon et al., 2012).

On the other hand, the effects of noisy learning environments on the general population are multiple and well-established in the literature, as discussed in the introduction, therefore the need to improve the sound environment in educational settings and its benefits for students and educators is extensively supported by research and lived experience:

"I'm hoping that your research will reach these big organizations and as they build new places. Thinking big, schools. What a change that would make to education if that was the only thing that was changed. I just think the difference it would have made to me to not be terrified all day, every day at school. What a difference on university… How would my education have been different from the results that I came out with? I aspired to be an architect. I didn't have the right qualifications. Would I have had the right qualifications if I'd have been in a better learning environment? I don't know. Maybe yes, maybe no. But I think children, not just children, everybody needs the best environment to learn and to experience life. Nobody should be detrimented because of the environment that we're in, and because people want it to be the norm."(Participant 10)

Finally, it is worth remembering that good educational environments ought to aim not only to not be distressful, but to facilitate learning and flourishing.

5. CONCLUSION

This paper presented part of the results of interviews with 12 autistic adults, most of which casually have worked in education. The interviews explored their experiences with daily life acoustic environments, and a compilation of the content related to educational settings, like schools and universities, has been presented. Participants' accounts show that these environments can be far from facilitating learning and teaching. The exposure to constant, inescapable and many times preventable sounds while having to be in a classroom trying to focus, and the dismissal of their experiences, can cause a long-lasting effect in people's self-image and psychological well-being, and have a great negative impact on their personal and professional outcomes. Negative experiences due to inadequate acoustic environments are also common for autistic educators, to the point that they can ending up leaving teaching careers, as was the case of the participants in this study.

The results indicate a need for less sensorially stressful environments that promote better conditions for learning and teaching, arguably for everyone. An adequate acoustics in schools and universities ought to be as "normal" as chairs and tables, since the main purpose of these buildings is to learn, and this is hindered by the presence of disabling acoustical conditions.

An inclusive acoustic environment for students and educators encompasses better acoustics standards and better understanding and acceptance of diversity in people's needs, including the diversity among autistic people. The findings of this study emphasise that inclusivity is not only about the design of the building where education takes place, but also about the design of that education and our attitude towards differences.

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