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Crisis – Challenge – Coherence: Combining Universal Design for Learning and Sense of Coherence

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Abstract

The study investigates the effectiveness of using the Universal Design for Learning (UDL) approach as a trauma-sensitive pedagogy strategy in higher education. By integrating the concepts of UDL and Salutogenesis, we aimed to develop a tool that promotes healthy learning, problem-solving, and motivation among students. Salutogenesis emphasizes the development of a Sense of Coherence (SoC), which serves as a tool for stress resilience and restoration. To assess the impact of UDL practices on SoC levels, we administered a Sense of Coherence-13 questionnaire before and after implementing UDL practices in English language classes at a polytechnic university. All the students in the study had experienced traumatic events caused by the current crisis in Ukraine. The study focused on demonstrating that UDL practices can serve as a restorative and inclusive tool. The results indicate that the application of UDL practices led to an increase in SoC levels, demonstrating their potential for promoting restoration. Additionally, teacher interviews were conducted to identify the challenges and benefits of implementing UDL practices.

Keywords: Universal Design for Learning; Salutogenesis; Sence of Coherence; Trauma-sensitive pedagogy.

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1. Introduction

The health and welfare of the population are the main indicators of the economic, social, political, and cultural development of society. In the light of recent events, the issue of individual vitality as the ability to resist crisis situations and to remain resourceful has become crucial for

today's Ukrainian educators and learners. As a result of military actions, we have a great number of internally displaced students who experienced fear, uncertainty, despair, and a decrease in their level of social security and adaptability. At the current stage, the problem of the spiritual development of young people as social personalities ready for active participation in public life has become acutely relevant.

Scientists are searching for concepts and approaches on how to overcome crises, optimize the educational process, and create safe and engaging learning environments for students who have experienced a stressful or traumatic event. The concept of Salutogenesis arose (Antonovsky, 1987) in foreign psychology as an attempt to answer the question of how, despite the difficult conditions of existence or stress, personality maintains a high level of activity, ability to work, and overcomes crisis situations in an adequate way. The salutogenic theory's key idea, the Sense of Coherence (SoC), explains how people perceive and react to stressors in ways that can benefit health. Therefore, there is an urgent need for educators to develop trauma-sensitive teaching skills with a focus on the prevalence of trauma acknowledgement, its symptoms and associated behavioral changes, the educational management of trauma-affected students, and creating safe, barrier- and stress-free learning environments.

Having resumed the educational process under war conditions, we noticed dramatic changes in students' ability to learn, including difficulties with focusing, being exposed to uncontrolled emotions, processing and recalling information, reacting unpredictably to comments, the fear of future planning, showing low self-esteem, having an increased level of anxiety with regard to public speaking, and being assigned and assessed. All these trauma consequences form barriers to learning that can be eliminated when applying the strategies and philosophy of UDL, which creates a barrier-free learning environment and promotes wellbeing.

With this in mind, we approached the concept of trauma-informed pedagogy from the perspective of Universal Design for Learning (UDL) and SoC. In educational settings, there is a growing body of literature examining the individual effects of the UDL and SoC frameworks. However, there is a significant research gap regarding the synergistic effects of combining these two approaches as restorative practices in higher education. There is little empirical research that looks at how their intersection can provide a comprehensive approach to addressing the well-being and learning needs of students, particularly in the context of trauma-sensitive pedagogy. Investigating this point of

intersection could provide insight into how UDL and SoC complement each other, providing a fresh viewpoint on creating inclusive, resilient, and empowered learning environments.

We have chosen to prioritize the application of UDL and SoC strategies as trauma-sensitive practices at the university. Our objective is two-fold. We present the theoretical background for the connection of UDL philosophy with Antonovsky's (1987) theory of salutogenesis, predominantly SoC. We applied Antonovsky's theory as an approach that demonstrates the impact of stress on human vitality and the ability to study, to develop, and to find meaning in the events happening to a person. We regard it as important to empirically study the SOC level of Ukrainian students, whose contemporary life experiences are filled with stressful situations.

The second part of the research is an empirical study on the implementation of UDL strategies developed with the integration of the SoC concept. Our study is focused on two key questions:

1. What is the Sense of Coherence level of Ukrainian students?
2. What are the most efficient UDL strategies that can be applied from the perspective of salutogenesis in the new reality of Ukrainian education?

The hypothesis of our research is that the UDL can serve as a salutogenetic means to establish a healthy way of learning and problem-solving.

2. Theoretical Background

Today, the salutogenetic approach represents an alternative system of understanding the relationships between a personality and the environment. Salutogenesis has entered a lot of different scientific branches, like medical humanities, pedagogy, didactics, and special needs education. It should be noted that the SoC is in some ways similar to the concept of resilience introduced by Kobasa et al. (1982) as a factor that allows for resisting the negative effects of stress and moving towards psychological well-being. However, the mechanisms of resilience regulation can be different: Antonovsky (1993) emphasizes the role of emotions, whereas Kobasa et al. (1982) speak mainly about cognitive processes.

Among studies devoted to stress, we highlight the work of Greenberg (2016). He outlined the concept of "determination" and identified reasons that might prevent the development of the disease due to stress: obligation, control, and endurance. Therefore, the main idea is that change should be perceived as a challenge, not as a threat.

Another concept similar in content to a SoC is self-efficacy (Saienko et al., 2020; Moradi, 2022), which is defined as an individual's belief in his ability to cope with a certain activity. However, self-efficacy, in contrast to the SoC, is considered a specific belief associated with a specific activity and not a global belief of the individual related to life in general; in addition, self-efficacy is associated more with the individual's confidence within the range of their own controllable resources.

From Antonovsky's theory of salutogenesis, it follows that efforts should be made not to eliminate pathogens but to maintain healing factors such as "general resources of resistance" and "SoC". The first concept includes biological, material, and psychological factors that allow an individual to experience life as permanent, understandable, and systematized. Typical resources of resistance are money, knowledge, experience, self-esteem, commitment, social support, cultural background, education, traditions, and worldview (Moksnes, 2021). If a person processes such resources, it is much easier to overcome life's troubles. These (re)activated resources help a person create a coherent life experience and build an open mindset.

But what is much more important than the resources themselves is the ability to use them. Here, SoC plays a significant role. Resistance resources allow accumulating life experiences, which activate a sense of personal coherence—a way of perceiving life—and the ability to successfully manage many stressful situations. According to scientists, stress itself is not always pathogenic, but under certain conditions it can be a salutogenic factor. Concepts like "distress" and "eustress" (Selye, 1975), resilience and prosilience (Hoopes, 2017), as well as post-traumatic growth (Tedeschi & Calhoun, 2004), have become key concepts of positive psychology (Seligman & Csikszentmihalyi, 2000), which aims at wellbeing and personal growth. Successfully overcoming an event of crisis might lead a person to a positive experience. A crisis situation can be seen as a challenge not only to learn to function effectively despite unfavorable life conditions but also to "use" stress to one's advantage. The consequences of stress depend on individual means of responding to it. Antonovsky (1993) describes the main components of SOC as follows (Fig. 1):

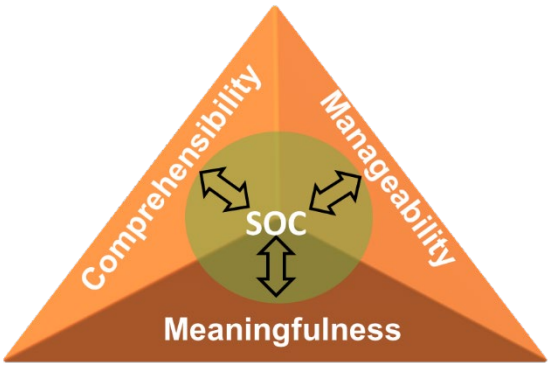

Figure 1: SoC main components (Source: developed by the authors)

1. Comprehensibility is a cognitive component that interprets stimuli coming from external and internal sources.
2. Manageability is an instrumental or behavioral component that finds the resources needed to meet the requirements of stimuli. This feeling supports a person and demonstrates that a person cannot prevent trouble, but using their own strengths and abilities, it is possible to cope with stress and survive.
3. Meaningfulness is a motivational component that defines challenges that are worth investing resources in.

The scientist argued that it is not necessary to feel that everything in life is sufficiently clear, feasible, and significant in order to have a strong SoC. It is quite possible not to perceive the world as harmonious and understandable. However, it is also crucial that there are areas in life that have subjective importance, and these areas are seen as understandable, feasible, and significant. Antonovsky (1993) claimed that SoC is formed mainly during the first three decades of life. In the future, only massive changes in life can disrupt and change SoC. If a person is not interested in art history, it does not appear to be necessary to consider these areas as comprehensible, manageable, and meaningful; the general sense of coherence is determined by the extent to which people experience it in relation to their own lives—feelings, work, relationships with other people, existential problems. A person with a high SoC is more open towards feedback, taking the opportunity to choose and try a new strategy in case of failure, and thereby clearly showing an open mindset. A person with a low SoC, in turn, ignores the feedback by avoiding the problem or by self-deception and rigidly sticks to the chosen strategy (closed mindset). Ultimately, high levels of coherence lead to effective problem-solving and stress relief, while ineffective coping leads to

continued tension and possibly the devastating effects of stress. This restorative effect was empirically proved by Stoyanova and Stoyanov (2021), who examined how a strong SoC, which is a person's capacity to understand, control, and derive meaning from stressful circumstances, can serve as a preventative measure against professional burnout. Given the tremendous difficulties healthcare personnel had during the pandemic, the article provides insightful information about the function of SoC in preventing burnout among these specialists.

Employment of SoC paradigm in educational settings is analyzed by Colomer-Pérez et al. (2022), and researchers proved that nursing students' SoC and self-care agency were positively correlated. SoC, which the authors associate with work engagement and conflict management, has been identified as being essential for the wellbeing of healthcare practitioners. According to the study, nursing education should adopt a salutogenic approach that emphasizes patient empowerment, self-care, and holistic health.

Therefore, the SoC is an important factor in achieving the psychological wellbeing of an individual. It is quite logical that the psychological wellbeing of an individual is connected with the ability to use internal and external resources to overcome negative influences, to differentiate between those challenges that are worth investing in, to manage the environment, and to create the conditions and circumstances necessary to satisfy personal needs and achieve goals.

In order to grasp the idea of SoC and UDL integration, we have to introduce the meaning behind the UDL approach. Extensive literature has investigated the concept of integrating UDL into tertiary education. The greatest advantage of UDL is its capacity to provide flexible, unbiased, and accessible learning for everyone (CAST, 2018). UDL is a philosophical paradigm that can guide educational technological transformations and contribute to socially inclusive and responsible universities. Empirical evidence from social scientists' studies (Kumar & Wideman, 2014; Smith, 2012) demonstrates that UDL has considerable potential for developing an inclusive curriculum. Erkilic (2012) supports this view and concludes that UDL shares the same ideas as inclusive pedagogy, valuing equality and social justice through designing flexible ways for expression based on students' learning styles, backgrounds, and needs.

Through UDL, teachers can create an interactive educational program that caters best to students' needs, implement differentiated training, accelerate or slow down the learning rate, and provide alternative options for students to demonstrate their learning outcomes. Designing a barrier-free

learning environment involves paying attention to the needs of all students in the class. Each of the three principles of UDL is grounded in brain activity, reflecting how information is received and processed. The UDL approach is based on three types of neurological connections in our brain that stimulate learning:

- The affective network is responsible for launching the learning process and affecting intrinsic motivation, emotions, and self-regulation in response to incoming information.
- The recognition network is responsible for selecting and interpreting information and constructing meaning.
- The strategic network is responsible for planning an individual learning trajectory, responding, communicating, and taking action.

The goal of UDL is to recognize and eliminate learning barriers, then thoughtfully plan educational practices to perceive learners' diversity by providing flexible educational strategies, accessible materials, and assessments. The flexibility of training is built through principles aligned to three networks (CAST, 2023):

1. Flexibility of methods of educational material presentation—multiple ways of representation. All students have different leading sources of information perception: some perceive visual information better, some are auditory, and some need to have tactile-motor contact with perceived objects. It means that information should be provided in several formats: through explanations, collective discussion, and educational instructions, with an emphasis on visual, auditory, and kinesthetic ways of perception.
2. Differentiation of self-expression ways: multiple ways of action and expression. Learners should be given various opportunities to demonstrate acquired knowledge, abilities, and skills in accordance with their psychophysical characteristics, inclinations, interests, and preferences. In other words, in the process of evaluating the level of educational achievements, different, perhaps non-traditional, methods are used, and they do not have to be the same for everyone. Such methods may include, for example, traditional oral and written tests, as well as verbal and/or visual presentations, individual or group projects, etc.
3. Variability in engagement in educational activities makes it possible to take into account the needs and capabilities of all students, set appropriate challenges for them, and increase the level of motivation. According to this principle, a teacher should take into account the

differences between students in the sense of their learning styles, abilities, and interests in order not only to meet individual needs but also to help discover their strengths. multiple means of engagement, multiple means of representation, and multiple means of action and expression (Rogers-Shaw, 2018).

The developers of UDL, Rose and Meyer (2002), claim that everyone learns uniquely, teaching practices should be flexible, assessments should be construct-relevant, and interactions should involve all learners. It can be achieved by:

- creating an engaging and safe environment in the classroom;
- maintaining high expectations for all students;
- creating conditions to meet these expectations.

Thus, UDL provides a framework for teachers to ensure that their teaching methods are accessible and inclusive, the curriculum is flexible, and the assessment process is differentiated for students who benefit from a multifaceted educational process. Building a supportive and inclusive learning environment is crucial for all students, especially those who have experienced trauma. Trauma-informed pedagogy and UDL share this core principle (Lelli, 2020). Youde (2020) mentioned that allowing learners to have sufficient time to process information and reflect on their learning, contributes to information processing. Traumatized students suffer from cognition disturbances, and UDL enables students to engage with the material at their own pace, fostering deeper understanding (Housel, 2023). UDL also advocates using strategies that offer diverse class interactions. Experts in UDL, Rogers-Shaw, Carr-Chellman, and Choi (2018) claim that UDL emphasizes clear expectations, rubrics, and diverse assessment methods, that benefit all learners by providing predictability and a sense of control. These not only enhance learning but also create a safe and inclusive classroom, aligning with the goals of trauma-informed pedagogy. Therefore, establishing a supportive learning community is another crucial element of both approaches.

3. Methodology

As a methodological background for our study, we employed the framework of the Design Research Methodology (Blessing, Chakrabarti, 2009). The first stage involved the critical analysis of literature sources and personal observations to formulate the research objectives and hypothesis. At the descriptive stage, we conducted theoretical research to find theories and assumptions for the

confirmation or rejection of our hypothesis. The third stage, prescriptive study, was employed for the testing and empirical data collection to outline the current state of the issue and to understand the depth of the problem. The empirical action study was participatory in nature, as it empowered the participants to augment the research procedure and outcomes. Moreover, students and teachers could reflect on those issues that caused learning barriers and suggest ideas for changes. The last stage was focused on the evaluation of UDL practices, which were enhanced with SoC concepts, efficiency, and feasibility. The study was approved by the Scientific Board of Igor Sikorsky KPI.

3.1. Participants

We involved 128 students majoring in engineering from Igor Sikorsky Kyiv Polytechnic Institute and 8 teachers from the department of English Language for Engineering. The average student's age was 19–23 years old; there were 85 male and 43 female students. Among them, 62 students were internally displaced. The sample size was calculated through the online size sample calculator with a confidence level of 95% and a margin of error of -3.76%. The students' participation was voluntary and anonymous. There were no academic consequences if students wanted to stop participating in the study. Every participant has acknowledged giving their informed consent to participate.

3.2. Data Collection Tools

To find the answer to the first theoretical question of our study, regarding the compatibility of SoC and UDL, we reviewed literature and documents with follow-up critical analysis and synthesis of information. The empirical part of the study required the employment of such tools as the SoC-13 questionnaire (Antonovsky, 1993) and a structured interview. The brief form of the SoC scale includes 13 statements that cover all three components: Comprehensibility (5 items), Manageability (4 items), and Meaningfulness (4 items). The test measures a global orientation of the personality that makes it easier to find adaptable solutions to difficulties in the stressful conditions that students encounter throughout their lives. The participants indicated agreement or disagreement on a 7-category differential scale with two fixed responses customized to the content of each item. The total score varies between 13 and 91 points, and a higher score means a higher SoC. Examples of statements on the comprehensibility dimension are as follows:

- *When you talk to people, do you have a feeling that they don't understand you? (from 'never have this feeling' to 'always have this feeling') (Antonovsky, 1987, p. 190)*

The meaningfulness is evaluated through statements 1, 4, 7, and 12 and demonstrates the person's motivation to overcome challenges and stress resilience. The comprehensibility is measured through items 2, 6, 8, 9, and 11 and represents the cognitive ability to understand a difficult situation. The manageability is evaluated through statements 3, 5, 10, and 13 and refers to the person's ability to find and apply efficient resources to cope with the stressful situation. The questionnaire was performed twice, before and after the UDL practice implementation.

The additional data collection tool was a structured interview with teachers who implemented UDL practices. The focus of the interview was on the reflection and perception of applied practices in terms of their efficiency and feasibility. The interview included four open-ended questions:

1. Could you share your experiences using UDL techniques improved with SoC in your teaching, as well as the circumstances that initially led you to investigate this mix of methodologies?
2. How did you combine UDL strategies with the SoC concept to create a more inclusive and effective learning environment?
3. Could you elaborate on the key tools or instructional strategies that were crucial to your application of UDL and the SoC concept and how these factors influenced students wellbeing?
4. What, in your opinion, were the main advantages or good results for your students that came from combining UDL and SoC, and how did this integrated strategy affect various things like student engagement, stress management, and general learning experiences in a university setting?

3.3. Data Analysis Tools

To analyze the SoC-13 questionnaire findings, we applied descriptive statistics. The alpha for the SOC-13 scale was.82 (range=.74-.81). Antonovsky (1993) concluded that content, construct, and criterion validity were adequate. Erickson and Lindstrom (2005) found that Cronbach's alpha for the SOC-13 scale ranged from.70 to.92.

First, we calculated the overall SoC score for each participant by summing the scores for all 13 items. This score represented the individual's general sense of coherence. Then we calculated basic descriptive statistics for each component of the SoC-13 questionnaire: the mean, median, and standard deviation for each component (Comprehensibility, Manageability, Meaningfulness)

separately. To ensure component correlation, we also performed Confirmatory Factor Analysis (CFA). These statistics provide an overview of participants' SoC levels in each dimension.

Narrative analysis was used to evaluate the interview data as it represented the respondents' individual experiences. In our narrative analysis of interview data, we used a systematic approach to identify thematic codes. These captured key ideas, concerns, and experiences that respondents shared in integrating UDL and SOC in their teaching practices phase. We applied an open-coding approach to identify these thematic codes. This iterative process helped us refine and adjust the codes as appropriate, ensuring that they adequately represented the diversity of perspectives evident in the interviews. A key consideration in the coding process is to capture the individual perspectives of the participants as well as reflect the broader context of our research. Thus, our goal was to strike a balance between inductive coding (generating themes directly from the data) and deductive coding (using predetermined theoretical frameworks such as UDL and SoC as a guide). Through identified codes for organization, we organized the interview data systematically into themes, examples of extracted codes, and relationships between them.

We identified thematic codes to illustrate important aspects of the researched issue and concerns regarding the needs of students and their well-being that motivated teachers to investigate the integration of UDL and SoC in their instruction. Prior to the coding process, coders worked together to develop a coding framework that described each subject code and provided specific criteria and examples to illustrate how these codes should be applied to interview data. We organized frequent discussions and review meetings to improve the accuracy of the subject codes and to resolve any disagreements or differences in interpretation. The codes were identified and calculated with the assistance of the Coding Analysis Toolkit.

1. Experience and barriers: student struggles with traditional methods, trauma exploration, addressing student anxiety and stress, information processing worsening, control of emotions;
2. Implementation: options for representation and engagement, assessment strategies, format and content diversity, options for expression, educational strategies flexibility;
3. Key tools and strategies: stress-reduction techniques, mindfulness strategies, supportive atmosphere, reflective practices, self-regulation strategies;
4. Outcomes: self-awareness, self-esteem, students' agency, resilience, and intrinsic motivation.

In order to identify similar themes, patterns, and insights on the integration of UDL and SoC in their teaching experiences, these codes were used to examine and categorize the narratives of teachers.

3.4. Working Procedure

We thoroughly collected and organized the relevant data in the initial stage of our study. We delved into the complexities of trauma-sensitive pedagogy, carefully examined the principles and techniques of Universal Design for Learning (UDL), and organized our approach during the phase, which lasted four months from May to October 2023. Our study included a number of crucial elements, such as:

- pre- and post-study surveys: we conducted two thorough surveys before and after the study to evaluate students' degrees of sense of coherence (SoC). These surveys gave us useful information on how students' perceptions and experiences change over time.
- employment of UDL practices: we carried out the introduction courses on UDL practices for teachers prior to the study. After that, teachers incorporated UDL concepts and strategies into their teaching practices.
- reflective interviews: we performed reflective interviews with the dedicated teachers who were actively involved in the research. These interviews provided a way to learn more about their achievements, struggles, and experiences with UDL strategies that were strengthened by the SoC concept.
- data analysis: we were able to identify significant trends, make inferences, and develop a comprehensive knowledge of the effects of our interventions.

Our study involved a meticulous balance of theoretical inquiry, practical application, and reflective analysis over several months. The initial phase of UDL implementation focused on identifying students' learning barriers, which was accomplished through various methods such as discussions, interviews, or short surveys. Teachers were given autonomy to choose the approach that best suited their classroom context and students' needs. Once learning barriers were identified, teachers selected appropriate UDL practices aligned with the UDL framework to address these challenges. Central to this process was the presentation of information through diverse modes and providing students with a range of opportunities for expression. Weekly meetings with educators

were dedicated to reflection sessions, where strategies to mitigate the impact of learning barriers were discussed and pedagogical scaffolding was developed to support improved information processing.

To assess the effectiveness of the UDL interventions, several measures were employed. Firstly, students' academic achievements were monitored and compared before and after the implementation of UDL practices. This included analyzing grades, assessment results, and overall performance indicators. Additionally, both students and teachers participated in reflective activities, providing insights into their experiences with the interventions and any observed changes in learning outcomes. Furthermore, qualitative feedback from students and teachers was collected through surveys, interviews, or discussions to capture their perceptions of the impact of UDL practices on their learning experiences.

4. Results and Discussion

The data collected by the SoC questionnaire before the UDL implementation pointed out a worrying trend: there were no students with a high level of SoC; medium level (“rather good”) was detected in 48.6%; low (“rather poor”) was detected in 40.4%; and very low was detected in 11% of the sample. As it can be seen from the point distribution, the students lacked a pronounced sense of the comprehensibility, stability, and predictability of the world and demonstrated low manageability and motivation to cope with challenges and learning. About 79% of young people perceived the current situation in a country as dangerous, unpredictable, and not favorable for studying. With such indicators, we could not expect high social and cognitive activity since students’ efforts were aimed at keeping safe and preserving the insignificant resources that they had, and the motivation was focused on failure avoidance rather than success achievement. The results of the second questionnaire demonstrated a positive dynamic, but due to the short period of experiment time, level of previous traumatic experience, and continuation of stressful situations, the results did not change significantly (Table 1)

Table 1. Results of SoC-13 questionnaire

SoC levels	Before	After
high	0	0

medium	48, 6%	56%
low	40.4%	37%
very low	11%	7%

Table 2 demonstrates the descriptive statistics of the SoC components.

Table 2: SoC-13 components descriptive statistics

SoC components	Mean Pre/Post	SD Pre/Post	Variance Pre/Post	Sum Pre/Post	Pre-study (%)	Post-study (%)
Comprehensibility	15,76/17,33	5,63/7,44	7,04/8,78	1544/1756	67%	83%
Manageability	13.54/15.33	3.84/5.03	5.23/7.33	1316/1478	56,8%	71,6%
Meaningfulness	12.01/16.03	2.11/6.35	4.47/8.04	1201/1536	47.4%	88.4%

We also used the statistical technique of confirmatory factor analysis (CFA) to compare three concepts of SoC (Table 3). Preliminary considerations suggested that there is only one underlying factor explaining SoC. Based on the theory, the second proposed hypothesis was that SoC consists of three distinct components. Both models showed a statistically significant chi-square ($\chi 2$) value. Looking beyond the chi-square, we examined other fit indices. These other considerations showed that the one-factor model did not fit the data well, suggesting that it was not an accurate representation of the SoC in this study. However, the three-factor model showed a good fit to the data and is more consistent with the theoretical understanding of SoC.

Table 3. CFA findings

Model	Chi-square	Df	RMSEA	SRMR
One factor	92.25	34	0.70	0.53
Three factors	68.33	31	0.60	0.45

The interview results confirmed that teachers experienced a variety of difficulties, but they also revealed useful strategies and resources for overcoming problems and raising levels of SoC. In the transcribed interviews, we found several codes that participants consistently mentioned:

4. Experience and barriers to UDL implementation:

Teacher 1: "One of the challenges I face is the perception of the diversity of abilities in my classroom. It's hard to meet individual needs."

Teacher 2: "Poor mental state of students, uncontrolled emotions make it difficult to implement UDL effectively."

Using this thematic code, we categorized reviews reflecting barriers teachers faced: mix-ability and traumatic experience.

5. Outcomes and success stories:

Teacher 3: "When our students feel consistent in their learning environment and are able to manage their drawbacks, they are motivated and more engaged."

Teacher 4: "By integrating SoC principles, I have seen improved problem-solving skills and overall well-being in my students."

This code helped us highlight issues related to the use of SoC benefiting students' academic achievement and personal development.

6. Strategies for promoting inclusive learning through UDL

Teacher 5: "Using technology allows me to provide my students with a variety of ways to represent, engage, and express themselves."

Teacher 6: "Collaborating with other teachers and sharing best practices has been important in implementing UDL in my classroom."

The frequency counts for the thematic codes resulting from the narrative analysis, conducted with 8 teachers, are represented graphically in Figure 2.

Figure.2 Narrative analysis frequency counts

In the following section of the paper, we will delve into the efficiency and range of UDL practices. It is important to note that all eight teachers agreed that using UDL practices has a positive impact. The teachers observed increased engagement during class activities (as reported by six teachers), lower levels of irritability (as reported by four teachers), a rise in interest and intrinsic motivation (as

reported by four teachers), lower levels of anxiety during autonomous tasks (as reported by three teachers), and higher levels of confidence and self-esteem (as reported by five teachers).

During the final class of the course, teachers conducted an informal discussion with students regarding the changes that had been introduced. After summarizing the students' answers and opinions, we concluded that students found the innovations stimulating and meaningful. The students supported the idea of having more choice and autonomy, being involved in the development of assessment criteria as well as peer assessment itself, receiving information through multiple resources, and engaging in decision-making. Additionally, the students appreciated the option of presenting outcomes or solutions to learning tasks in various ways. These practices allowed students to feel in control of difficult situations and enabled them to manage and activate available resources.

- **SoC and UDL compatibility**

The hypothesis of our study was the assumption that SoC and UDL can be connected, and UDL can also serve as a salutogenetic technique to promote wellbeing and eliminate stress or traumatic experiences as learning barriers.

Having analyzed the structure of SoC, we assumed that three UDL aspects might match three SoC components quite well: Representation is similar to Comprehensibility, Action & Expression is similar to Manageability, Engagement is similar to Meaningfulness. As depicted, this combination would then mean that the UDL can serve as a salutogenetic means to establish a healthy way of learning and problem-solving (see Fig.3).

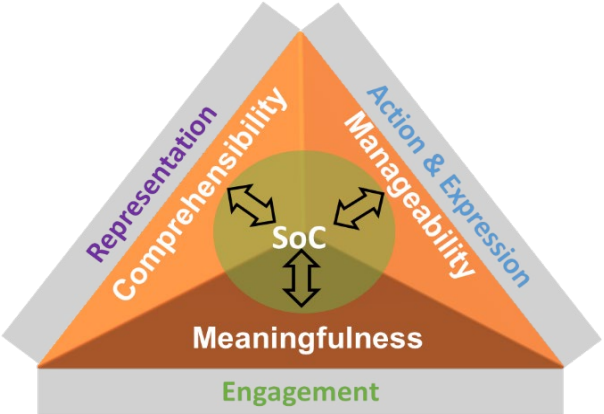

Figure.3 Compatibility of UDL and SoC (Source: Developed by the authors)

Representation implies customizing the information provision, taking into account individual features of perception, language, provision, and comprehension. Comparing this component with comprehensibility, we have to mention that information is a stimulus that triggers cognitive abilities. However, it is crucial to demonstrate to students that the information and environment are safe, predictable, and explicable. Thus, we eliminate the fear of risk-taking when dealing with new and unprocessed information.

The second stage is Engagement (UDL) or Meaningfulness (SoC), and they are both about motivation. At this stage, we motivate students, optimize relevance and autonomy, and minimize threats and distractions. Through collaboration, communication, variability of resources, and clarifying objectives, an educator turns a threat into a challenge and explains the meaningfulness of the learning process and challenges that are worth overcoming.

The third stage is Action & Expression (UDL), which is similar to Manageability (SoC). This stage deals with information processing and management, searching for resources, demonstrating outcomes, planning the follow-up learning process, and self-reflection. When a student reaches this stage, it means that the information or education activity is not considered potentially dangerous or unpredictable. A student is involved in the problem-solution process and becomes confident in their own abilities and knowledge. It means that we eliminated the stress barrier and transformed the learning environment into a safe, engaging, and productive one. In such a case, we can claim that UDL is also a salutogenesis strategy that contributes to health and well-being.

Table 4 demonstrates the logical link between SoC, Sense for Coherence (SfC), and UDL, from the dimension of positive or negative feelings and (dis)abilities, diagnostics, up to the role of teachers and their didactic options (UDL). The application of the salutogenic model and its strategies adjusted by professionals to community needs transform the concept of a Sense of Coherence into a Sense for Coherence (Magistretti et al., 2019). The SfC performed through three stages close in meaning to the SoC and UDL: clarity and confidence, empowerment, mastery, and accomplishment. UDL not only offers a tableau of concrete means to foster SoC components but also initiates processes of problem-centered and proactive reflection and professionalization. The process can be read from left to right, starting with the dimension of emotions, leading to detecting barriers (diagnostics), and then choosing and providing suitable options to dissolve those barriers. Thus, crises can be seen as chances

for personal and professional growth for both students and teachers (Mittelmark et al., 2017). Coped and managed barriers create opportunities for sustainable didactic and pedagogical bridges that can eventually lead to coherent as well as healthy life and learning experiences.

Table 4: SoC, SfC and UDL compatibility (Source: developed by the authors)

Focus	**Individual student**	**Diagnostics**	**Teacher, mentor, peer**	**Reflected Application of didactic means**				**Goals**
		Reflection		**Reflection of applied didactic means**				
Concept	**SoC (Antonovsky 1987)**	**SoC-13 Items**	**SfC (Magistretti et al. 2019)**	**UDL (CAST, 2023)**	**Provide (multiple/ specific) means of**			
Emotions/ actions/ behavior to (be), feel, …	*Have (no) barriers concerning:*	*Think about, reflect, detect barriers/ strengths*	*Strengthen, foster Guide towards, enable*	*Dissolve barriers, foster strengths by applying multiple means of*	regarding Access	regarding Build	regarding Internalize	To be(come), to feel…
(not) understand (not) understood / (mis)understood (in)secure, (not) confident	Comprehensibility (Verstehbarkeit)	2, 6, 8, 9, 11	Clarity & Confidence (Sicherheit)	Representation (What of learning)	Perception (CP 1)	Language & Symbols (CP2)	Comprehension (CP3)	Resourceful & knowledgeable
(un)able, (un)encouraged (un)guided (un)empowered	Manageability (Handhabbarkeit)	3, 5, 10, 13	Empowerment (Ermächtigung)	Action & Expression (How of learning)	Physical Action (CP 4)	Expression & Communication (CP 5)	Executive Functions (CP 6)	Strategic & goal-directed
(un)motivated, (un)willing, (un)interested (un)affected	Meaningfulness (Sinnhaftigkeit)	1, 4, 7, 12	Mastery & Accomplishment (Bewältigung)	Engagement (Why of learning)	Recruiting Interest (CP 7)	Sustain Effort and Persistence (CP 8)	Self Regulation (CP 9)	Purposeful & motivated

It is impossible and also unnecessary to implement all recommendations from the list at once, but even implementing some of them changed the tendency. Observing the results of the study, we can state that UDL practices are a restorative and empowering strategy for trauma-experienced

students and that UDL can be regarded as a salutogenetic tool. SoC levels can serve as a diagnostic basis for applying the UDL as a didactic tool to strengthen or foster SoC components as well as to detect and dissolve barriers to learning and wellbeing. In this regard, from the perspective of teachers, a Sense for Coherence (Magistretti et al., 2019) becomes crucial. Combining the UDL and SoC would then have positive effects on students in terms of their feelings, beliefs, and skills regarding comprehensibility, manageability and meaningfulness. Taking into account the three corresponding teacher-centered SfC components, by combining SoC and UDL practices, teachers would become reflective mentors who guide students towards "clarity and confidence" (comprehensibility/representation), "empowerment" (Manageability/Action & Expression) and lead them to "mastery and accomplishment" (Meaningfulness/Engagement).

- **UDL practices implementation**

From a salutogenic perspective, implementing UDL not only removes barriers but also contributes to restoring well-being after traumatic experiences, in terms of post-traumatic growth (Mays, 2021). During the implementation of UDL practices, teachers chose those that aligned with the learning objectives and students' needs and could improve the results of the SoC questionnaire. Bearing this in mind, teachers had to define a learning barrier at first, then create a safe learning environment and present information through multiple digital means. For instance, after five months of living and studying under stressful conditions due to displacement, most students experienced difficulties with information recall and processing. They had trouble concentrating and comprehending information, requiring more time and scaffolding to complete tasks that were previously easy. Teachers reported that students used to retell the text using only 3-5 keywords, but after the traumatic situation, they required topic sentences to complete the same task. Furthermore, teachers had to repeat oral instructions or explain grammar more frequently. Therefore, teachers presented the same information or material in different formats (video, printed texts, oral explanation) and allowed more time for students to process the information. For the concentration improvement, we applied the strategy of "Acoustic Highlighting", which is a listening comprehension practice for teaching new words or sentence structures. It involves emphasizing particular words or phrases to make them more noticeable. When someone misinterprets a sentence, acoustic highlighting is often used to draw attention to the mistake. This strategy supports UDL

guidelines by eliminating threats or distractions and developing fluency by providing varying levels of assistance for both practice and actual performance.

While traumatic experiences were a significant factor in the lack of concentration, students confessed that the primary reason was the loss of intrinsic motivation due to the shift to survival mode. They opposed learning, as a free cognitive activity, to survival, as a forced physical necessity, leading to a mindset where students questioned the meaningfulness of learning. One student expressed this existential doubt: *"When everything goes wrong and people are struggling for survival, how can learning help me? What are we studying for?"* To address the lack of motivation, we divided a general learning goal into achievable sub-goals that students could accomplish progressively and at an individual pace. We emphasized that language could be a powerful tool for defense, highlighting the importance of communicating information about the current situation to an international audience. The two sub-goals were to transmit information and raise students' motivation. To manage students' lifeworld concerns, we implemented situated learning tasks that involved translating articles for international news, Wikipedia, conducting interviews, making presentations, and participating in international youth conferences, forums, blogs, and webinars with students from foreign universities. This practice aligned with the UDL principle of accepting learners' variability, providing students with multiple possibilities of action and expression, and optimizing relevance, value, and authenticity (CAST, 2023). Consequently, students could choose the activity they wanted to pursue, which effectively raised their intrinsic motivation and meaningfulness.

After addressing the issue of motivation, we focused on improving comprehensibility, which was rather poor according to the questionnaire results. Among the practices that teachers marked as effective for this purpose were online concept mapping, Frayer model, closed sentences, and rank-talk-write. These practices are aimed at fostering and simplifying information perception and processing. The Frayer model, for example, is a graphic organizer that activates prior knowledge and contributes to the comprehension of the concept. It consists of four blocks that suggest a full semantic description of an unknown concept: definition, characteristics, examples, and non-examples. The practice activates students' previous knowledge and restores bonds between past academic experience and the present, allowing students to predict, retain, assume, and verify information. Thus, transferring background knowledge to new circumstances makes the present environment more

predictable and stable. When students revise known information, they recall a safe, positive past learning experience and bring it to the present, making the process of comprehension easier and more engaging. This activity aligns with the UDL principles and checkpoints (CAST, 2023), such as Guideline 2: Provide options for language, mathematical expressions, and symbols; Checkpoint 2.1: Clarify vocabulary and symbols: pre-teach vocabulary and symbols, especially in ways that promote connection to the learners' experience and prior knowledge (CAST, 2023).

Among the commonly observed barriers that teachers mentioned was a lack of concentration. A "Closed sentences" strategy was applied for the concentration training. The meaning of the task is to find the missing word using the information from the text as a clue. It helps focus attention and also promotes critical analysis of the information and understanding of the language structure. Another practice for analyzing information is metacognitive note-taking. The strategy develops self-monitoring comprehension in the process of information perception. During the note-taking, students ask questions, identify known and unknown information, make connections with their own experiences and feelings while reading, find out how this topic is related to previously studied topics, things they already know, etc., and outline issues for further studying. It is better to use this strategy for flipped classes when students have to process a large amount of information and be prepared for the discussion. According to UDL Guidelines (CAST, 2023), this activity corresponds to Guideline 3: Provide options for comprehension; Checkpoint 3.1: Activate or supply background knowledge; anchor instruction by linking to and activating relevant prior knowledge; and use advanced metacognitive organizers (CAST, 2023).

In fact, information that does not involve learners' cognition and engagement is inaccessible. Educators cannot reach every student by suggesting only one way of representing information without taking into account students' interests and needs (Khasawneh, 2020). Therefore, multiple ways of engagement and information representation are critical for involving as many students as possible in the learning process. One of the beneficial ways to raise students' interest, motivation, and engagement is to increase the level of learner autonomy in choosing topics for the discussion or the order of activities. It worked successfully when teachers allowed students to choose the tools for collecting and representing information, the level of the suggested challenge, and develop assessment criteria and topics for the discussion. It does not mean that students have uncontrolled freedom to do the teaching job. The alternatives should be developed by a teacher. It is a time-consuming process;

however, as a result, students feel more confident and demonstrate a higher level of self-esteem. Engagement makes the learning process understandable and predictable, and it shows that a student can change the environment or situation. It motivates them to overcome problems because students feel the power of choice and participation.

As we were teaching online, we utilized various online tools and platforms to provide students with diverse ways to demonstrate their outcomes in terms of action and expression. For instance, we employed tools for collaborative writing for the "Silent Discussion" strategy, which allowed students to write responses to suggested topics, providing more time for those who required it to process information and respond orally. It also helped students who may be fearful of public speaking. Online learning proved to be advantageous for our students as it allowed more flexibility in terms of location and pace of study, more resources for task performance, and the ability to interact with others while still having the option to remain anonymous until ready to participate.

Overall, our insights on the connection between trauma-informed practices and UDL are in line with research performed by a number of educators (Kumar, Wideman, 2014; Marquart, Báez, 2021; Rogers-Shaw et al., 2018), who highlight the similarities of strategies in these approaches: presenting and chunking information in a variety of ways, using less complex language, establishing routines and providing consistency in course design, using graphic organizers to keep students on task, and giving cognitive support like scaffolding assignments, providing context, and summarizing foundational concepts. Our conclusions also accord with Smith's (2012). observations, which showed that encouraging varied class interactions and fostering collaboration through structured pair and group work and whole-class discussions nurtures a community of learners. This study supports evidence from Housel's (2020) study, in which he claimed that establishing clear classroom protocols and expectations, providing rubrics, and allowing students to demonstrate their mastery of content in ways that support diverse learning styles are essential components for trauma-informed assessments.

Finally, as we observed, both UDL and trauma-informed pedagogy encourage learner autonomy and self-advocacy (Moradi et al., 2022). For instance, UDL strategies like the "Three Before Me" approach equip students with the tools to seek help from various resources before approaching the instructor. This empowers students and aligns with the core principle of trauma-informed pedagogy: fostering a learning environment where students feel comfortable advocating for their needs.

There are a lot of recommendations on how to implement UDL practices; however, we selected eleven that worked well in our case:

1. Perform a survey to get to know the students' strengths, weaknesses, and needs; consider how students' strengths and problems can be identified and mobilized through specific learning activities and related contents.
2. Create a trustful and safe learning environment that promotes compassion and empathy, showing your intention to connect with students. (Engagement)
3. Suggest predictable activities, consistent expectations, and explicit and well-designed assessment criteria assuring traceability, stability, and support (Expression).
4. When appropriate, apply digital educational resources, as they suggest endless opportunities for the differentiation and multiplicity of expression tools and self-representation (A&E).
5. Organize collaborative activities in which students could learn from their peers and test their behavioral models in a safe place; (Engagement)
6. Apply scaffolding to support independent and autonomous learning (Representation);
7. Customize the content and the way it is presented. (Representation)
8. Involve students in organizing and creating the learning process, allowing them to collaborate on assessment criteria, disclose their learning needs, discuss topics for the presentations or assignments, and take into account their educational priorities in the learning achievements demonstration. This will help restore a sense of agency and empowerment, as well as pave the way for not only applying but also experiencing situated learning scenarios (Engagement).
9. Set goals together with students (Engagement);
10. Use flexible tools for the assessment (Expression);
11. Facilitate learning by emphasizing the role of empathy, effort, and reflection.

Although it is not necessary to implement all these recommendations at once, even implementing some of them can make a significant difference. Our study showed that UDL practices can be a restorative and empowering strategy for trauma-experienced students, serving as a salutogenic tool. SoC levels, as identified by the SoC-13 questionnaire, can serve as a diagnostic basis for applying UDL as a didactic tool to strengthen or foster SoC components and to detect and minimize barriers to learning and wellbeing. A comparison of the findings with those of other studies (Lelli, 2020;

Housel, 2023) confirms that UDL and trauma-informed pedagogy share a fundamental similarity: addressing individual needs in an inclusive way. By embracing both frameworks, educators can create a safe and supportive learning environment where all students, regardless of background or experience, can thrive.

The results of this observational study suggest that UDL practices might be restorative for students who have experienced trauma and may help prevent motivation loss. We suggest several practical implications for educators. By creating an inclusive learning environment that accommodates the needs of diverse students and takes into account challenges related to trauma, educators can increase student engagement, motivation, and academic success. Teachers play an important role in supporting student well-being by fostering a sense of consistency, coherence, and flexibility in their classrooms. By promoting a supportive and nurturing learning environment in which students feel understood, valued, and empowered, educators can contribute to positive mental health and overall academic success. Educators, policymakers, and stakeholders can work together to develop comprehensive support programs for students with multiple needs. By fostering interdisciplinary partnerships and sharing best practices, stakeholders can jointly develop coordinated holistic strategies to support student well-being and learning outcomes. Policymakers should prioritize research and evaluation efforts to assess the effectiveness of UDL and academic interventions for dementia. By investing in similar research, policymakers can accumulate evidence to inform decision-making and resource allocation in education.

5. Conclusions and limitations

Our study focused on UDL's potential as a restorative and empowering strategy that reduces barriers caused by psychological trauma, stress, or forced displacement, allowing students to use previous stressful experiences as a resource to accept and meet new challenges and grow with them. The UDL framework emphasizes the importance of motivation and engagement, which are crucial for effective learning outcomes. The process of UDL can be viewed as a salutogenic strategy that contributes to the health and well-being of students. By combining UDL with the SoC model, educators can create a meaningful and coherent learning environment that empowers students and promotes their mastery and accomplishment. Therefore, the implementation of UDL and SoC can transform barriers into opportunities for personal and professional growth, leading to sustainable

didactic and pedagogical bridges that support healthy and coherent learning experiences. It's important to recognize a few limitations that could affect how our results are generalized and interpreted: sample specificity (only students who had gone through painful experiences connected to the present Ukrainian conflict were included in our study's sample); subjective evaluations (the study was done in the context of English language classes); potential confounders (our study did not take into account all possible confounding factors, such as additional interventions or outside influences on students' lives). For prospective research, it will be beneficial to study the application of UDL strategies for the assessment to make it flexible and differentiated for students and feasible for teachers. In addition, it is necessary to find practices that will increase the level of Sense of Coherence.

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- Conceptualization, Yuliana Lavrysh and Daniel Rühlow ; methodology, software, validation Yuliana Lavrysh; formal analysis Daniel Rühlow; resources, Yuliana Lavrysh and Daniel Rühlow; data curation, Yuliana Lavrysh and Daniel Rühlow.; writing original draft preparation, Yuliana Lavrysh; visualization, Daniel Rühlow. All authors have read and agreed to the published version of the manuscript.

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