

### Research Article

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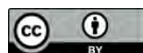
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## Impact of a Mentoring Program on the Seven Dimensions of Students' Well-Being

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### Abstract

**Background/purpose.** Student mentoring aims to contribute to learner development beyond that of their academic program. In this study, we focus on a student mentoring program (SMP) consisting of mentors, communities, and peers, which aimed to promote students' seven dimensions of well-being (Emotional, Social, Physical, Intellectual, Occupational, Spiritual, and Financial). The purpose of the study was to examine the mentoring program's perceived influence according to these seven dimensions.

**Materials/methods.** The study was conducted according to a mixed QUAL-Quan methodology approach and was carried out within a multi-campus private university in México. Data were collected using a Likert-type scale that was responded to by 996 participant students, plus four focus groups (with 24 mentors) were held.

**Results.** The results show that the SMP contributed to the students well-being. Specifically, the mentors contributed to the students' Emotional dimension, while the student communities contributed to the Social dimension.

**Conclusion.** This study sheds light on how best to integrate the components of a SMP in order to achieve a more holistic impact on students' objective, subjective, and psychological well-being dimensions. It is considered important to replicate and continue analyzing this kind of mentoring program in higher education institutions to improve students' overall university experience, as well as their levels of academic achievement.

## 1. Introduction

Mentoring is often understood as the support given by expert professionals who look after mentees during their initial preparatory stage of a career or extended course of study (Hudson & Hudson, 2018). Mentoring is crucial to co-construct the practical knowledge, skills, and attitudes necessary to accomplish certain tasks (Darling-Hammond et al., 2017), as well as to develop the mentee's future identity as a professional (Fletcher & Kosnik, 2016). In the educational context, mentors usually take on different roles to support students and student teachers, such as being their advisor, trainer, assessor, partner, model, guide, or even friend (Clarke & Mena, 2020; Ganser, 2002).

In universities, mentoring has traditionally been promoted as a meaningful way for students to learn about their future profession since it helps to provide and reinforce the required knowledge and skills to face the most likely but uncertain in-context scenarios and the complexities of practice in their future career (Hobson et al., 2009). For instance, researchers who have examined mentoring conversations in professional learning have found that these conversations are generally not random. Rather, these types of interaction are often "very focused, confidential, and ideally voluntary conversations that are quite structured and follow a process that helps learning to occur, allowing performance to improve and potential to be realized" (Parsloe & Leedham, 2009, p. 9). The study of these conversations reveals how mentors may facilitate learning through this interaction and dialogue.

The university that was observed in the current study had recently adopted an educational model (Visión 2030 – see Tecnológico de Monterrey, 2019b) that prioritizes having a support program for undergraduate students. This program includes: (1) academic support in the exploration stage (directors of entry career); (2) academic support in the specialization stage (directors of the career program); and (3) a student mentoring program (SMP) (Tecnológico de Monterrey, 2019b). The SMP is intended to support students throughout their career and contribute to their well-being through the promotion and strengthening of seven pre-established dimensions (Tecnológico de Monterrey, 2019a). The seven well-being dimensions considered in the SMP are described as follows. After each dimension name, in parenthesis, the corresponding objective, subjective and/or psychological well-being measures are given (Linley et al., 2009; Tecnológico de Monterrey, 2021; Voukelatou et al., 2021).

- **Emotional** (self-acceptance and personal growth): Involves feeling good about oneself, being able to recognize, accept, understand, regulate, and constructively share emotions in order to respond to life's challenges.
- **Social** (positive relationships and socioeconomic development): Encompasses the ability to develop and build healthy relationships through communication and respect.
- **Physical** (health and environment): Considers the optimal balance for the functioning of the body in relation to food as a source of energy, physical exercise, and appropriate rest. Includes training in healthy behaviors and health promotion.
- **Intellectual** (personal growth): Considers the curiosity and deep understanding of topics, the commitment to permanent learning, and the diverse ways of thinking that contribute to mind stimulation and creativity.
- **Occupational** (personal growth, job opportunities, and positive relationships): Refers to achieving personal self-realization through paid or unpaid activities that contribute constructively to society.
- **Spiritual** (purpose in life and self-acceptance): Considers that life has a meaning and purpose beyond the person and the material, which contributes to the ability to transcend their circumstances based on their values and beliefs.

- **Financial** (autonomy and socioeconomic development): Considers living with peace of mind and making responsible use of available resources to contribute to decision making, aligned with present and future personal goals.

The university's SMP consists of mentors, peers, and student communities. The mentors are adults trained in psychology, whose role is to act as guide and counselor to support their student mentees towards success, defined as holistic development according to the seven dimensions, and to lead efforts to guarantee a memorable university experience. Peers are senior students who support new students during the first two semesters of university life. The student communities are led by mentors, and each is named in Esperanto language (e.g., Forta, Pasio, Spiritia). The objective of these student communities is to integrate community members considering diversity and inclusion through the development of integration and recreational activities throughout each semester.

The conceptualization of the university's mentoring model, as an integral and innovative part of the university's overall educational model, arises from a recognized need to guide students more proactively and effectively throughout a new curriculum that requires more decision making at various stages. The university journey, from admission to graduation and life as an alumnus, is an experience during which students develop personal talents, integrate themselves into inclusive communities, actively participate in institutional life, and take care of their overall health and well-being, a period through which students are supported by the SMP in order to help them achieve a more fulfilling life (Tecnológico de Monterrey, 2021).

The current study aimed to explore the experience and perceived impact of an innovative student mentoring program that considers objective, subjective, and psychological well-being measures. The objective of the current research was therefore: (a) To examine students' experience with the SMP and the perceived impact on their well-being, considering the seven dimensions and sociodemographic variables of gender, scholarship status, age, and the school they were attending (according to their career); and (b) To reveal the experience and best practices of mentors and peers during the overall mentoring experience. The current study aimed to offer the academic community a tested model that is replicable, or at least partially. The remainder of this manuscript has been developed as follows: First, a review of the literature is presented, which aims to give a broad approach to the concept and types of mentoring, followed by a description of the methodology. Finally, the results and conclusions of the study are presented.

## 2. Literature Review

Mentoring is a practice that dates back thousands of years. History tells that Aristotle was one of Plato's disciples and he in turn was Socrates' student; that Galileo had Viviani and Torricelli as disciples. There have been many such examples over time, both known and unknown, although perhaps not always conceived as part of a formal or informal mentoring program. According to Houston (2020), mentoring programs began in the 1970s, although universities such as Harvard established faculty clubs to develop social networks as early as 1920; however, it was not until the 1980s that their popularity grew considerably (Hobson et al., 2009).

### 2.1. What is Mentoring?

The term mentoring is attributed to the relationship between a person with greater knowledge and experience (mentor) with another (mentee) who is in need of guidance and advice (Owusu-Agyeman, 2022). This relationship involves the facilitation of professional learning (Eisenschmidt & Oder, 2018), and mentors also provide a certain level of emotional support to their mentees (Mena et al., 2020). According to Zentgraf (2020), mentoring is a practice developed through the relationship between an expert individual and another who has a lesser degree of knowledge or expertise. According to Aderibigbe et al. (2018), mentoring is a cultural practice that contributes to the improvement of professional habits and relationships through collegiate work and reflective

collaboration. For students, mentoring offers a service whose characteristic is the exchange of specific experiences (Parnter & Collier, 2022).

According to Casado Muñoz et al. (2015), mentoring is a process in which one participates voluntarily and has certain critical moments upon which its success depends. In general, various studies in the literature have agreed that mentoring programs contribute to improving the university experience of participating students (Dollinger et al., 2019), thus helping universities to achieve objectives such as improved retention and the academic success of their students (Casado-Muñoz et al., 2015). However, it must also be considered that having a mentor does not guarantee that the objectives of first year students will be achieved, hence special attention must be paid to certain characteristics that are considered essential to the success likelihood of such programs. Standing out as key elements for success are ensuring adequate training is given to mentors and that appropriate allocation is realized between mentors and mentees (Casado-Muñoz et al., 2015; García et al., 2020; Lennox et al., 2007; Putsche et al., 2008).

In this context, mentors are seen as a key component of any mentoring program. They play a multifaceted role, such as advisor, teacher, and coach; providing guidance to university students as they face challenges throughout their academic journey (Beck Dallaghan et al., 2022). In a study by Leavitt et al. (2022), it was suggested that, based on their literature review of mentoring programs, a gap exists in the current research landscape regarding the effects of mentoring on the mentors themselves.

## ***2.2. Mentoring Types and Practices***

The mentoring experience can be formal or informal. Formal mentoring is circumscribed in a structured program, such as the Big Sister Big Brother program (Griffith et al., 2021; Raposa et al., 2016) or the M\_STEM Academies Program at the University of Michigan (Mondisa et al., 2016), while informal mentoring is voluntary and does not form part of an institutional program (Jones & Smith, 2022), often arising instead from a spontaneous relationship between mentor and mentee as two people (usually of different experience levels) who share the same interests (Eby et al., 2007). According to Fitzgerald and McNamara (2021), there are conflicting opinions about which type of mentoring is better, formal or informal. However, this depends significantly on the context as well as the objective of the intervention.

Mentoring is a term with numerous meanings, be that as a formal function, based on social expectations or academic level (Haggard et al., 2011) or some set purpose or objective (Bozionelos & Wang, 2006). It can also vary based on the culture in which it occurs (Asada, 2012). In research conducted by Mena et al. (2020), it was revealed that Thai mentoring in teacher training has a focus on the ethical aspects of the profession, while in Spain it emphasizes strengthening the relationship between mentor and mentee. In this way, we can see that a mentoring model can be defined by various guidelines, institutional needs, and with countless other possibilities and permutations (Zentgraf, 2020). Some of the more common mentoring practices are: (1) Mentoring that arises from the relationship between a doctoral or master's student and their dissertation/thesis advisor (Vázquez-Parra & Kustala, 2018); (2) mentoring between a successful and influential professional veteran and a rookie, providing them with knowledge, advice, challenges, and support until they become a fully functional member of a particular profession (Hackmann & Malin, 2020; Johnson, 2016); (3) mentoring given according to a relationship between an experienced teacher and one still in training (Asada, 2012; Hobson et al., 2009; Mena et al., 2020); (4) mentoring based on the relationship between an expert professor and a final-year student, where the mentor facilitates the development of skills focused on the workplace (Jones & Smith, 2022); (5) mentoring aimed at members of a vulnerable group, whether for academic, socioeconomic, or racial reasons (Fitzgerald & McNamara, 2021; Rockinson-Szapkiw et al., 2021; Tuladhar et al., 2021); and (6) mentoring

between a young person (e.g., high school student) and an adult who supports them in their academic and emotional development (Busse et al., 2018; Christensen et al., 2020).

### **2.3. What is the Impact of Mentoring?**

Currently, mentoring has various objectives which are based on the needs of the context in which it occurs. In terms of higher education, mentoring is generally used for retention purposes (Vázquez-Parra & Kustala, 2018). For example, the longitudinal study by Hagler et al. (2024) examined the role of mentor and mentee in the transition to college process, reporting that mentoring networks are an important factor in student retention. On the other hand, in the case of mentoring young people, the support tends to focus on helping or developing the potential of members of vulnerable groups (Griffith et al., 2021). In research by Rockinson-Szapkiw et al. (2021), the findings showed that experiences of a racial and ethnic minority (REM) group benefited from finding a sense of belonging and interest in STEM careers through a virtual program conducted via peer mentoring.

In the professional field, mentoring aimed at final-year undergraduate students has contributed to their subsequent professional success and, consequently, to improving productivity within the sector (Bozionelos & Wang, 2006). Additionally, in times of crisis such as academic confinement during the COVID-19 pandemic, mentoring has been employed as an important tool to support students (Ersin & Atay, 2021). Times of crisis have also highlighted the need to establish more compassionate and intimate relationships between mentors and mentees, extending the scope of mentoring programs to aspects of wellness that the mentee can then later transfer to their own professional practice (Lasater et al., 2021).

However, despite the good intentions behind some applications of mentoring, a number of studies have revealed certain constraints in its practice. In the research study by Parnter and Collier (2022), one of their findings revealed that students failed to take advantage of the mentoring services on offer, perhaps due to a lack of knowledge about what the mentoring entailed or the program's objectives. Evans et al. (2022) stated that trust and reciprocity combined with an ethical approach to mentoring are key elements for the development of ethical leadership in students. In addition, a good mentoring program should provide training and guidance to mentors so as to enable them to become better mentors (Eisenschmidt & Oder, 2018; Ersin & Atay, 2021; Houston, 2020; Taha et al., 2015) and to provide training to address or escalate cases of mentees with more serious issues regarding their mental or emotional health (Raposa et al., 2016). In this sense, mentoring practices should align significantly with the structure and objectives of the institution that intends to implement it (Christensen et al., 2020).

On the other hand, Al-Thani et al. (2023) observed that younger students (e.g., middle school) require more assistance and support compared to those attending high school, and that university students initially need more guidance but gradually gain in confidence and independence as they progress. This highlights that both the age and context of mentees can present additional challenges to the success of any mentoring program.

In this regard, several authors have agreed on the importance of considering the following lessons learned while implementing mentoring programs in order to improve the chances of success (Casado-Muñoz et al., 2015; Dollinger et al., 2019; García et al., 2020; Lennox et al., 2007; Zentgraf, 2020). They agreed that the success of a mentoring program should not be measured solely by the number of sessions held between mentor and mentee. Instead, mentors should actively participate in academic activities to provide timely assistance to their mentees. It may be said that having a double function, as both mentor and academic advisor, can allow mentors to provide better advice and to better influence the academic life of their mentee. Allocating sufficient time to select and adequately train mentors to ensure they have the necessary competencies, offering mentors psychological assistance and advice, and ensuring the interests of mentors and mentees are aligned as far as possible can help promote a successful mentor-mentee partnership. Additionally, facilitating

communication between mentors and their mentees as soon as possible in the relationship, publicizing the mentoring program through various communication channels to ensure that it forms an accepted part of the university's culture and has the support of the entire community can also help, as can having small groups (e.g., seven or eight students) to facilitate social interaction; and monitoring and evaluating mentoring programs based on the purpose of continuous improvement.

In general, whatever the educational level in which the mentoring practice is carried out, there will always be the common factor of mentees being supported in order to develop their potential. Although it is true that mentoring processes should be subject to continuous improvement, mentoring is a positive and necessary practice since it works with people who are vulnerable to rapid and abrupt changes in the environment.

The current study presents a mentoring program aimed at supporting higher education students during their university life so as to promote a more memorable (and successful) experience. As previously mentioned, the university's mentoring program forms part of their overall student support model, which features (a) academic advice and support given to students during their career exploration and specialty stages, and (b) strengthening and supporting the seven well-being dimensions (Emotional, Social, Physical, Spiritual, Intellectual, Occupational, and Financial) of the mentored students.

### 3. Methodology

The study was conducted with a mixed methodology approach of the QUAL→QUAN type (Creswell, 2007), in which the qualitative results (a) guided the quantitative instrument design and (b) provided information about the mentors' practices regarding the seven dimensions of well-being. The purpose of the investigation was to answer the following research questions:

- (1) What was the students' perceived impact of the SMP (mentors, peers, and community) in the well-being dimensions? (by campus size, gender, school, age, and scholarship status);
- (2) What was the students' opinion of the SMP and what type of activities did they value the most?;
- (3) What was the experience of mentors and peers during the SMP?; and,
- (4) What were the best practices during the SMP according to mentors and peers?

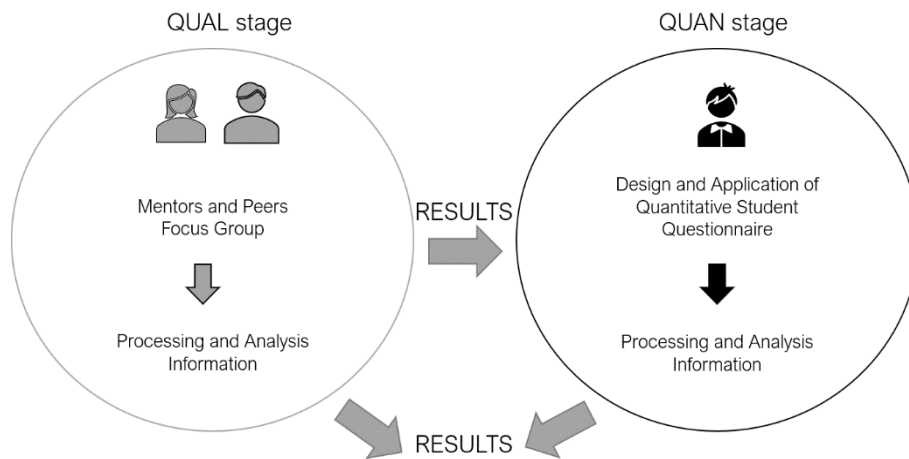
#### 3.1. Participants

The participants in the current study were the mentors, peers, and students who took part in the student mentoring program. Since the university in which the research was contextualized has a multi-campus presence throughout México, the participants were stratified by campus size: "main campus" (seven large campuses), "medium campus" (13 medium-sized campuses), and "small campus" (six small campuses). Therefore, the sampling was stratified, by stages and at random. Mentors at large campuses were responsible for around 320 mentees and 20 peers, at medium-sized campuses they were responsible for 150-200 mentees and 10 peers, while on small campuses (also called developing campuses), each mentor had around 30 mentees but no peers. It was commonplace for career directors to also have the role of mentor.

#### 3.2. Instruments and Procedures

The study was conducted from January to June of 2022. The QUAL stage involved conducting focus groups that consisted of both mentors and peers. The collected data served as input for the instrument's development that would later be applied, during the QUAN stage, to students. Figure 1 illustrates the methodological process of the study.





**Figure 1.** Methodological Process

Focus group discussions were conducted in order to collect information about the mentors' and peers' experiences regarding their SMP participation. There were a total of eight focus group discussions held, each with a maximum of six mentors or peers. In total, 24 mentors and nine peers participated. All of the focus group sessions were held within a virtual environment. The sessions held with the mentors lasted approximately 120 minutes each, whilst those with the peers were approximately 60 minutes each in length. Each focus group session was conducted by the researchers with a previously prepared script.

Based on the data collected from the mentors and peers, an instrument was designed with a continuous Likert-type scale (rated from 1 to 100 points). The questionnaire aimed to evaluate the perceived impact of the SMP (which included mentors, peers, and student communities) in accordance with the seven dimensions of well-being (Emotional, Social, Physical, Intellectual, Occupational, Spiritual, and Financial). The questionnaire was administered during the fall of 2021 and was answered by a total of 996 second-semester students. The developed instrument was validated by mentors and experts in the area of human well-being and yielded a Cronbach's alpha value of .89 from a pilot test conducted with 60 undergraduate students 1 month prior to the main intervention.

### **3.3. Data Analysis**

For the qualitative stage of the study, case study analysis technique was employed for direct interpretation of the collected data (Creswell, 2007). Meaning was drawn from the interview answers and patterns then established after looking for differences and similarities between the mentors' and peers' experiences. Finally, generalizations were developed about the experience that each role had with the SMP (mentors and peers), which guided the development of the quantitative instrument that was later applied to the students. This qualitative analysis was processed using Atlas TI software, which ran 37 codes and 280 text segments.

The quantitative data were processed using IBM's SPSS software, and to determine if there were any significant differences in the SMP evaluation (according to the eight dimensions of well-being) with respect to gender, age, faculty, and scholarship status. The data were analyzed using ANOVA and post-hoc tests (Games-Howell).

## **4. Results**

This section presents the most relevant results of the qualitative and quantitative instruments. First, we address the results of the focus group discussions and then we present the quantitative

results. In this way, the reader can observe the convergences and divergences between both approaches.

#### **4.1. Focus Group Discussions with Mentors and Peers**

In general, the mentors perceived that their role allowed them to listen, support, and inspire trust in their student mentees, whilst the peers perceived that their role allowed them to support, guide, and share experiences with their mentees. On the topic of communication, both the mentors and peers preferred to use WhatsApp groups in order to keep in touch with their mentees, and Instagram to share information about events.

The mentors and peers also commented on good practices that had helped them to motivate their mentees and build community. Some of the most commented on good practices were as follows:

- Use of Instagram to perform integration activities.
- Use of WhatsApp to periodically check how the students are feeling and to send out a survey at the end of the cycle with this same purpose.
- Activities conducted to reduce students' stress during seasons with a high academic load or in which students needed to make changes or reach important decisions.
- Ideas shared on the design and instigation of community activities.
- Specific needs of different groups of students considered and specific activities conducted in order to best serve them (e.g., brochure designed with valuable information about the city for out-of-town students).
- Students assigned a peer according to their profile and/or interests.
- Colleagues communicated with from other departments to coordinate attention to students and share relevant information.
- Spaces promoted within the facilities to connect with students beyond academics.
- Activities conducted that fostered a feeling of belonging to the community (e.g., all members wearing t-shirts).

Regarding the student communities, the most outstanding practices carried out were intercommunity events and activities designed to promote the breaking of stereotypes and paradigms, as well as mini activities that promoted inclusion. According to the mentors, the dimensions in which they focused the most were Social and Emotional, while the Spiritual dimension was their least prioritized. Regarding the relationship between mentors and peers, the mentors valued the support that they received from their assigned peers, their commitment, and their ideas for community activities. On the other hand, the peers considered that they had a good relationship with the mentors, and valued the mentors' willingness to listen to their ideas.

Regardless of the campus or type, all of the mentors considered that the mentoring program had the following strengths: (1) They were the first contact for the students; (2) they were focused on the students' well-being; (3) they developed meaningful relationships with their students; (4) they supported the students beyond academics; and (5) the students knew that their mentor was an impartial person they could count on. Regarding opportunity, the mentors agreed that: (1) The number of mentees assigned per mentor should not be greater than 200; (2) the Spiritual dimension needed strengthening; and (3) activities and projects they had to undertake for other areas made them feel saturated.



#### 4.2. Results from Instrument Answered by Students

The survey was managed using the Qualtrics platform, and was responded to by a total of 996 students from the university's 25 campuses located across different Mexican cities. The most represented campuses were: Monterrey (44%), Ciudad de México, Santa Fé (9%), Guadalajara (8%), Toluca (7.4%), Estado de México (7%), Querétaro (4%), Sonora (3.6%), and Puebla (3.5%). The remaining 13.5% of students who responded were located at campuses in Aguascalientes, Chihuahua, Cuernavaca, Hidalgo, Torreon, Leon, Morelia, Saltillo, San Luis Potosi, Sinaloa, Tampico, Zacatecas, Chiapas, Ciudad Juarez, Irapuato, and Ciudad Obregon.

Of the surveyed students, 52% were female, 47% were male, and 1% did not disclose their gender. Also, all schools in the university were represented: School of Engineering and Sciences (41%); School of Business (34%); School of Architecture, Art, and Design (14%); School of Social Sciences and Government (8%); and School of Humanities and Education (2%).

Regarding the participants gender, the survey was answered by 515 females, 466 males, and 15 students who preferred not to reveal their gender. There was no significative difference according to gender on the students' perceived impact of the SMP in any seven of the dimensions of well-being, as shown in Table 1.

**Table 1.** Differences by Gender (ANOVA,  $\alpha > .05$ )

Dimension	Male	Female	Gender Not Defined
Emotional	81.9	83.6	74.1
Social	83.4	84.8	77.6
Physical	80.2	79.4	69.2
Spiritual	79.7	80.1	71.9
Intellectual	79.8	79.4	69.5
Occupational	78.4	69.1	77.7
Financial	73.1	69.1	59.2

At a descriptive level, the female respondents perceived that the SMP had the most impact on the Emotional, Social, and Spiritual dimensions, while the males perceived the most impact was on the Physical, Intellectual, Occupational, and Financial dimensions. On the other hand, those students who preferred not to disclose their gender gave the lowest ratings across all seven dimensions.

Regarding their enrolled school, the participants generated some interesting results. Table 2 shows the perceived impact of the SMP on the Social and Physical dimensions according to the school to which the participants were enrolled. Scores that revealed a significant difference are marked in Table 2 with an asterisk (\*). The  $\alpha$  value denotes the significance level of the difference between the school means; and for this purpose, the Games-Howell test was applied. The sample sizes by enrolled school were as follows:

- School of Business (SB): 145 students.
- School of Social Sciences and Government (SSSG): 80 students.
- School of Architecture, Art, and Design (SAAD): 145 students.
- School of Humanities and Education (SHE): 20 students.
- School of Engineering and Sciences (SES): 404 students.

**Table 2.** Differences by School

Dimension	Global mean	SAAD	SSSG	SHE	SES	SB	Significance (Games-Howell)
Social	84.02	83.3	78.5*	82.9	83	86.7*	$\alpha = .047$
Physical	79.6	79.1	71.9*	79.6	79.2	81.9*	$\alpha = .034$

Respondents enrolled to the School of Business (SB) evaluated the Social and Physical dimensions better (they felt that the mentoring program supported them better in these areas) than those enrolled to the School of Social Sciences and Government (SSCG).

Also, some significant differences were found according to the respondents' age, as is shown in Table 3.

**Table 3.** Differences by Age

Dimension	Global mean	17 yrs	18 yrs	19 yrs	20 yrs	21 yrs	23 yrs	30 yrs	Significance (Games-Howell)
Emotional	82.7		83.5					92.4	$\alpha = .0011$
Emotional	82.7			82.7				92.4	$\alpha = .015$
Emotional	82.7				79.3		94.4		$\alpha = .040$
Emotional	82.7				79.3			92.4	$\alpha = .001$
Physical	79.6				77.8		94.1		$\alpha = .027$
Spiritual	79.9				76.7			95.2	$\alpha = .043$
Occupational	77.7	76.5					95.8		$\alpha = .047$
Occupational	77.7		79.4				95.8		$\alpha = .016$
Occupational	77.7			77.4			95.8		$\alpha = .009$
Occupational	77.7				75.1		95.8		$\alpha = .002$
Occupational	77.7					77.3	95.8		$\alpha = .041$

Students aged 30 years old evaluated the Emotional dimension better (they felt that the mentoring program supported them better in this area) than those aged 18 to 20 years old. Likewise, the 23 year-old students evaluated the Emotional dimension better than those aged 20 years old. In both the Social and Financial dimensions, there were no significant differences seen according to the students' age. In summary, the older students rated the Emotional, Spiritual, Physical, and Occupational dimensions better than their younger peers.

The sample sizes were as follows: 17 years old = 18 students; 18 years old = 304 students; 19 years old = 486 students; 20 years old = 135 students; 21 years old = 27 students; 23 years old = six students; and 30 years old = four students. Games-Howell test was used to shield the results, particularly since the variances were not found to be homogeneous.

Regarding the scholarship status of the students, those with a scholarship gave lower scores to the Financial dimension than students with no scholarship, meaning that the scholarship recipients do not feel as supported by the mentoring program in this area. In the remaining dimensions, there was no significant difference revealed according to the scholarship status of the participants, meaning that they held similar opinions about the support they received from the mentoring program

in the Emotional, Spiritual, Physical, Occupational, Social, and Intellectual dimensions. In terms of scholarship, the sample sizes were 649 scholarship recipients and 347 students with no scholarship. The average score given by the students in receipt of a scholarship was 69.1, while the average for the students with no scholarship was 74.02 (ANOVA,  $\alpha = .006$ ).

Table 4 presents the correlations among the seven dimensions of well-being, with the highest values shown using boldface type.

**Table 4.** Correlations Among Dimensions

Dimension	Emotional	Social	Physical	Spiritual	Intellectual	Occupational	Financial
Emotional	1						
Social	.882**	1					
Physical	.786**	.771**	1				
Spiritual	.738**	.741**	.814**	1			
Intellectual	.780**	.807**	.763**	.772**	1		
Occupational	.769**	.773**	.826**	.820**	.841**	1	
Financial	.682**	.673**	.775**	.739**	.753**	.815**	1

The dimensions all had a positive and strong correlation with each other. This means that if students' opinions in one dimension improved, their opinions according to the other dimensions would also improve as well. This can be considered as very positive, since it implies that any favorable change seen in any of the dimensions may potentially have a positive effect in the other dimensions too. The Emotional dimension showed the highest correlation with the Social dimension.

Students were asked what activities they would like to see developed within their community, for which they were given 13 options in a multiple-choice question. In order to define these 13 options, the students were given an open-ended version of a question used within the pilot study. As can be seen from Table 5, most of the activities were selected by between 30% and 60% of the students. The most popular answer was "Lunches, dinners, or picnics," whilst the least popular was "Study groups."

However, significant differences were identified in these preferences according to the participants' gender. In order to examine these differences, the chi-square and zeta tests were applied. The analysis revealed that the male respondents preferred "Competitions or games in teams or between communities," "Tournaments," and "Sports activities"; while the female respondents preferred "Artistic or creative activities," "Environmental care activities," "Activities to promote wellness," "Social service activities," "School dances," "Lunches, dinners, or picnics," "Visits to places," and "Sleepovers on campus." Also, the respondents who did not reveal their gender preferred "Artistic or creative activities" significantly more than their male counterparts.

**Table 5.** Activities to Develop Within Student Community

Activity	% of students who selected the activity
Tournaments	58.4
Competitions or games in teams or between communities	59.8
Artistic or creative activities	54.7
Sport activities	54.0
Environmental care activities	41.9
Social service activities	49.6
Activities to promote wellness	46.5
School dances	31.7
Motivational talks	34.6
Lunches, dinners, or picnics	65.2
Visits to places	57.3
Sleepovers on campus	53.4
Study groups	25.4

With regards to the mentoring program in general, most of the students considered that it helped them mainly to resolve logistical questions in areas such as schedules and procedures (82.2%). Regarding the relationship that they had with their mentors, most of the students looked to them for questions of an academic nature (81%) and to ask questions about their stay at school (67%). The relationship that they had with their peer was seen as similar to that with the mentor, with most students having also raised academic issues with them (61.5%).

On the other hand, 23% of the students mentioned having had no reason to contact their peer, or did not even know them. This percentage is striking since it was much higher than the percentage of students who stated having had no reason to contact their mentor (2%). In addition, significant differences were found in these perceptions according to the respondents' gender, with a higher proportion of males (29.2%) having sought advice from their peers for non-academic issues compared with their female (19.7%) counterparts. Finally, most of the students expressed a preference for having a peer for a period of 12 months. This question was asked since some of the mentors suggested it was better that students had peer support only during the first 6 months of their undergraduate studies.

## 5. Discussion

According to the study's participants, the university's SMP mainly favored the Social and Emotional dimensions of the students' well-being, which are considered important factors. These results were evident both from the focus group discussions held with the mentors and in the results of the quantitative instrument responded to by the students. Authors such as Al-Thani et al. (2023), Mena et al. (2020), and Zentgraf (2020) all agreed that mentoring is a practice that contributes to the emotional and social support of mentees, therefore a SMP can be said to contribute to the well-being of students.

Likewise, a SMP can help students develop a support network because, like the mentor, student communities can facilitate interpersonal relationships through different integration activities. This information was obtained from the focus groups and confirmed through the instrument that the students answered. This finding coincides with other studies in the literature, such as by Beck

Dallaghan et al. (2022), Dollinger et al. (2019), Fitzgerald and McNamara (2021), Rockinson-Szapkiw et al. (2021), and Tuladhar et al. (2021). In this sense, the university's SMP can be said to favor diversity and inclusion through student communities.

The formality of a mentoring program has the advantage of a structure and design that allows it to be evaluated and improved as and where necessary. The current study enabled aspects of the SMP that need strengthening to be revealed and those that must be improved in order to guarantee the success of the program, since the mere fact of having a mentor program does not guarantee its achievement (Casado-Muñoz et al., 2015). As such, it may be stated that the success of a SMP is best achieved if it is regularly evaluated and that the results are then used to continually improve the program.

In this sense, one aspect that is worthy of due consideration is the number of mentees assigned per mentor in order to better serve the students – results obtained from the focus group discussions in the current study and also the student instrument confirm this. On this point, our findings agree with the prior research published by Dollinger et al. (2019), García et al. (2020), Lennox et al. (2007), and Zentgraf (2020). Based on the results of the current study and the context to which the SMP is circumscribed at the participant university, the optimal number of mentees that should be assigned to a single mentor should not exceed 200 students.

Although the SMP did not specifically focus on student retention, considering that the participant students felt very much supported by the mentoring program in the Social and Emotional dimensions may be a contributory factor in the university's student retention, as also demonstrated in studies by Vázquez-Parra and Kustala (2018) and also Hagler et al. (2024). Therefore, it is considered important to conduct further research in this area that explores the impact that similar mentoring programs may have on student retention.

## 6. Conclusion

Based on the quantitative and qualitative results of the current research, it can be concluded that participant students perceived the mentoring program as a tool that supported their development according to the different dimensions of well-being. However, some areas of opportunity were also identified in order that the student experience may be improved and the benefit obtained from the program. The results from the study indicate that the SMP had seen greater success on campuses that had fewer mentees assigned to each mentor, thereby allowing for a closer mentor-mentee relationship. The participant mentors agreed that the maximum number of assigned mentees should not exceed 200 in order to offer an appropriate level of service.

Another area of opportunity revealed in the study was the role of peers, since the mentors recognized that they too play an important role in the process, although the students failed to recognize it in the same way. As such, this may be an important area to be strengthened and the role of peers clarified in order that it becomes evident to all concerned within the community. The Social, Emotional, and Physical dimensions of well-being obtained the best ratings from the students, whilst the Spiritual and Financial dimensions obtained the lowest. In addition, the high correlation found between the different dimensions, especially the correlation revealed between the Emotional and Social dimensions, indicates that improvements seen in one dimension may positively impact all the others. In this sense, it is a priority that mentors have clarity regarding how to strengthen the Spiritual and Financial dimensions, considering the general needs of the student community.

The current research confirms that significant differences exist in terms of what students prefer and expect from a SMP according to their gender and school type. Therefore, this finding should be considered in the design of community activities or in the design and implementation of future mentoring schemes. Once such strengthening and improvement actions have been implemented, the current study should then be replicated in order to measure the impact of these changes. It would

also be relevant to inquire about the specific practices carried out by mentors and communities in each school, particularly at the School of Business and at the School of Social Sciences and Government, and then to replicate the best practices of the communities and schools which achieved the most success with their implementation of the SMP.

While the current study provides the academic community with a mentoring model designed to enhance student success through a holistic approach to student well-being, its scope remains descriptive, since it primarily presents an evaluation of the program from various perspectives. Given that the SMP at the participant university is relatively new, ongoing efforts should be focused on collecting data for future longitudinal analysis.

## Declarations

**Author Contributions.** E.G.R-F.: Introduction, Literature review, data analysis, discussion, conclusions, and suggestions. N.R.: Abstract, data analysis, results, conclusions, suggestions, review-editing and writing, plus format adaptations. J.M.: Review-editing and suggestions. E.L-C.: Translation, copyediting, and review of statistical processes. All authors have read and approved publication of the final version of the article.

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## References

- Aderibigbe, S., Gray, D. S., & Colucci-Gray, L. (2018). Understanding the nature of mentoring experiences between teachers and student teachers. *International Journal of Mentoring and Coaching in Education*, 7(1), 54-71. <https://doi.org/10.1108/IJMCE-04-2017-0028>
- Al-Thani, N. J., Santhosh, M. E., Bhadra, J., & Ahmad, Z. (2023). The prominent roles of undergraduate mentors in an online near-peer mentoring model. *Sustainability*, 15(4), Article 3020. <https://doi.org/10.3390/su15043020>
- Asada, T. (2012). Mentoring novice teachers in Japanese schools. *International Journal of Mentoring and Coaching in Education*, 1(1), 54-65. <https://doi.org/10.1108/20466851211231620>
- Beck Dallaghan, G. L., Coe, C. L., Towner Wright, S., & Jordan, S. G. (2022). Mentoring medical education research: Guidelines from a narrative review. *Medical Science Educator*, 32(3), 723-731. <https://doi.org/10.1007/s40670-022-01565-2>
- Bozionelos, N., & Wang, L. (2006). The relationship of mentoring and network resources with career success in the Chinese organizational environment. *International Journal of Human Resource Management*, 17(9), 1531-1546. <https://doi.org/10.1080/09585190600878345>
- Busse, H., Campbell, R., & Kipping, R. (2018). Examining the wider context of formal youth mentoring programme development, delivery and maintenance: A qualitative study with mentoring managers and experts in the United Kingdom. *Children and Youth Services Review*, 95, 95-108. <https://doi.org/10.1016/j.childyouth.2018.10.028>
- Casado-Muñoz, R., Lezcano-Barbero, F., & Colomer-Feliu, J. (2015). Ten Key Steps to Developing a Programme of University Mentoring for Newly Enrolled Students. *Revista Electrónica Educare*, 19(2), 155-180. [https://www.scielo.sa.cr/scielo.php?pid=S1409-42582015000200010&script=sci\\_arttext&lng=en](https://www.scielo.sa.cr/scielo.php?pid=S1409-42582015000200010&script=sci_arttext&lng=en)



- Christensen, K. M., Hagler, M. A., Stams, G. J., Raposa, E. B., Burton, S., & Rhodes, J. E. (2020). Non-Specific versus Targeted Approaches to Youth Mentoring: A Follow-up Meta-analysis. *Journal of Youth and Adolescence*, 49(5), 959-972. <https://doi.org/10.1007/s10964-020-01233-x>
- Clarke, A., & Mena, J. (2020). An international comparative study of practicum mentors: Learning about ourselves by learning about others. *Educational and Teacher Education*, 90, Article 103026. <https://doi.org/10.1016/j.tate.2020.103026>
- Creswell, J. W. (2007). *Qualitative inquiry research design. Choosing among five approaches* (2nd ed.). Sage.
- Darling-Hammond, L., Hyster, M. E., & Gardner, M. (2017, June 5). *Effective Teacher Professional Development*. Learning Policy Institute. <https://doi.org/10.54300/122.311>
- Dollinger, M., Arkoudis, S., & Marangell, S. (2019). University Alumni Mentoring Programs: A Win-Win? *Journal of Higher Education Policy and Management*, 41(4), 375-389. <https://doi.org/10.1080/1360080X.2019.1617657>
- Eby, L. T., Rhodes, J. E., & Allen, T. D. (2007). Definition and evolution of mentoring. In T. D. Allen & L. T. Eby (Eds.), *The Blackwell Handbook of Mentoring: A Multiple Perspectives Approach* (pp. 7-20). Blackwell. <https://doi.org/10.1111/b.9781405133739.2007.00002.x>
- Eisenschmidt, E., & Oder, T. (2018). Does mentoring matter? On the way to collaborative school culture. *Educational Process: International Journal*, 7(1), 7-23. <http://dx.doi.org/10.22521/edupij.2018.71.1>
- Ersin, P., & Atay, D. (2021). Exploring online mentoring with preservice teachers in a pandemic and the need to deliver quality education. *International Journal of Mentoring and Coaching in Education*, 10(2), 203-215. <https://doi.org/10.1108/IJMCE-11-2020-0077>
- Evans, M. E., Taylor, R. M., McCloud, L., & Burr, K. (2022). Exploring the role of faculty and staff mentors in fostering ethical leadership among undergraduate students: "We have to narrow the distance." *International Journal of Mentoring and Coaching in Education*, 11(2), 137-152. <https://doi.org/10.1108/IJMCE-09-2020-0058>
- Fitzgerald, A., & McNamara, N. (2021). Mentoring dyads in higher education: It feels lucky, but it's more than luck. *International Journal of Mentoring and Coaching in Education*, 10(3), 355-369. <https://doi.org/10.1108/IJMCE-12-2020-0088>
- Fletcher, T., & Kosnik, C. (2016). Pre-service primary teachers negotiating physical education identities during the practicum. *Education 3-13*, 44(5), 556-565. <https://doi.org/10.1080/03004279.2016.1169486>
- Ganser, T. (2002). Building the capacity of school districts to design, implement, and evaluate effective new teacher mentor programs: Action points for colleges and universities. *Mentoring and Tutoring*, 10(1), 47-55. <https://doi.org/10.1080/13611260220133144>
- García, A. I., Álvarez, T. G., Martín, V. M. G., Román, M. D. G., Merchán, D. T., & Zamudio, S. C. (2020). University mentoring programmes for gifted high school students: Satisfaction of workshops. *Sustainability*, 12(13), Article 5282. <https://ideas.repec.org/a/gam/jsusta/v12y2020i13p5282-d378428.html>
- Griffith, A. N., Melton, T. N., & Deutsch, N. L. (2021). How group experiences influence mentor-mentee relational development in a combined group and one-on-one mentoring program for early adolescent girls. *Applied Developmental Science*, 25(2), 150-167. <https://doi.org/10.1080/10888691.2018.1555042>
- Hackmann, D. G., & Malin, J. R. (2020). From dyad to network: the evolution of a mentoring relationship. *Mentoring and Tutoring: Partnership in Learning*, 28(4), 498-515. <https://doi.org/10.1080/13611267.2020.1793085>
- Haggard, D. L., Dougherty, T. W., Turban, D. B., & Wilbanks, J. E. (2011). Who is a mentor? A review of evolving definitions and implications for research. *Journal of Management*, 37(1), 280-304. <https://doi.org/10.1177/0149206310386227>

- Hagler, M. A., Christensen, K. M., & Rhodes, J. E. (2024). A Longitudinal Investigation of First-Generation College Students' Mentoring Relationships During Their Transition to Higher Education. *Journal of College Student Retention: Research, Theory & Practice*, 25(4), 791-819. <https://doi.org/10.1177/15210251211022741>
- Hobson, A., Ashby, P., Malderez, A., & Tomlinson, P. (2009). Mentoring beginning teachers: What we know and what we don't. *Educational and Teacher Education*, 25(1), 207-216. <https://doi.org/10.1016/j.tate.2008.09.001>
- Houston, M. J. (2020). Faculty Mentoring Programs at Academic Institutions: a Systematic Literature Review and Suggestions for Future Mentoring Programs. *International Journal of Engineering Technologies and Management Research*, 6(10), 24-30. <https://doi.org/10.29121/ijetmr.v6.i10.2019.457>
- Hudson, P., & Hudson, S. (2018). Mentoring preservice teachers: identifying tensions and possible resolutions. *Teacher Development*, 22(1), 16-30. <https://doi.org/10.1080/13664530.2017.1298535>
- Johnson, W. B. (2016). *On being a mentor: A guide for higher education faculty* (2nd ed.). Routledge. <https://doi.org/10.4324/9781315669120>
- Jones, J., & Smith, H. A. (2022). A comparative study of formal coaching and mentoring programmes in higher education. *International Journal of Mentoring and Coaching in Education*, 11(2), 213-231. <https://doi.org/10.1108/IJMCE-03-2021-0054>
- Lasater, K., Smith, C., Pijanowski, J., & Brady, K. P. (2021). Redefining mentorship in an era of crisis: responding to COVID-19 through compassionate relationships. *International Journal of Mentoring and Coaching in Education*, 10(2), 158-172. <https://doi.org/10.1108/IJMCE-11-2020-0078>
- Leavitt, A. S., Nelson, K. L., & Cutucache, C. E. (2022). The effect of mentoring on undergraduate mentors: A systematic review of the literature. *Frontiers in Education*, 6, Article 731657. <https://doi.org/10.3389/feduc.2021.731657>
- Lennox, J., Pillion, R., & Leonard, D. (2007). An Evaluation of a University Peer-Mentoring Training Programme. *International Journal of Evidence Based Coaching and Mentoring*, 5(1), 42-57. <http://hdl.handle.net/10393/22766>
- Linley, P. A., Maltby, J., Wood, A. M., Osborne, G., & Hurling, R. (2009). Measuring happiness: The higher order factor structure of subjective and psychological well-being measures. *Personality and Individual Differences*, 47(8), 878-884. <https://doi.org/10.1016/j.paid.2009.07.010>
- Mena, J., Faikhamta, C., & Clarke, A. (2020). Mentors' approach to practicum mentoring in the Spanish and Thai contexts: a two-cohort comparison using the Mentoring Profile Inventory. *International Journal of Mentoring and Coaching in Education*, 9(2), 169-185. <https://doi.org/10.1108/IJMCE-08-2019-0079>
- Mondisa, J.-L., Packard, B. W.-L., & Montgomery, B. L. (2021). Understanding what STEM mentoring ecosystems need to thrive: a STEM-ME framework. *Mentoring and Tutoring: Partnership in Learning*, 29(1), 110-135. <https://doi.org/10.1080/13611267.2021.1899588>
- Owusu-Agyeman, Y. (2022). The Mentoring Experiences of Early Career and Senior Academics in a Multicampus University in South Africa. *Educational Process: International Journal*, 11(1), 65-85. <https://doi.org/10.22521/edupij.2022.111.5>
- Parnter, C., & Collier, D. (2022). Meaning making of mentorship for the tuition-free student. *International Journal of Mentoring and Coaching in Education*, 11(2), 183-194. <https://doi.org/10.1108/IJMCE-03-2021-0052>
- Parsloe, E., & Leedham, M. (2009). *Coaching and mentoring: Practical conversations to improve learning*. Kogan Page.

- Putsche, L., Storrs, D., Lewis, A., & Haylett, J. (2008). The development of a mentoring program for university undergraduate women. *Cambridge Journal of Education*, 38(4), 513-528. <https://doi.org/10.1080/03057640802482322>
- Raposa, E. B., Rhodes, J. E., & Herrera, C. (2016). The Impact of Youth Risk on Mentoring Relationship Quality: Do Mentor Characteristics Matter? *American Journal of Community Psychology*, 57(3-4), 320-329. <https://doi.org/10.1002/ajcp.12057>
- Rockinson-Szapkiw, A., Herring Watson, J., Gishbaugher, J., & Wendt, J. L. (2021). A case for a virtual STEM peer-mentoring experience for racial and ethnic minority women mentees. *International Journal of Mentoring and Coaching in Education*, 10(3), 267-283. <https://doi.org/10.1108/IJMCE-08-2020-0053>
- Taha, H., Hanim, F., Johar, M., & Shah, M. (2015). Peer Mentoring Module: The Effect of an Intervention of Academic Mentoring Program towards Motivation and Self-esteem among Foundation Students in Malaysia. *Universal Journal of Psychology*, 3(3), 80-83. <https://doi.org/10.13189/ujp.2015.030304>
- Tecnológico de Monterrey. (2019a). *Tec21 la guía*. <https://tec.mx/es/la-guia-tec21>
- Tecnológico de Monterrey. (2019b). *Visión 2030*. <https://tec.mx/es/vision2030>
- Tecnológico de Monterrey. (2021). *TQueremos: Un sitio hecho para ti*. <https://tqueremos.tec.mx/es>
- Tuladhar, A., Queener, C., Mondisa, J. L., & Okwudire, C. (2021). Informal community spaces, mentoring and representation: unpacking factors that influence African American engineering undergraduates. *International Journal of Mentoring and Coaching in Education*, 10(3), 317-338. <https://doi.org/10.1108/IJMCE-06-2020-0032>
- Vázquez-Parra, J. C., & Kustala, P. (2018). Acompañar y formar. El mentoreo como herramienta para reducir la deserción escolar. *Apuntes Universitarios*, 8(1), 41-51. <https://doi.org/10.17162/au.v8i1.178>
- Voukelatou, V., Gabrielli, L., Miliou, I., Cresci, S., Sharma, R., Tesconi, M., & Pappalardo, L. (2021). Measuring objective and subjective well-being: dimensions and data sources. *International Journal of Data Science and Analytics*, 11, 279-309. <https://doi.org/10.1007/s41060-020-00224-2>
- Zentgraf, L. L. (2020). Mentoring reality: from concepts and theory to real expertise and the mentor's point of view. *International Journal of Mentoring and Coaching in Education*, 9(4), 427-443. <https://doi.org/10.1108/IJMCE-12-2017-0077>

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