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About the Journal

The Catholic University of Croatia is proud to introduce the UniCath Journal of Biomedicine and Bioethics, a novel initiative ratified by the University Senate on January 16, 2024. Our goal is twofold: to advance the frontiers of research in the intersecting disciplines of biomedicine and bioethics and to provide an educational platform for our nascent researchers.

The UniCath Journal of Biomedicine and Bioethics will welcome a broad spectrum of contributions, including but not limited to research articles, editorials, case reports and other scholarly works. We are dedicated to upholding the highest standards of peer review and publication ethics, ensuring that every manuscript is rigorously evaluated by at least two expert reviewers in a meticulously conducted double-blind review process.

The journal is set to publish two issues per year, in both print and digital formats. Upon completion of the production process, the articles will be immediately available online in a fully citable form, complete with a Universal Digital Object Identifier (DOI), signifying our commitment to the rapid dissemination of research findings. Furthermore, all the published articles will be freely accessible for viewing and downloading.

The launch of the UniCath Journal of Biomedicine and Bioethics represents a significant milestone in our pursuit of academic and research excellence. By offering a dynamic platform for the exploration and discussion of critical issues at the intersection of biomedicine and bioethics, we aim to contribute to the global academic community and inspire a culture of research and innovation within the Catholic University of Croatia.

The Editorial Team

Prevalence and Associated Factors of Postpartum Stress in Mothers: A Cross-Sectional Study

Lucija Kolić[1] and Sandra Nakić Radoš

[1]Kindergarten "Maslačak"
Zadar, Croatia

[2]University Department of Psychology
Catholic University of Croatia
Zagreb, Croatia

Lucija Kolić
lucija.k@outlook.com

Sandra Nakić Radoš
snrados@unicath.hr
ORCID: 0000-0002-8330-8427

Corresponding author:
Sandra Nakić Radoš
University Department of Psychology
Catholic University of Croatia
Ilica 244, Zagreb, Croatia

snrados@unicath.hr

Abstract

Background: Postpartum stress refers to an unpleasant emotional state caused by stressors that arise during the postpartum period, though its prevalence remains unclear. Previous research indicates that up to 30% of mothers experience emotional difficulties, including stress, during this time. However, postpartum stress is often neglected in maternal mental health research, leading to inconclusive findings. Additionally, studies suggest that elevated stress levels persist throughout the first year after childbirth.

Aim: This study aimed to investigate the frequency of postpartum stress in mothers and the effects of sociodemographic and obstetric variables, as well as social support, on perceived postpartum stress.

Methods: Mothers who had given birth within the previous 6-12 weeks participated in an online survey (N=199). Participants completed the Depression, Anxiety, and Stress Scales, the Maternal Postpartum Stress Scale, the Birth Satisfaction Scale-Revised, the Perceived Partner Support Scale, and the Social Support Appraisals Scale.

Results: The findings revealed that mothers reported higher levels of postpartum-specific stress compared to general stress. Significant predictors of postpartum stress included younger maternal age, planned Caesarean section (C-section), varied infant feeding methods, and lower partner support which explained 34% of the total stress variance.

Conclusion: This study offers valuable insights into the factors contributing to postpartum stress and provides guidance for future interventions aimed at preventing and reducing postpartum stress. This, in turn, can facilitate smoother maternal adjustment to parenthood and promote better child development.

Keywords: psychological stress, postpartum, mothers, birth, social support

Introduction

The birth of a child is a significant event, but the first year postpartum can also be challenging, with an increased risk of stress and mental health issues (1,2). Postpartum stress is an unpleasant emotional state caused by postpartum stressors, occurring during the six weeks after childbirth or up to a year after childbirth (3,4). These stressors can be any events, situations, or challenges that mothers perceive as sources of discomfort during the postpartum period (5). These are often not major life events but daily difficulties (6), such as infant feeding, sleep deprivation, childcare, and adjusting to a new routine (5).

Studies suggest that 10% to 30% of women face psychological difficulties, including depression, anxiety, and stress (7,8,9). Research from Croatia indicates that mothers experience low to moderate stress during the first year postpartum (10,11). However, these studies assessed general rather than specific stress, so the prevalence of postpartum-specific stress remains uncertain.

Risk factors for stress in the postpartum period encompass different sociodemographic, obstetric and psychosocial factors. *Sociodemographic factors* related to postpartum stress have yielded mixed results. Delaying parenthood to late twenties or early thirties facilitates the transition to parenthood (12), but age does not consistently predict postpartum stress (13,14). Younger maternal age is associated with depression and anxiety after childbirth (14,15), indicating the need for further research to clarify this relationship. The effect of maternal education on postpartum stress is also inconsistent. Some studies suggest lower education predicts reduced stress (16), while others find it associated with higher stress (17), and some report no effect (13). Similarly, the role of socioeconomic status (SES) on postpartum stress varies, with some studies finding no effect (13), while others associate lower SES with increased postpartum stress (18).

Concerning *obstetric factors*, research indicates that primiparas are at higher risk for postpartum stress (4,16,19), though some studies suggest multiparas may also experience elevated stress levels (20). Pregnancy planning impacts postpartum stress; unplanned pregnancies are typically linked to higher stress (20), although some studies find no clear association (13).

Childbirth satisfaction, influenced by personal beliefs, care quality, and delivery stress (21), is another predictor of postpartum stress (22,23). Lower satisfaction with childbirth, particularly after assisted vaginal birth or emergency Caesarean section (C-sections) (4,23), is associated with higher stress and depression.

The relationship between gestational age and postpartum stress remains unclear; some studies find that lower gestational age correlates with higher stress (13), while others do not (16). Feeding methods also affect postpartum stress, with breastfeeding being particularly stressful for some mothers (4,24). Mixed feeding methods are sometimes associated with higher stress levels (16,25), but not consistently (11).

Current research underscores the importance of *social support* during the peripartum period, which aids in developing maternal behaviours and caring for their newborns, benefiting the entire family (26). Both primiparas and multiparas in fulfilling romantic relationships experience lower postpartum stress (27). Research on postpartum stress concerning social support is limited, often focusing on support within the context of postpartum depression.

This study aimed to (i) assess the prevalence of stress in postpartum mothers, (ii) evaluate whether postpartum stress can be explained by sociodemographic and obstetrical variables, birth satisfaction, and social support, and (iii) investigate whether social support moderates the relationship between birth satisfaction and general and postpartum-specific stress. We hypothesised a prevalence of around 10% and expected that younger age, lower SES and education level, primiparity, unplanned pregnancy, lower gestational age, assisted vaginal birth, or emergency (C-section), lower birth satisfaction, and lower social support would contribute to higher levels of general and postpartum-specific stress. Additionally, we hypothesised that perceived social support would moderate the relationship between birth satisfaction and both general and postpartum-specific stress.

Materials and Methods

Study design

This was a cross-sectional study.

Ethics

The study protocol was approved by the Ethics Committees of the Catholic University of Croatia (Class: 641-03/21-03/21; No: 498-16/2-22-04) and the University Hospital "Sveti Duh" (No: 012-1539). Participation was voluntary, and all participants provided their consent. They could withdraw at any time without consequences.

Participants

The study was part of a longitudinal project at the maternity ward of "Sveti Duh" Clinical Hospital (Zagreb, Croatia). Participants were recruited during a routine pregnancy check-up, providing general data and contact information. Six to twelve weeks postpartum, participants received a link to complete a follow-up, with reminders sent once a week until 12 weeks postpartum. The study was conducted from September 2022 to May 2023.

Instruments

Depression, Anxiety, Stress Scales (DASS-21) (28) consist of 21 items with three subscales (depression, anxiety, and stress), each with seven items. For this study, only the stress subscale was utilised. Participants rated items on a 0 to 3 scale, with total scores multiplied by two to be comparable to the full version, thus ranging from 0 to 42. Higher scores indicate greater symptom presence. For the stress subscale, cut-off values are 0-14 (normal stress), 15-18 (mild stress), 19-25 (moderate stress), 26-33 (severe stress), and above 34 (extreme stress). The reliability, measured by McDonald's ω was .92.

Birth Satisfaction Scale–Revised (BSS-R) (21) consists of 10 items measuring satisfaction with childbirth across three aspects: stress during labour, personal characteristics of the woman, and quality of care. Participants rate their responses on a 0 to 4 scale. The total score ranges from 0 to 40, with a higher score indicating greater satisfaction. The scale was previously validated in Croatian postpartum women (29). McDonald's ω was .78.

Maternal Postpartum Stress Scale (MPSS) (4) consists of 22 items measuring stress caused by stressors during the first year postpartum with three subscales: personal needs and fatigue, childcare, and physical changes and sexuality. Participants rate their responses on a 0 to 4 scale. A higher total score indicates greater perceived postpartum stress. McDonald's ω was .91.

Perceived Partner Support Scale (PPS) (30) consists of 5 items measuring overall relationship satisfaction, emotional and instrumental support, and confiding and trust in the partner. Participants rate their responses on a 1 to 5 scale, with the total score ranging from 5 to 25, where a higher score indicates greater perceived support. The McDonald's ω was .91.

Social Support Appraisals Scale (SS-A) (31) measures perceived social support from family, friends, and others. For this study, only the family and friends subscales were used. Participants rated their responses on a 1 to 5 scale, with the total score for each subscale ranging from 7 to 35. A higher total score indicates greater perceived social support. McDonald's ω was .95 and .97 for friends and family support subscale, respectively.

The general data questionnaire included demographics such as age, education level, financial status, place of residence, marital status, and employment status. Psychiatric history, including hereditary conditions, psychiatric illnesses, and treatment were addressed. Participants were asked about the number of children, gestational age at birth, the infant's age and gender, pregnancy planning, multiple pregnancies, pregnancy and birth complications, and infant feeding methods. Other questions concerned the type of delivery (vaginal, instrumental vaginal, emergency or planned C-section) and pre-term birth.

Statistical analysis

Data were analysed using IBM SPSS Statistics 23. Descriptive analyses, Pearson's or Spearman's correlation coefficients and a backward regression analysis were conducted. Additionally, the moderating effect of social support on the relationship between birth satisfaction and both general and specific postpartum stress was analysed using *PROCESS Macro* (32).

Results

Characteristics of participants

Mothers (N=199) of average age 32 years (SD=5.2) participated when their infant was, on average, 7.93 weeks old (SD=1.9; range 6-15 weeks). They mainly were married or cohabiting, had high education levels, lived in urban areas, and had average- to high-income levels (Table 1). Regarding obstetric variables, 52.8% were primiparas, 62.8% had planned pregnancies, most had a vaginal birth (76.9%), and most breastfed exclusively (56.8%) (Table 1).

Table 1. *Demographic and obstetric data (N=199)*

	M (SD)
Mother's age (years)	*32 (5.2)*
Baby's age (weeks)	7.93 (1.9)
	n (%)
Marital status	
Married	151 (75.9%)
Cohabiting	48 (24.1%)
Education level	
Completed primary school	1 (0.5%)
Completed secondary school	51 (25.6%)
Completed college or university	147 (73.9%)
Perceived financial status	
Below average	4 (2.0%)
Average	122 (61.3%)
Above average	73 (36.7%)
Place of residence	
Urban area	161 (80.9%)
Suburban area	20 (10.1%)
Rural area	18 (9.0%)
Parity	
One child	105 (52.8%)
Two or more children	94 (47.2%)
Last pregnancy – Multiple births*	2 (1%)
Child's gender	
Girl	104 (52.3%)
Boy	95 (47.7%)
Pregnancy	
Planned	125 (62.8%)
Unplanned but desired	73 (36.7%)
Unplanned and undesired	1 (0.5%)
Type of birth	
Vaginal birth	153 (76.9%)
Planned C-section	17 (8.5%)
Emergency C-section	28 (14.1%)
Instrumental vaginal birth	1 (0.5%)
Type of infant feeding	
Breastfeeding	113 (56.8%)
Formula feeding	36 (18.1%)
Mixed (breastfeeding, pumping, and formula feeding combination)	50 (25.1%)
Birth complications for the child*	18 (9%)
Birth complications for the mother*	49 (24.6%)
Previous mental health disorders*	11 (5.5%)
Current mental health disorders *	6 (3%)

*Note: * - Percentage of responses "Yes"*

Stress prevalence

Concerning general stress, average levels were low (Table 2). Among the sample, 82.4% of women reported general stress within the normal range, 6.1% reported mild stress, 8.5% reported moderate stress, 1.0% reported significant stress, and 2.0% reported extreme stress. For postpartum-specific stress, participants reported moderate levels.

Associations between variables

General and postpartum-specific stress are in a moderate positive correlation (r=.54, p<.01). Regarding socioeconomic variables, only the mother's age and level of education were associated with stress (Table 2). Younger mothers reported higher total postpartum-specific stress, while mothers with lower levels of education reported higher stress related to personal needs and fatigue, as well as bodily changes and sexuality.

Obstetric variables were not associated with general stress but with postpartum-specific stress. Lower gestational age and planned

Table 2. *Correlations between general and postpartum-specific stress with sociodemographic variables, obstetric variables, and social support (N=199)*

	General stress	Postpartum-specific stress			
		Total score	Child-care	Personal Needs and Fatigue	Physical Changes and Sexuality
M	7.90	29.61	13.66	10.11	7.54
SD	0.60	17.93	8.61	7.68	6.49
Observed range	0 – 40	0 – 81	0 – 36	0 – 28	0 – 24
Possible range	0 – 42	0 – 88	0 – 36	0 – 28	0 – 24
Mother's Age	.01	**-.19***	-.11	-.09	-.03
Socioeconomic Status	-.10	.09	-.01	.02	.06
Level of Education	-.07	-.18	-.10	**-.20****	**-.18***
Parity	.10	-.04	-.06	.11	.01
Pregnancy Planning [a]	-.01	.09	.05	.11	.11
Gestational Age at Birth	-.01	**-.18***	-.12	-.14	-.05
Vaginal Birth vs. Planned C-Section [b]	.06	**.22***	.05	**.21****	.15
Vaginal Birth vs. Emergency C-Section [b]	-.08	.01	.04	-.02	.05
Breastfeeding vs. Formula Feeding [c]	-.01	.09	.15	-.04	.08
Breastfeeding vs. Mixed Feeding [c]	.05	**.20***	**.40****	.13	.03
Birth Satisfaction	**-.31****	**-.34****	**-.29****	**-.29****	**-.31****
Partner Support	**-.33****	**-.23****	.05	**-.23****	**-.26****
Family Support	**-.31****	**-.23****	.05	**-.23****	**-.26****
Friend Support	**-.31****	**-.24****	.04	**-.30****	**-.22****

Note: *$p<0.05$; **$p<0.01$ (significant correlations are highlighted in bold); [a] 1 = planned and desired, 2 = unplanned but desired, 3 = unplanned and undesired; [b] 0 – Vaginal birth, 1 – Planned C-Section/ Emergency C-Section; [c] 0 – Breastfeeding, 1 – Formula Feeding/Mixed Feeding

C-section were associated with higher postpartum-specific stress. Mixed feeding, as opposed to exclusive breastfeeding, was associated with postpartum-specific stress related to childcare.

Lower levels of birth satisfaction were associated with higher levels of both general and postpartum-specific stress. Lower levels of perceived social support from the partner, family and friends were related to all stress domains, except for no correlation with childcare-related stress.

Prediction of Postpartum-Specific Stress

Only variables significantly correlated with stress were included in the regression analyses (Table 3). This set of predictors explained 28% of general stress and 19%-34% of postpartum-specific stress variance.

General stress was explained by emergency C-section and lower birth satisfaction and support from partners and family. Postpartum-specific stress was explained by younger maternal age, planned C-sections, formula or mixed feeding (compared to breastfeeding), lower birth satisfaction and partner support.

Somewhat different predictors were established for different aspects of postpartum-specific stress. Childcare-specific stress was explained by planned C-sections, formula and mixed feeding, and lower birth satisfaction. Stress related to personal needs and fatigue was associated with younger maternal age, lower education level, planned C-sections, mixed feeding methods, lower birth satisfaction and partner support. Stress related to physical changes and sexuality was linked to lower education levels, birth satisfaction and support from the partner and family.

Social support was further examined as a possible moderation between birth satisfaction and general (Table 4) and postpartum-specific stress (Table 5). Although all models were significant, indicating that birth satisfaction and social support explain stress variance, the moderation effect was not established.

Table 3. *Regression analysis with sociodemographic variables, obstetric variables and social support as predictors of general and postpartum-specific stress (N=199)*

	General Stress			**Postpartum-specific stress**											
				Total score			Childcare			Personal needs and fatigue			Physical changes and sexuality		
Predictor	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*
Constant		45.44	4.43		107.49	14.45		15.91	2.32		54.52	7.00		36.65	5.86
Mother's age				-.25	-0.95	0.30				-.13	-0.22	0.12			
Education level										-.13	-2.35	1.28	-.14	-2.02	1.09
Gestational age															
Vaginal Birth vs. Planned C-Section [a]				.24	16.54	5.32	.12	3.50	2.05	.21	6.51	2.11			
Vaginal Birth vs. Emergency C-Section [a]	-.16	-3.78	1.56												
Breastfeeding vs. Formula Feeding [b]				.17	8.15	3.85	.28	6.25	1.57						
Breastfeeding vs. Mixed Feeding [b]				.28	11.91	3.39	.45	8.08	1.26	.16	3.32	1.40			
Birth satisfaction	-.32	-0.41	0.08	-.33	-0.94	0.22	-.27	-0.33	0.08	-.29	-0.40	0.10	-.28	-0.29	0.08
Partner support	-.27	-0.59	0.14	-.27	-1.23	0.35				-.33	-0.73	0.15	-.16	-0.27	0.14
Family support	-.24	-0.42	0.11										-.18	-0.27	0.12
Friend support															
	$R^2 = .28$ $F(4, 194) = 18.85^{**}$			$R^2 = .34$ $F(6, 192) = 9.69^{**}$			$R^2 = .31$ $F(4, 194) = 16.81^{**}$			$R^2 = .28$ $F(6, 192) = 10.09^{**}$			$R^2 = .19$ $F(4, 192) = 8.07^{**}$		

Note: $^*p<0.05$; $^{**}p<0.01$ (non-significant predictors are not presented): [a] 0 – Vaginal birth, 1 – Planned C-Section/Emergency C-Section; [b] 0 – Breastfeeding, 1 – Formula Feeding/Mixed Feeding

Table 4. *Moderating Effect of Perceived Social Support on the Relationship Between Birth Satisfaction and General Postpartum Stress (N=199)*

	B	***SE (B)***	***t***	***p***	
Perceived partner support					$R^2 = 0.22$ $F(3, 195) = 18.11^{**}$
(Constant)	45.26	14.18	3.19	.002	
Perceived partner support	-1.22	0.63	-1.93	.056	
Birth satisfaction	-0.75	0.50	-1.48	.139	
Interaction	0.02	0.02	0.68	.495	
Perceived family support					$R^2 = 0.20$ $F(3, 195) = 15.89^{**}$
(Constant)	30.71	15.07	2.04	.043	
Perceived family support	-0.46	0.46	-0.99	.322	
Birth satisfaction	-0.16	0.60	-0.27	.785	
Interaction	-0.01	0.02	-0.25	.803	
Perceived friend support					$R^2 = 0.18$ $F(3, 195) = 14.13^{**}$
(Constant)	44.52	14.57	3.06	.003	
Perceived friend support	-0.91	0.48	-1.91	.057	
Birth satisfaction	-0.79	0.57	-1.31	.164	
Interaction	0.01	0.02	0.78	.434	

Note: $^*p<0.01$

Table 5. *Moderating Effect of Perceived Social Support on the Relationship Between Birth Satisfaction and General Postpartum Stress (N=199)*

	B	*SE(B)*	*t*	*p*	
Perceived partner support					$R^2 = 0.17$ $F(3, 195) = 8.25^{**}$
(Constant)	84.12	37.54	2.24	.027	
Perceived partner support	-1.31	1.70	-0.77	.444	
Birth satisfaction	-1.11	1.31	-0.85	.398	
Interaction	0.01	0.06	0.11	.914	
Perceived family support					$R^2 = 0.15$ $F(3, 195) = 6.75^{**}$
(Constant)	105.09	53.37	1.97	.051	
Perceived family support	-1.68	1.08	-1.02	.310	
Birth satisfaction	-2.05	2.27	-0.91	.367	
Interaction	0.04	0.07	0.56	.577	
Perceived friend support					$R^2 = 0.15$ $F(3, 195) = 6.92^{**}$
(Constant)	100.99	41.39	2.44	.016	
Perceived friend support	-1.59	1.39	-1.15	.253	
Birth satisfaction	-1.85	1.55	-1.19	.237	
Interaction	0.03	0.05	0.62	.536	

Note: $^{**}p<0.01$

Discussion

This study examined the prevalence of postpartum stress among mothers and its predictors regarding sociodemographic, obstetric, and social support variables. The results indicated that mothers report low general stress and moderate postpartum-specific stress. Additionally, birth satisfaction, partner support, and mixed infant feeding emerged as significant predictors of post-partum-specific stress, whereas other socio-demographic and obstetric variables were not important.

As previous research indicates, exposure to stress during the postpartum period can affect a mother's functioning and mental health, potentially making her more vulnerable to depression (33). This study demonstrates that postpartum stress is not to be overlooked. Although, mothers reported low stress levels, 17.6% of postpartum mothers still reported elevated stress, of which most reported moderate to extreme stress.

Among all sociodemographic variables, only younger maternal age was associated with specific postpartum stress. These results contradict previous studies that found no association between maternal age and postpartum stress levels (13,14). Additionally, younger age at first birth is associated with poorer mental health outcomes later in life (34), suggesting a need for further investigation.

Regarding education level, it was found to be a negative predictor of stress related to personal needs and fatigue, as well as stress related to physical changes and sexuality. Highly educated women might have been better prepared for the challenges of newborn care or generally possessed more knowledge to cope. Still, these findings are somewhat contradictory to previous studies, which did not find such associations (13). It is important to note that most participants in this study were highly educated (74%), which may have affected the results.

Among obstetric variables, only birth satisfaction was significantly associated with both general and specific postpartum stress. No other obstetric variables were significantly related to general stress. On the other hand, higher levels of specific postpartum stress were associated with lower gestational age at delivery, planned C-section, and more frequent use of formula feeding.

Previous research confirms that lower birth satisfaction is linked to higher levels of postpartum stress (22). Interestingly, while an emergency C-section was associated with lower satisfaction, it was not a significant predictor of specific postpartum stress, unlike a planned C-section. This might be because planned C-sections are performed due to complications such as preeclampsia or placenta previa (35), which may contribute to higher stress levels later. Future research should include measures of stress before childbirth to assess whether they contribute to the relationship between delivery type and postpartum stress.

This study did not find a significant relationship between parity and stress levels. A possible explanation could be that most participants reported planned pregnancies. Previous research suggests that differences in postpartum stress between first-time and experienced mothers are due to levels of confidence and readiness for childcare (36). Thus, first-time mothers may have felt prepared and confident in handling the challenges of motherhood.

Regarding infant feeding types, more frequent use of formula was associated with increased postpartum stress. Regression analysis revealed that mixed feeding methods were a significant predictor of higher postpartum stress. As expected, women who exclusively breastfed reported the lowest levels of stress related to childcare. These findings align with previous research, which has also shown that a mix of feeding methods is associated with higher stress levels in mothers (24,37). Future research should explore the specific reasons why mothers choose different feeding methods and investigate whether these reasons contribute to this association.

In this study, perceived social support was examined both as a predictor of postpartum-specific stress and as a moderator in the relationship between birth satisfaction and postpartum stress. The results indicated that lower partner support was associated both with higher general and postpartum-specific stress, low family support was associated with high general stress only, while friends' support was not associated with either stress type when other variables were considered. However, social support did not significantly moderate the relationship between birth satisfaction and postpartum stress. Previous research has highlighted the importance of family and friend support in adapting to parenthood through instrumental assistance and simple words of encouragement and socialisation experiences (14,38,39). Higher perceived partner support predicts lower levels of postpartum stress, consistent with previous research (16,26,40).

When interpreting the results, several limitations must be considered. The cross-sectional design limits causal inferences, and factors affecting stress during pregnancy or changes in stressors postpartum were not addressed. Future research should employ longitudinal designs covering pregnancy through the first year postpartum to better understand these effects. The sample consisted of women from one maternity ward who were predominantly highly educated with average or above-average incomes, making the sample homogeneous and not generalisable to lower-educated or lower-income women. Additionally, all participants were either married or cohabiting, limiting generalizability to single mothers, who may have less support (41). Future studies should explore which specific forms of social support are most effective in reducing postpartum stress. Additionally, this study did not examine how mothers perceive the social support received from healthcare professionals, which could be a valuable area for future research, given it had a significant role in other postpartum mental health experiences, such as fear of childbirth (42).

Conclusion

The results indicate that 17.6% of mothers report elevated levels of stress. Somewhat different patterns of associations were established for general and postpartum-specific stress. It reveals that general stress measures may not capture the unique challenges postpartum, underscoring the need for targeted research on postpartum stress as a distinct issue, where a recently developed postpartum stress scale (4) can be utilised. Summarising, maternal stress can be explained by younger maternal age and education level, lower gestational age at birth, C-section, non-exclusive breastfeeding, and lower childbirth satisfaction. Although partner and family support were associated with stress, they did not significantly moderate the relationship between childbirth satisfaction and general or specific postpartum stress. Effective interventions should focus on specific postpartum stress and include psychosocial support with adaptive coping strategies.

Declarations

Aknowledgements

This study was part of Lucija Kolić`s Master of Psychology thesis, which was originally written and defended in Croatian.

Authors' contributions

LK and SNR conceptualised the study, SNR collected the data, LK made the analyses, LK drafted the manuscript and SNR supervised. All authors approved the final version.

Ethics

The study protocol was approved by the Ethics Committees of the Catholic University of Croatia (Class: 641-03/21-03/21; No: 498-16/2-22-04) and the University Hospital "Sveti Duh" (No: 012-1539).

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Competing interests

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Data sharing statement

Data is available from the authors upon reasonable request.

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Clinical Implications of Associations between Genetic Mechanisms and Oral Isotretinoin Therapy: A Review of Literature

Luka Bulić[1], Eva Brenner[1], Nives Pustišek[2,3], Suzana Ožanić Bulić[2,3]

[1] School of Medicine
University of Zagreb
Zagreb, Croatia

[2] Department of Pediatric Dermatology
Children's Hospital Zagreb
Zagreb, Croatia

[3] School of Medicine
Catholic University of Croatia
Zagreb, Croatia

Luka Bulić
luka.bulic0302@gmail.com
ORCID: 0000-0001-6522-891X

Eva Brenner
eva.brenner13@gmail.com
ORCID: 0000-0002-6638-2967

Nives Pustišek
nives.pustisek@kdb.hr
ORCID: 0000-0002-2401-9238

Suzana Ožanić Bulić
suzanaozanic@hotmail.com
ORCID: 0000-0002-1871-826X

Corresponding author:
Suzana Ožanić Bulić
Department of Pediatric Dermatology
Children's Hospital Zagreb
Ul. Vjekoslava Klaića 16
Zagreb, Croatia
suzanaozanic@hotmail.com

Abstract

Isotretinoin (13-cis-retinoic acid) is a vitamin A derivative most commonly used for the treatment of acne vulgaris. While its therapeutic effectiveness in this skin condition has been demonstrated by numerous studies, oral isotretinoin therapy impacts many other organ systems by interacting with complex genetic mechanisms. Epigenetic modifications make up a large portion of these interactions and they entail induction or suppression of specific gene expressions. While gene expression modification has been shown as important for the mechanism of action of isotretinoin, it is also deemed responsible by some for certain adverse events. Studies have postulated associations between isotretinoin and inflammatory bowel disease (IBD), autoimmune thyroiditis, and skeletal system diseases in the context of specific genetic predispositions. Isotretinoin has also been shown to negatively affect the glucose and lipid metabolic profile via these interactions. Furthermore, it can alter the therapeutic effect of other drugs by modulating the activity of their metabolizing enzymes. On the other hand, isotretinoin has shown anti-tumor activity and a positive effect in anthracycline cardiotoxicity. The other relevant component of genetic factors in isotretinoin therapy is pharmacogenetics, which entails genetic products that take part in isotretinoin metabolism. Variants in these genes alter the mechanism by which the body metabolizes isotretinoin, which can cause therapeutic ineffectiveness or toxicity depending on the variant. The aim of this review was to provide a synthesis of knowledge regarding these interactions and potentially contribute to individualized isotretinoin therapy based on certain genetic findings.

Keywords: epigenetics, isotretinoin, metabolism, pharmacogenetics

1. Introduction

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous unit caused by obstruction of hair follicles. It is estimated that this condition affects up to 9% of the world population and is generally one of the most common skin conditions. While the condition does not affect other organ systems and presents little threat to overall health, it has significant psychosocial implications and can negatively impact quality of life. Potential therapeutic options include topical treatment, such as benzoyl peroxide and topical retinoids, or systemic treatment, such as hormone-based therapy, doxycycline, and oral isotretinoin (1).

Isotretinoin, or 13-cis-retinoic acid, is a vitamin A derivative approved for the treatment of severe acne by the Food and Drug Administration in 1982. Since the beginning of its use, isotretinoin has proved great efficacy in the treatment of acne, including moderate, and severe lesions like acne conglobata (2). Many studies have investigated the effectiveness of isotretinoin therapy and concluded that it is an effective agent against acne (3). On the other hand, some meta-analyses call isotretinoin treatment effectiveness into question and suggest it still requires further investigation (4). Alongside acne vulgaris, isotretinoin has been used off-label in the treatment of many other skin conditions. These include psoriasis, pityriasis rubra pilaris, rosacea, granuloma annulare, hidradenitis suppurativa, and even neoplastic skin diseases such as non-melanoma skin cancer and cutaneous T-cell lymphoma. As expected, the effective dose varies depending on the condition being treated (5).

Over the last decade, a growing new concept in healthcare has been personalized medicine, which implies individualized treatment for each patient based on their biomolecular profile. Biomolecular profiling is closely related to MULTI-OMICS analysis, which entails genomics, transcriptomics, proteomics, metabolomics, glycomics, etc. Regarding genomic medicine, an essential tool, widely used today in both research and clinical medicine, is whole genome sequencing (WGS) (6). Using WGS technology, an unimaginably wide range of genetic variants can be discovered, leaving the crux of the issue in their interpretation. Pharmacogenomics is a specialized branch of genomic medicine that focuses on how genetic variants in specific genes can affect the relationship between a drug, or more specifically, its dose, and its therapeutic effect. The goal of this research is to facilitate the creation of personalized therapeutic guidelines for each drug, dependent on the patient's genetic profile (7).

The relationship between systemic isotretinoin therapy and genetics has been established in the literature. On the one hand, isotretinoin impacts existing genetic mechanisms through epigenetic modifications. On the other hand, certain genetic variants in genes involved in isotretinoin metabolism impact its therapeutic effect (Figure 1).

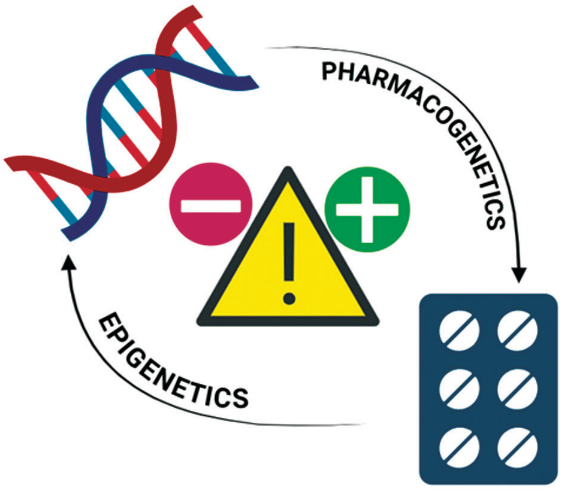

Figure 1. *Graphical representation of the relationship between isotretinoin and genetics (created with Biorender.com)*

The aim of this review is to provide a synthesis of knowledge produced by studies which investigated these relationships. These findings should be highlighted as they are crucial for the development of personalized guidelines for isotretinoin therapy administration.

2. Epigenetic modifications related to systemic isotretinoin therapy

The impact of systemic isotretinoin therapy on epigenetic mechanisms has been thoroughly researched. Many such examples have been discovered and published, pertaining to multiple genes and organ systems. While these mechanisms do account for certain adverse events, positive modifications have also been discovered, pointing to other possible uses for this medication.

2.1. Expression modulation associated with mechanism of action

Zhang et al. investigated the effect of systemic isotretinoin therapy on the meibomian gland secretory function in a rat model (8). After a significant period of systemic therapy administration, the authors measured the expression levels of several genes and associated products, including *PPARγ, FoxO1, FoxO3, IL-6,* and others. Upregulation of expression of inflammatory genes was not detected but a significant suppression of the PPARγ pathway was noted. This was associated with meibomian gland dysfunction as a result of differentiation abnormalities caused by the PPARγ alterations. The study by Nelson et al. investigated gene expressions altered by isotretinoin in a large number of genes and genetic loci (9). Findings after a certain period of treatment found that expressions of nearly 200 genes had been increased and that expressions of nearly 600 genes had been decreased. The domains of increased expression included genes such as collagen and fibronectin, while domains of decreased expression included steroid metabolism enzymes, as well as genes related to other metabolic pathways. The effect of isotretinoin on sebaceous glands was confirmed, as treatment caused functional impairment within 2 weeks and anatomical reduction of the glands within 8 weeks. The authors concluded this was a result of cell cycle arrest and apoptosis induction caused by specific epigenetic modifications.

2.2. Expression modulation associated with specific organ-system adverse effects

Migdad et al. investigated the associations between systemic isotretinoin therapy and inflammatory bowel disease (IBD) (10). While findings showed that there is no general significant association between isotretinoin and IBD, a possible risk of ulcerative colitis development was noted in patients who were highly susceptible to the disease. One interesting theory behind this, which was presented in the article, was an increased expression of *a4β7* and *CCR9* genes in T-cells activated by isotretinoin, which greatly impacts the inflammatory response in the gastrointestinal system. Becker et al. also investigated the association between IBD and isotretinoin (11). Findings showed induced IL-10 signaling in Treg cells and naïve T-cells, with reduced proliferation of T-cells. A case report by Nugroho and Schweiger presents systemic isotretinoin therapy as a potential trigger for autoimmune thyroiditis in patients with genetic predispositions (12). The explanation the authors present entails alteration of TSH expression through dimerization of the RXR nuclear receptor with RAR and thyroid nuclear receptors. A report published by Lamb et al. postulates the association between KRT10 variants, systemic isotretinoin therapy, and adverse events related to the musculoskeletal system such as skeletal hyperostosis and avascular hip necrosis (13).

2.3. Expression modulation associated with altered metabolic profile

Sedova et al. published a study in which the effect of systemic isotretinoin on the metabolic profile of the insulin resistance rat model was investigated (14). Increased expressions of the *ApoC-III* and *Hnf-4* genes were detected in isotretinoin-treated rats. Regarding the metabolic profile, increased peripheral insulin resistance and glycerol concentrations were detected. Interactions of isotretinoin with pharmacogenetic mechanisms of other drugs have also been noted. Another study, published by Khabour et al., investigated lipid profile changes with specific leptin (*LEP*) gene variants in patients on systemic isotretinoin therapy (15). Significant changes in lipid profile included an increase in LDL cholesterol, total cholesterol, and triglycerides, and a reduction in HDL cholesterol. Additionally, liver enzymes AST and ALT were significantly increased. The aforementioned changes in metabolic profile were associated with the *LEP* rs7799039 polymorphism. Similarly, associations between isotretinoin and adiponectin (*ADIPOQ*) variants and their effect on the metabolic profile have also been investigated. Garba et al. found a significant impact of the *ADIPOQ* rs1501299 polymorphism on HDL cholesterol levels in patients on systemic isotretinoin treatment (16).

2.4. Expression modulation of genes involved in drug metabolism

A study by Zhao et al. investigated the effect of isotretinoin on the activity of different genes involved in drug metabolism (17). Findings showed suppression of *CYP2D6* activity and induction of *CYP3A* and *UGT2B* activity. Interference with *CYP2D6* activity can cause adverse events in patients using psychotropic drugs, such as amitriptyline or desipramine, and cardiac-related drugs, such as metoprolol, flecainide, or propafenone (18). Similarly, *CYP3A* modifications can cause undesirable interactions with immunomodulators, macrolide antibiotics, calcium channel blockers, antiepileptic drugs, benzodiazepines, and others (19).

2.5. Expression modulation with a positive impact on other diseases

A study by Agamia et al. investigated correlations between systemic isotretinoin and *p53* expression (20). After six weeks of therapy, the expression of *p53* was found to be significantly increased. By modulating *p53* expression, isotretinoin indirectly affects several other transcription mechanisms, such as *FoxO1*, the androgen receptor gene, and genes critical for apoptosis and autophagy. These epigenetic modifications are in line with morphological and functional changes noted in sebaceous glands. It has also been shown that isotretinoin negatively affects *c-MYC* promoters in hepatocytes, leading to the suppression of the gene (21). This presents a potential use of isotretinoin for oncogene expression modulation in hepatocellular carcinoma. A similar anti-tumor effect was found in human neuroblastoma cells in a study published by Sonawane et al. (22). Isotretinoin and its metabolite 4-oxo-13-cis-retinoic acid were shown to reduce the expression of the *MYCN* gene and increase the expression of *RARβ*. *MYCN* is a proto-oncogene that plays a key role in the genetic pathogenesis of neuroblastoma and is one of the potential targets in trials for individualized cancer therapy (23, 24). Additionally, isotretinoin has been shown to affect the expression of topoisomerase IIβ in medulloblastoma cells, an enzyme that has a crucial role in neuronal differentiation (25). An article by Ma et al. discusses the potential of systemic isotretinoin use in anthracycline-induced cardiotoxicity (26). The underlying mechanism is the regulation of tight junction protein ZO-1 expression via activation of the retinoic receptor RXRA, which stimulates the repair of damaged endothelium.

3. Pharmacogenetic factors related to systemic isotretinoin therapy

Genetic polymorphisms in certain genes can affect how the body metabolizes orally administered isotretinoin. These metabolic alterations can lead to deviations from the expected dose-effect relationship. On the one hand, fast metabolizers might experience therapeutic ineffectiveness, as a higher dose of the drug might be necessary to reach the same effect. On the other hand, slow metabolizers may experience toxic side effects, due to increased amounts of the drug in the bloodstream than expected. Alongside enzyme genes, transporter and receptor gene polymorphisms can also negatively impact therapeutic effectiveness (7). Studies have investigated which genes take part in isotretinoin metabolism and might contribute to unwanted effects.

The advantages of pharmacogenetic polymorphism testing in the case of systemic isotretinoin therapy are highlighted in the article published by Veal et al. (27). Alzoubi et al. studied how three polymorphisms (rs9303285, rs2715554, and rs4890109) in the retinoic acid receptor alpha (*RARA*) gene affect therapeutic effectiveness (28). Side effects such as headaches, epistaxis, myalgia, and arthralgia were associated with CTG and TTG three-locus haplotypes. Headaches and epistaxis were also associated with the TCG three-locus haplotype, while arthralgia and myalgia were associated with the TTT three-locus haplotype. Additionally, increased AST levels were associated with the rs2715554 TC genotype, while the rs9303285 T allele had a protective effect regarding depression. An article published by Ross and Zolfaghari discusses the genes and enzymes involved in retinoic acid metabolism (29). The *CYP26* family is highlighted, including *CYP26A1*, *CYP26B1*, and *CYP26C1*. Alongside its essential role in embryonic development, the article points out the importance of *CYP26A1* in retinoic acid clearance and proposes that limiting *CYP26* activity might be a viable way to extend retinoic acid half-life. However, a study by Wang et al., which investigated how *CYP26* activity affects isotretinoin therapeutic effectiveness (30), showed that the impact was not significant. Gota et al. also investigated this matter, taking into account polymorphisms of *UGT2B7*, *CYP3A5*, *CYP3A7*, and *CYP2C8* (31). The authors also found no effect of the tested polymorphisms on isotretinoin pharmacokinetics. The aforementioned study by Sonawane et al. found that *CYP3A4* plays a major role in isotretinoin metabolism, more accurately its catalysis to 4-oxo-13-cis-retinoic acid (22). With the previously mentioned inducing effect that isotretinoin has on the *CYP3A* family, this suggests a two-sided impact between the two factors (17).

4. Conclusion

The scientific evidence provided in this review demonstrates a strong association between various genetic factors and orally administered isotretinoin. Findings suggest that genetic testing might be beneficial prior to oral isotretinoin therapy initiation. A panel of selected genes, which are proven to interact with this drug, would potentially discover any risk-associated variants and aid in avoiding adverse events by dose modulation or alternative therapy selection. On the other hand, the study of genetic associations has led to other potential indications for this drug, an excellent example of which is its anti-tumor activity. However, before these various findings are implemented into clinical practice in the form of individualized guidelines or other, further research is needed and a consensus must be made among the experts.

Declarations

Authors' contributions

All the authors have contributed equally to this work and have read and approved the final version of the manuscript.

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Sudden Intrauterine Fetal Death Caused by Midgut Volvulus at Term: A Case Report

Dino Pavoković[1], Tvrtko Tupek[2], Anis Cerovac[3,4], Dubravko Habek[5], Mislav Mikuš[6], Vedrana Petrovečki[7]

[1]Department of Gynecology and Obstetrics, General Hospital Virovitica, Croatia

[2]Department of Gynecology and Obstetrics, Sveti Duh, University Hospital Zagreb, Croatia

[3]Department of Gynecology and Obstetrics, General Hospital Tešanj Bosnia and Herzegovina

[4]Department of Anatomy, School of Medicine, University of Tuzla Tuzla, Bosnia and Herzegovina

[5]Department of Gynecology and Obstetrics, Merkur University Hospital

[6]Department of Gynecology and Obstetrics University Hospital Centre Zagreb., Croatia

[7]Department of Forensic Medicine and Criminology, School of Medicine University of Zagreb, Zagreb, Croatia

Dino Pavoković
e-mail: dino.pavokovic@gmail.com
ORCID: 0000-0002-6140-4557

Tvrtko Tupek
e-mail: tvrtko.tupek@gmail.com
ORCID: 0000-0003-4052-4178

Anis Cerovac
e-mail: cerovac.anis@gmail.com
ORCID: 0000-0002-7209-382X

Dubravko Habek
e-mail: dhabek@unicath.hr
ORCID: 0000-0002-7675-7064

Mislav Mikuš
e-mail: m.mikus19@mail.com
ORCID: 0000-0002-1365-8704

Vedrana Petrovečki
e-mail: vedrana.petrovecki@mef.hr
ORCID: 0000-0001-5385-5561

Corresponding author:
Prof. Dubravko Habek, MD, MSc, PhD

Department of Gynecology and
Obstetrics, Merkur University
Hospital, School of Medicine
Catholic University of Croatia
Ilica 244, Zagreb, Croatia

dhabek@unicath.hr

Abstract

Background: Fetal midgut volvulus is a serious finding with a high risk of life-threatening fetal complications.

Aim: To describe a sudden intrauterine fetal death caused by midgut volvulus at term.

Methods: This is a case report of a 28-year-old G2P0 patient with no significant medical history. At 34 weeks of gestation, an ultrasound revealed a cystic formation in the right upper abdominal quadrant of the fetus. In the 38th week, abrupt fetal intestinal dilatation and the absence of bowel peristalsis in what had been a normally developing fetus prompted the decision to induce labor and perform an emergency caesarean section due to terminal bradycardia. Neonatal resuscitation was attempted but unsuccessful (Apgar score 0/0/0 at 1, 5, and 15 minutes).

Conclusion: In this case, the true diagnosis of a fetal midgut volvulus and the cause of fetal death were confirmed by autopsy and a pathologist's finding.

Keywords: midgut volvulus, prenatal diagnosis, stillbirth, autopsy

Introduction

Fetal midgut volvulus (FMV) is a life-threatening condition that arises from intestinal malrotation. The frequency of associated neonatal small bowel complications, such as atresia and obstruction, has been reported to be 1 per 1,500-3,000, with the occurrence of malrotation estimated to be approximately 1 per 6,000 live births (1). This condition refers to a group of intestinal malrotation and fixation abnormalities resulting from intestinal nonrotation, incomplete rotation and impaired intestinal development in the first trimester (2). Midgut volvulus is a disorder in which the small bowel and colon twist around the superior mesenteric artery. In higher grades of bowel obstruction, there can be vascular compromise of the bowel itself, which might lead to infarction and even perforation (3–5). In the literature, two types of volvulus presenting antenatally are well described: the classic and segmental types. The classic type is defined as malrotation of the bowel due to clockwise rotation of the midgut (small bowel and ascending colon) around the superior mesenteric artery without any abnormality predisposing to rotation. Segmental volvulus is twisting of the bowel loops due to an intestinal abnormality, such as mesenteric defects (our case), intestinal atresia, meconium ileus, duplication cysts or congenital diaphragmatic hernia (6).

We present a case report about an autopsy and pathohistologically confirmed ischemic midgut volvulus which led to sudden term intrauterine fetal death.

Case report

The mother was a 28-year-old G2P0, without any significant medical history. She was referred to our tertiary perinatal center at 34 weeks of gestation for clinical evaluation and management of a small cystic formation in the right upper abdominal quadrant of the fetus that was noted on ultrasound. On our initial ultrasound, we verified a male fetus with normal biometry measurements and normal biophysical profile (BPP) using Doppler sonography. An anechogenic cyst was positioned under the liver near the right kidney, 31x10 mm in size. Due to the presence of a dilated common bile duct and the absence of hepatomegaly with visible bowel peristalsis, a hydrops of the gallbladder was suspected. The other fetal morphology was normal. Serial ultrasound examinations revealed stable cyst dimensions with normal BPPs. Upon reaching 37 weeks, the mother was admitted to our hospital for fetal surveillance and delivery planning. Despite reassuring daily nonstress cardiotocography (CTG) tests and total BPPs, the cyst continued to enlarge with an associated dilatation of the intestines. On hospital day 7, in the 38th week of pregnancy, the perinatal team decided to proceed with an induction of labor due to ultrasound pictures of increase in bowel dilatation and the absence of bowel peristalsis (Figure 1). Approximately 30 minutes after the decision was made to proceed with labor induction, CTG scan showed fetal terminal bradycardia, which was confirmed with ultrasound. An emergent cesarean section was performed and a eutrophic, hypotonic male neonate weighing 2650 grams was delivered. An unsuccessful neonatal resuscitation was performed (Apgar score 0/0/0 at 1/5/15 minutes).

Figure 1. *Ultrasound findings of dilated small bowel*

On fetal autopsy examination, no abnormalities of the liver or gallbladder were noted. In the lower part of the neonatal abdomen, dilated loops of the proximal and middle parts of the small intestine were found with a necrotic, dilated third part of the small intestine. The necrotic loops were dark red and firmly adherent to the adjacent bowel with 210 ml of hemorrhagic fluid. The root of the associated mesentery was partially twisted around the superior mesenteric artery. Segmental overgrowth of the twisted mesentery was noticed and assumed to be the reason for the incident. Upon further inspection of the bowel with dissection in the caudal direction, it was noted that one loop of the distal small bowel was completely twisted around the mesenteric root, leading to complete obstruction of the intestinal lumen (Figure 2).

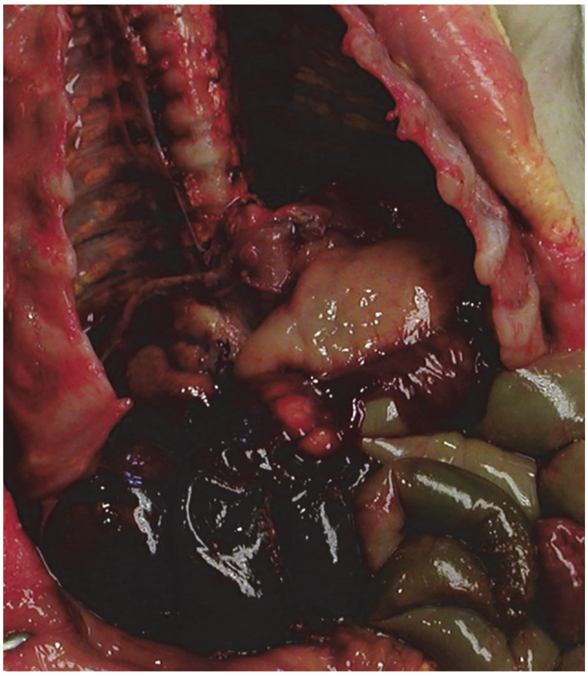

Figure 2. *Pathological examination*

Pathohistological examination of that segment revealed total transmural hemorrhagic necrosis without perforation, with the absence of the mucosal layer and infiltration of neutrophils in the subserous, edematous connective tissue. There was no other focal lesion found that might explain the volvulus. The pathologist gave the diagnosis of FMV with bowel necrosis. The reason for the intrauterine fetal death was assumed to be acute fetal inflammatory biohumoral response with cardiotoxicity and terminal bradycardia to a large segment of bowel necrosis.

Discussion

Fetal intestinal volvulus is a condition in which a delay in diagnosis and surgical intervention leads to high morbidity and mortality. When exhibiting *in utero*, it usually presents with ischemic necrosis of the bowel due to vascular compromise (7, 8).

Volvulus could be suspected during routine ultrasound examination or when non-specific fetal distress symptoms appear. The most frequent symptom is a decrease in fetal movements, which usually accompanies a non-reassuring CTG trace. In the literature, there are many prenatal ultrasound findings that are more or less specific for the diagnosis of volvulus: polyhydramnios, hyperechogenic and dilated loop of the bowel, fetal ascites, peritoneal calcifications as an indirect sign of meconial peritonitis and, finally, as the most specific and pathognomonic, “coffee bean” and “whirlpool” signs (9–11). Doppler studies can demonstrate elevated peak systolic velocity in the middle cerebral artery due to severe fetal anemia, secondary to hemorrhagic ascites (12).

Intestinal atresia and malrotation are almost always the causes of fetal intestinal volvulus (9). In a few case reports, the underlying mechanism of volvulus was a mesenteric developmental abnormality (13). In our autopsy report, we concluded that overgrowth of the mesentery was the reason for the abnormal intestinal movement, which resulted in intestinal volvulus, ischemia and hemorrhagic necrosis. The main cause of volvulus in our case was found to be a mesenteric defect and, thus, the final diagnosis was type 2 volvulus. It is important to emphasize the possibility that bowel perforation and subsequent meconial peritonitis may have led to even more rapid fetal deterioration. In the literature, a few case reports describe intrauterine fetal death due to intestinal volvulus but without intestinal perforation (4,5).

We believe that a combination of pathophysiologic factors contributed to intrauterine fetal demise. Due to arterial obstruction with ischemia and the resulting proinflammatory cytokinemia and hypovolemia, the fetus in our case experienced excessive activity of the parasympathetic nervous system (14, 15), although pathognomonic signs were absent. Prior to the indicated induction of labor, progressive and rapid bowel dilatation suggested the development of intestinal pathology with toxemia. A fetal intestinal volvulus was suspected and definitively diagnosed postnatally at autopsy.

We should always keep in mind that abrupt fetal intestinal dilatation in a previously normally developing fetus with mechanical ileus and decreased fetal movements may indicate intestinal volvulus. With advances in ultrasound technology and its widespread use in the third trimester, the diagnosis of volvulus can be made prenatally.

Conclusion

Without prompt obstetrical intervention, this diagnosis often results in a poor fetal outcome. A multidisciplinary team of obstetricians, neonatologists, anesthesiologists and pediatric surgeons should coordinate a plan that optimizes perinatal outcomes in the setting of fetal intestinal obstruction. However, in this particular case, the true diagnosis and cause of fetal death were confirmed by autopsy and a pathologist's findings.

Declarations

Authors' contributions

DP, TT and DH designed the study, participated in patient treatment and critically reviewed the manuscript, AC and MM designed the study, wrote the main manuscript and critically reviewed the manuscript. VP performed the autopsy and critically reviewed the manuscript.

All authors approved the final version of the manuscript, meet the authorship criteria, and hold rights to the intellectual content.

Ethics consideration

This case report has been approved by the Ethics Committee of the Clinical Hospital Sveti Duh, Decision No. 01-03-2089/4, dated May 12, 2022.

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Competing interests

The authors have nothing to disclose and no conflict of interest to declare.

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Health Behaviors, Health Cognition and Sources of Health Information Among Nursing Students: A Cross-Sectional Study

Petra Bekavac[1], Helena Koren[1], Marina Milakovic[1], Marija Bubaš[2]

[1]Croatian Institute of Public Health
Zagreb, Croatia

[2]Ministry of Health of the Republic of Croatia, Zagreb, Croatia

Petra Bekavac
petra.bekavac@hzjz.hr
ORCID: 0009-0003-6633-4556

Helena Koren
helena.koren@hzjz.hr
ORCID: 0009-0002-2541-5256

Marina Milaković
marina.milakovic@hzjz.hr
ORCID: 0009-0009-8267-6525

Marija Bubaš
marija.bubas@miz.hr
ORCID: 0000-0003-2120-2974

Corresponding author:
Petra Bekavac
Radoslava Cimermana 64a
Zagreb, Croatia
petra.bekavac@hzjz.hr

Abstract

Background: Nursing students are knowledgeable about health promoting behavior and should be role models for patients, although it is not unusual for them to lead unhealthy lifestyles.

Aim: This study aimed to examine health behaviors, associated cognitive factors and sources of health information among nursing students.

Methods: In total, 51 undergraduate nursing students from a university in Croatia answered a self-reported questionnaire related to health behaviors, health cognition factors and sources of health information. The statistical software package SPSS was used for statistical analysis, and descriptive statistics and correlations were analyzed.

Results: The results show that the nursing students demonstrated a moderate level of health-promoting behaviors. In general, the nursing students had a high level of health consciousness, very strong health-oriented beliefs and were generally willing to seek health information. More than 90% of them believed that social networks have a strong or very strong influence on health and confidence in the healthcare system. However, they did not perceive social networks as reliable sources of health information. As for national and international sources of health information, the Croatian Institute of Public Health is the most frequently used.

Conclusion: While the nursing students demonstrated high levels of health consciousness and information orientation, it is necessary to implement interventions that aim at empowering students to adopt healthy behaviors and cultivate personal health habits.

Keywords: health behavior, health promotion, health information, nursing students

Introduction

Health promotion is essential to improve people's well-being and mitigate the prevalence of non-communicable diseases (NCDs), which continue to pose significant global health challenges. NCDs, such as heart disease, diabetes, stroke and cancer are closely linked to lifestyle behaviors such as poor diet, tobacco use, excessive alcohol consumption and physical inactivity. Fortunately, many NCDs can be prevented by adopting health-promoting lifestyles and empowering people to take responsibility for their health (1). Among healthcare professionals, nursing professionals play a crucial role in the promotion of health and healthy lifestyles while delivering interventions to their clients. As such, nursing students should establish credibility to educate individuals effectively about healthy habits and serve as role models for patients. However, it has been observed that both nurses and nursing students, despite their health knowledge, have unhealthy lifestyles, including poor diet, low physical activity, and alcohol and tobacco consumption (2–7). Therefore, nursing students should adopt healthy behaviors during their education, if not earlier, which could provide the basis for maintaining health-promoting behaviors once they become nurses.

Health behavior is related to various factors, such as health consciousness, health information orientation and health-oriented beliefs. For example, if an individual believes that a medicine should not be taken until the prescribed amount is used up, but should be stopped when the symptoms disappear, they will not take it, despite the doctor's instructions. Health consciousness is the degree to which an individual cares about his health (8). The more health-conscious individuals are, the more likely they are to have healthy habits (9), which is the basis for taking preventive measures. Self-awareness of one's health and a willingness to participate in activities that promote wellness and health are indicators of health consciousness (10). It should come as no surprise that people who care about their health actively seek information on how to become healthier and follow through (11,12). A high degree of health information orientation indicates a willingness to seek out information about health-related issues and educate oneself about them. Health information orientation could be defined as the degree to which a person is willing to seek health-related information.

Additionally, the specific thoughts that people have about healthy behaviors, such as exercising and eating a balanced diet, are referred to as health beliefs. Since a person's willingness to change their health behaviors primarily comes from their health perceptions, it is important to examine health beliefs.

In addition, a variety of digital communication platforms, collectively referred to as social networks, facilitate the creation and exchange of ideas and information on both peer-to-peer and broader scales. Research findings can be disseminated to a wide audience through social networks. Healthcare professionals can also use social networks to educate the public about a range of healthcare topics, which helps to improve health literacy (13).

However, issues have been raised about the spread of misleading information and the lack of oversight mechanisms to guarantee the veracity of the content shared on these platforms, which makes people increasingly skeptical of the information they encounter on social networks.

Therefore, the primary objective of this study was to investigate the health behaviors, associated cognitive factors and health information sources among undergraduate nursing students.

Materials and Methods

Study design

This was a cross-sectional study.

Ethics

The study protocol did not undergo an ethics review, as it relied on anonymous data without any identifying information, thereby minimizing the risk of participant identification. Additionally, no sensitive information was collected, and respondents experienced no greater stress or discomfort while completing the questionnaire than they would in everyday situations.

Participants

The participants were second-year undergraduate nursing students enrolled in the professional Bachelor of Nursing program at the University of the North in Croatia. They responded to questions concerning health behaviors, health cognition, and sources of health information.

Measures

Health behaviors. The scale used to assess health behaviors consisted of 20 items and five subscales, of which three subscales reflect health-promoting behaviors: Diet (5 items), Preventive Self-Care (7 items), and Medical Compliance (2 items), while two subscales reflected health risk behavior: Anger and Stress (3 items) and Substance Use (3 items). Participants were asked to rate how much each given item applied to them on a scale from 1 (always) to 7 (never). The health-promoting items are reverse-scored, so a higher score represents better health behavior. Cronbach's alpha for the subscales ranged from 0.60 to 0.87.

Health consciousness. Five items were used to measure health consciousness: ("Eating right, exercising, and taking preventive measures will keep me healthy for life," "I do everything I can to stay healthy.") Responses were measured on a 1 to 5 scale, with 1 representing "strongly disagree" and 5 representing "strongly agree." Cronbach's alpha for this scale was 0.85.

Health information orientation. Eight items measured health information orientation (e.g., "I really enjoy learning about health issues," "When I take medicine, I try to get as much information as possible about its benefits and side effects"). Responses were measured on a 1 to 5 scale, with 1 representing "strongly disagree" and 5 representing "strongly agree." Cronbach's alpha for this scale was 0.84.

Health-oriented beliefs. Participants were asked to rate how important they think certain behaviors are to their overall health, on a scale from 1 (not important at all) to 5 (very important). Items included "eating a diet that is low in fat," "eating lots of fruits, vegetables and grains," "drinking plenty of water every day," "taking vitamins and mineral supplements regularly," "exercising regularly," "not smoking cigarettes," "not drinking alcohol or drinking in moderation" and "maintaining a healthy body weight." Cronbach's alpha for this scale was 0.63.

Sources of health information. Two items were used to measure attitude toward social networks: "To what extent do you think social networks affect health?" and "To what extent do you think social networks affect trust in the healthcare system?" Responses were measured on a 1 to 5 scale, with 1 representing "not at all" and 5 representing "extremely strong." Furthermore, the perceived reliability of social networks for providing health information (Facebook, Instagram, TikTok, LinkedIn, Twitter(X) and YouTube) was measured on a 1 to 5 scale, with 1 representing "completely unreliable" and 5 representing "completely reliable." The extent of the use of certain sources of health information (Medscape, World Health Organization [WHO], Center for Disease Control [CDC)], European Center for Disease Control [ECDC], Croatian Institute of Public Health [CIPH], Mayo Clinic) was measured on a 1 to 5 scale, with 1 representing "not at all" and 5 representing "always."

Data were analyzed using SPSS Statistics for Windows, version 22.0. Descriptive analysis was used for demographic and health-related variables. A correlation analysis was performed to determine the relationship among health behaviors, health consciousness, health information orientation and health-orientated beliefs.

Results

In total, 51 students participated in the study, of whom 45 were women (88%) and 6 were men (12%). The average age of the participants was 22.69 (±5.39; 19–42) years.

The results of the health behaviors are presented in Table 1. Overall, the nursing students showed a moderate level of health-promoting behaviors. Predominantly, they exhibit positive health behaviors toward medical cooperation (e.g., immediate collection of prescribed medicines from the pharmacy) and avoidance of substance use (e.g., use of tobacco products, alcohol or drugs). However, they exhibit the least positive health behaviors toward a healthy diet and the regulation of anger and stress, while moderately engaging in preventive self-care.

Table 1. *Results on the Health behaviors scale (N=51)*

Health behaviors	M	SD
Diet	3.96	1.12
Preventive self-care	4.87	1.08
Regulation of anger and stress	4.07	1.37
Medical compliance	6.28	1.37
Avoidance of substance use	5.84	1.53

Table 2. *Results on the Health cognition scale (N=51)*

Health cognition	M	SD
Health consciousness	4.02	0.76
Health information orientation	4.04	0.62
Health-orientated beliefs	4.50	0.36

The results of the health cognition scales (Table 2) indicate that the participants have a high level of health consciousness (M=4.02±0.76) and are largely willing to seek health information (M=4.04±0.62). Furthermore, the students have extremely strong health-orientated beliefs (M=4.50±0.36).

The results presented in Table 3 show that people who are health conscious are more likely to search for health-related information (r=0.523, p<0.01) and have stronger health beliefs (r=0.278, p<0.05). Health consciousness is also correlated to preventive self-care activities (r=0.381, p<0.01) as part of health behavior, but no significant correlation with other aspects of health behavior was found. The same was observed for health-orientated beliefs, ony showing a significant correlation with preventive self-care (r=0.417, p<0.01). Health information orientation is significantly correlated to healthy diet (r=0.340, p<0.05), regulation of anger and stress (r=0.295, p<0.05), as well as with preventive self-care (r=0.140, p<0.05).

Finally, the results show that more than 90% of the participants believe that social networks have a strong or very strong influence on health and trust in the healthcare system.

Table 3. *Correlations among health behaviors, health consciousness, health information orientation and health-orientated beliefs*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Diet	1							
(2) Regulation of anger and stress	0.297*	1						
(3) Preventive self-care	0.340*	-0.027	1					
(4) Medical compliance	0.012	0.069	0.471**	1				
(5) Avoidance of substance use	-0.046	0.186	0.314*	0.490**	1			
(6) Health consciousness	0.186	0.147	0.381**	0.047	0.204	1		
(7) Health information orientation	0.340*	0.295*	0.140*	-0.058	-0.074	0.523**	1	
(8) Health-orientated beliefs	0.108	-0.031	0.417**	-0.124	0.081	0.278*	0.223	1

** Correlation is significant at the 0.01 level.
* Correlation is significant at the 0.05 level

However, on average, they do not perceive social networks as a reliable source of health information. Among the listed social network platforms presented in Figure 1, they perceive TikTok as completely unreliable, while YouTube is perceived as a moderately reliable source of health information.

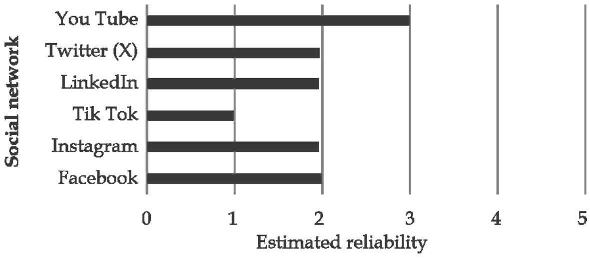

Figure 1. *Estimated reliability of social networks in providing health information (N=51)*

On the other hand, regarding the use of national and international sources of health information, Figure 2 shows that the Croatian Institute of Public Health (CIPH) is the most frequently used, while Medscape and the Mayo Clinic are the least contacted sources of health information among the nursing students.

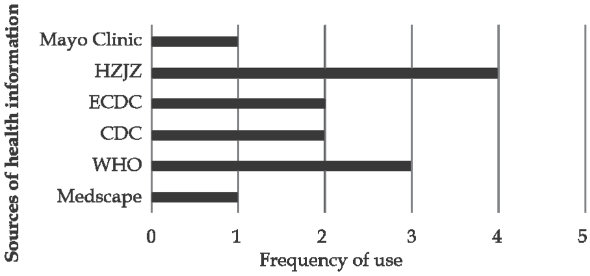

Figure 2. *Frequency of use of sources of health information (N=51)*

Discussion

This study evaluated health behaviors, health cognition and sources of health information among a group of nursing students in Croatia.

Regarding the health behaviors of the nursing students, the mean scores ranged from 3.96 (1.12) to 6.28 (1.37) out of 7 points among different aspects of health behaviors, which is higher at midpoint for most of the aspects of health behaviors. These results are similar to those of previous studies (14, 15). The lowest result was found for the aspect of a healthy diet, which can be related to the status, lifestyle and possibly lower accessibility of healthful food choices. In general, university life and lifestyle may have a negative effect on students, worsening the health behaviors of some of them (16). For example, a study among first-year nursing students in Spain and Colombia showed a high prevalence of poor diet, poor sleep and insufficient physical activity, a moderate level of alcohol consumption and low levels of smoking (7). Among Scottish students, one-quarter smoked and nearly half were overweight or obese, while 15.4% (4) reported binge drinking.

In this study, the second lowest score on health behaviors was found for the regulation of anger and stress, which could be related to a lack of coping strategies among students with various life stressors. This is an important finding that requires intervention because the nursing profession assumes high levels of work-related stress. Different studies recognize that high demands and low control in nursing practice, as well as unfavorable work schedules (e.g., work overload, shift work, long working hours), contribute to increased stress and burnout and lower levels of job satisfaction (17–19). High levels of work-related stress can lead to unhealthy habits. There is considerable evidence that prolonged stress is associated with binge eating and increased sugar, fat and salt; and that chronic stress leads to weight gain and obesity (20). Therefore, it is important to prepare nursing students for stressful work environments and improve their coping strategies to preserve their physical and mental health.

Finally, the highest health-promoting behaviors were found on the subscales of the avoidance of substance use (tobacco, alcohol and drugs) and medical compliance, indicating that nursing students are willing to follow medical instructions. There is a mixed picture of the lifestyles of undergraduate nursing students in different countries.

The results of the health cognition scales indicate that the nursing students in this study have a high level of health consciousness and are largely willing to seek health information. Furthermore, students have extremely strong beliefs, indicating that they recognize that maintaining a healthy weight, drinking plenty of water daily and eating plenty of fruits, vegetables and grains are crucial to their overall health. The study showed that students who are health conscious are more likely to search for health-related information and have stronger health beliefs. Both health consciousness and health-orientated beliefs are significantly associated with preventive self-care activities as part of health behavior, but no significant correlation with other aspects of health behavior was found. Despite the nursing students' knowledge about the importance of health behavior and healthy lifestyle, it is not always associated with health-related activities. This has also been shown in other studies, indicating that knowledge of the health-promoting behaviors among nurses and nursing students did not necessarily lead to health-promoting behaviors (21–23). Ross et al. (2017) suggested that both intrinsic (personal) and extrinsic (environmental) factors, such as age, sex, past experiences, anxiety, depression, as well as institutional support, work schedules and demands, can interfere with the health promotion behaviors of nurses (21).

Furthermore, health information orientation is significantly correlated with a healthy diet, regulation of anger and stress, and preventive self-care. Duta-Bergman (2004) showed that the search for information about a healthy lifestyle was positively associated with health consciousness, health beliefs and engaging in healthful activities (24).

People obtain health information from a variety of sources. Medical professionals, friends, family, books, newspapers, magazines, educational brochures, radio, television and pharmaceutical advertisements are among the sources from which we piece together our knowledge about health and well-being. However, more and more of us are turning to the Internet, including social networks, in search of answers, as opposed to other sources (25).

The Internet has become a popular resource for learning about health and researching one's health condition. However, people can easily become misinformed due to the large amount of inaccurate information online. Although the Internet is thought of as a single, cohesive source of content, it consists of a wide range of distinct platforms and features. It is easy to find both low-quality and high-quality health information online, and because few social network platforms distinguish between trustworthy and non-trustworthy sources of information, users are left to determine for themselves how much trust to place in a source and the quality of the information it shares. These decisions are influenced by a variety of factors, including their level of digital and health literacy, prior knowledge, personal situations and personal beliefs. The motivation to research topics related to our health conditions or symptoms is greater, but even in these cases, determining the reliability of sources and the precision of information is a very challenging task (26).

Regarding social networks as a source of health information, this study shows that more than 90% of the nursing students consider that social networks have a strong or very strong influence on health and trust in the healthcare system. However, they did not perceive social networks as a reliable source of health information, evaluating TikTok as completely unreliable, while YouTube is perceived as a moderately reliable source of health information. These findings are consistent with what we mentioned above, that social networks can improve patient care and education but can also put patients and healthcare professionals at risk. The dissemination of inaccurate information can hurt patients and damage a provider's reputation.

Regarding the use of national and international sources of health information by the nursing students, the study showed that the Croatian Institute of Public Health (CIPH) is the most widely used source for searching for health information, which is expected, as it is the leading national public health institution that provides accurate information about different aspects of health. This is in line with research from 2015, where 70% of Americans reported that they viewed the CDC, the national public health agency of the United States, favorably (27).

It is well known that young people are active users of the Internet and that social networks influence people's daily life and their health behavior. Horgan and Sweeney (2012) in their study among Irish college students found that 66.1% of the participants had used the Internet to search for health information, for a variety of reasons, including information on specific diseases, sexual health, fitness and nutrition (28). However, in a study by Skinner et al. (2003) involving young people, they reported that the quality of information online was a concern for 96% of the participants (29).

They are several practical implications of this study. Firstly, the college environment is an ideal opportunity for encouraging a healthy lifestyle. In particular, the college can introduce more healthful food options in their facilities or provide students with physical activity within the college area or student sports clubs. Secondly, the college can implement the improvement of coping strategies as a way to reduce stress and prevent using unhealthy habits as way of coping with stress.

Taking into account the frequency of the use of the Internet and social networks as a source of health information, the perceived impact of social networks on health and trust in the healthcare system, and the perceived reliability of social networks in providing health information, it is important to emphasize that there is still room for the additional training of nursing students on how to search health information and think critically in such a way that, in courses where this is possible, together with professors, they could search health information and comment on the decision-making process as to why something seems credible or not. Furthermore, given the perceived impact of social networks on health and trust in the healthcare system, as well as the use of the CIPH as a source of information, it is evident that there is confidence and an opportunity for the public healthcare system to promote health and provide accurate and reliable health information.

This study has several limitations, including the fairly small sample from a single university, which can provide an overview but not general conclusions about the measured variables. The small proportion of male participants did not permit comparisons between male and female students in the measured variables. The use of only self-reported measures of health consciousness, health information orientation, health beliefs and health behavior without any objective measure was another limitation. Future research should use direct measures of health behavior, not just self-reports. Furthermore, all the nursing study programs in Croatia should be included in order to obtain complete information that could be used to make specific and comprehensive recommendations. Finally, in further research, other variables such as personal and environmental variables, which are drivers of and barriers to the health-promoting behaviors of nursing students, should also be included.

Conclusion

As future healthcare workers, nursing students contribute significantly to both their personal health and public health. Despite their knowledge of health-promoting behaviors, high levels of health consciousness or health information orientation, and strong health beliefs, this does not always result in a healthy lifestyle. As a result, nursing education must incorporate not only the knowledge and skills needed for health promotion but also empower students to engage in health-promoting behaviors and search for accurate and reliable health information.

Declarations

Authors` contibutions

All authors have read and agreed to the published version of the manuscript. Each of the undersigned authors confirms that they have contributed significantly to the work in the following ways:

PB, HK, MB: concept and study design; MB: data collection; PB, HK: data analysis and interpretation; PB, HK, MM: writing first draft of the manuscript. PB, HK, MM, MB: revising the manuscript for critical intellectual content. All authors approved the final version of the manuscript.

Ethics

The authors confirm that the research was conducted in accordance with ethical guidelines and principles.

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Conflict of interests

The authors have no conflict of interest related to this work.

Data sharing statement

The authors confirm that the data can be obtained by contacting the corresponding author.

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Quality of Life and Well-Being in Elderly Individuals Receiving In-Home Healthcare Support: A Cross- Sectional Study

Ina Stašević[1], Neda Dušak[2], Dinko Puntarić[1]

[1]Catholic University of Croatia
University Department of Nursing

[2]Virovitica-Podravina County Health Center, Outpost Slatina

Ina Stašević
ina.stasevic@unicath.hr
ORCID: 0000-0002-7868-8365

Neda Dušak
dusakneda53@gmail.com
ORCID: 0009-0009-8949-381X

Dinko Puntarić
dinko.puntaric@unicath.hr
ORCID: 0000-0001-9776-5533

Corresponding author:
Assist. Prof. Ina Stašević, MSc, PhD
Catholic University of Croatia
Department of Nursing
Ilica 244, 10000 Zagreb
ina.stasevic@unicath.hr

Abstract

Background: The basic problems faced by the elderly are: poor financial condition, loneliness, insufficient health care, lack of social contacts, lack of activities and low general life satisfaction.

Aim: The aim of this study was to examine the quality of life of elderly people, with regard to the support of health professionals in their homes.

Methods: This cross-sectional study was conducted on elderly individuals residing in the city of Slatina. Participants were divided into two groups: one receiving in-home support from healthcare professionals and the other not receiving such support. A standardized questionnaire was used, including general sociodemographic data and three adapted scales to assess quality of life.

Results: A total of 100 elderly individuals participated in the study, with half receiving in-home support from healthcare professionals and the other half not receiving such support. Participants receiving in-home support from health professionals have a significantly poorer health status, indicating greater health needs ($p<0.001$). They also show a greater need for social interaction ($p=0.007$) and rate their current situation as very difficult and sad ($p=0.01$). No significant differences were found in feelings of loneliness ($p=0.85$) or in overall quality of life assessment ($p=0.053$). However, reduced loneliness is associated with greater life satisfaction for all participants ($p<0.001$), especially for those receiving in-in-home support from healthcare professionals ($p<0.001$).

Conclusion: Participants receiving in-home support from healthcare workers tend to rate their health as poorer and perceive their health needs as greater, alongside a more pronounced sense of loneliness. Although there is a significant association between loneliness and quality of life, this relationship was not statistically confirmed among the participants. Loneliness is increasingly becoming a concern among the elderly, highlighting the need for focused social efforts to address this issue.

Keywords: elderly, quality of life, home care

Introduction

The basic problems faced by the elderly are usually poor financial condition, loneliness, insufficient health care, lack of social contacts, reduced activities and low general life satisfaction. An important role in solving their problems is played by health workers who provide them with institutional and non-institutional care (1). These issues are increasingly prevalent within our population, highlighting the need for the healthcare system to adapt to the evolving needs of its beneficiaries (2).

Research among older people has shown that the quality of life of people in the third age is largely determined by factors such as financial status, health, social contacts, activities and general life satisfaction. At the same time, no significant difference was found between the general socio-demographic variables (gender, age, level of education, place of residence, cohabitation, marital status, family status) and the tested quality of life indicators (3).

The majority of the elderly live alone in their homes, and due to impaired health, poor socioeconomic status and reduced quality of life, there is a need for increased social and health care (4). A greater need for health support is observed among older adults, single individuals, and those residing in homes for the elderly and infirm, while life satisfaction is higher in people living in a family (5). Aging is commonly viewed as a lifelong process, beginning at conception and encompassing a range of biological, physiological, and psychological transformations. Biological aging theories support this perspective by illustrating how the human body experiences functional changes from early development in utero, continuing throughout an individual's life until death (6).

In the aging process, there are a number of regressive changes that occur at the biological level. The risk of injuries and diseases and weakened functional abilities of the organism is increased (7). People experience aging processes differently. Therefore, the attitude towards aging is specific, whereby each person tries to achieve optimal adaptation to aging, which is of great importance in accepting old age and how to cope with it (8).

The concept of quality of life includes subjective and objective factors as well as the perception of each individual for his well-being in terms of health, a harmonious relationship with the physical environment and community, material well-being, and well-being on a psychological, physical and social level (9,10). The World Health Organization (WHO) defines quality as an individual's perception of his position in life in the context of the culture and value system in which he lives and in relation to his goals, expectations, standards and concerns (11). The quality of life is of interest to many disciplines such as theology, philosophy, sociology, psychology etc. (12-14).

Institutional care in homes for the elderly and infirm in the Republic of Croatia is unable to meet all of the needs of this population. According to the 2021 population census in the Republic of Croatia (RO), 22.5% of people are over 65 years old, which is more than 850,000 people (15). Only a part of them can be accommodated in homes for the elderly and infirm. The capacity of all homes in the Republic of Croatia (three homes owned by the Republic of Croatia, 45 homes owned by the counties/city of Zagreb, 121 private homes) is 16,712, while the demand for such accommodation is still high (7,430 elderly people are waiting for accommodation) (16). The appearance of multimorbidity decreases the quality of life of the elderly. The majority of the elderly remain in the community, so home health care can raise the level of quality of life (17). In doing so, the perspectives of biomedical and social determinants must be considered (18). More than three-quarters of the elderly population living in the community rely on help from others, such as family, friends, or neighbors. Assessing the needs of families, providing professional guidance, and equipping caregivers with the necessary skills are key to ensuring quality care for the elderly (19,20).

Many elderly individuals are increasingly choosing non-institutional care due to the greater benefits and flexibility offered by home care (21). This approach emphasizes the importance of enhancing individuals' ability to care for themselves, supported by a well-developed system that provides various forms of assistance, along with strengthened support from families and local communities (22). Such care allows elderly individuals to stay in their homes longer, maintain control over their living environment, and it offers a more humane option.

Home health services play a crucial role in this type of care. Both outpatient services and home healthcare provide essential nursing care within the community (4). By focusing on prevention and health promotion, community nurses help reduce complications associated with various illnesses and contribute to an improved quality of life for the elderly (23).

There has been limited research on how in-home support from healthcare professionals impacts the quality of life of elderly individuals. Such studies are important because the analysis and interpretation of results can help better define the needs of the elderly, highlight differences in the aging process, and encourage their integration and acceptance within their communities (24,25). This underscores the need for further research into the relationship between the quality of life of elderly people and healthcare, particularly non-institutional care provided in their homes (26).

The aim of this study was to examine how in-home healthcare support affects the quality of life of elderly individuals by assessing its impact on their physical, financial, social and emotional well-being and comparing the quality of life between those who receive such support and those who do not.

Materials and Methods

Study design

This was a cross-sectional study.

Ethics

For the purposes of this research, the approval of the Ethics Committee of the Catholic University of Croatia (Class: 602-04/21-11/24, Reg. number: 498-03-02-06/1-21-02, date: March 29th 2021) and the Ethics Committee of the Virovitica-Podravina County Health Center (Number: 2189-67/1-01-2371/2021, date: September 6th 2021) was obtained. All participants were informed about the study's purpose and objectives and provided their written consent to participate.

Participants

Participants were 100 elderly people aged 65 and over who live in their homes in the area of the city of Slatina for a period of six months in 2021. Fifty of them have in-home support from healthcare workers, while the remaining 50 do not. In addition to the mentioned characteristics (age, staying at home), the inclusion factor in the study was informed consent up to the target sample size (50 participants in each group).

Data collection and study tool

The data were collected by visiting nurses and health care nurses of the Health Center of the Virovitica-Podravina County by interview in the respondent's home. Health workers filled out the survey questionnaires after talking with participants.

A questionnaire that consisted of general sociodemographic data and three adapted standardized scales that examined the quality of life (27, 28) was administered while respecting the scientific methodological approach (29), in accordance with the research that was done in Split in 2007, using the same questionnaire (5). The questionnaire consisted of four sections addressing the following areas: the needs of the elderly, an assessment of life satisfaction, an assessment of self-perception, and a general assessment of quality of life across a time scale (past, present, and future).

Quality of life was assessed using a scale of 20 items that form four domains: the financial needs scale, the social needs scale, the activity needs scale and the health needs scale. The reliability coefficient of the entire Cronbach's alpha scale is 0.843, and of individual domains as follows: financial needs scale is 0.873, social needs scale is 0.789, activity needs scale is 0.711 and health needs scale is 0.741. Considering the obtained values of the Cronbach's alpha coefficient, it can be concluded that the questionnaire is a good tool for assessing the quality of life.

Life satisfaction was assessed with a 17-item scale with an internal reliability of Cronbach's alpha of 0.833, which confirms that the questionnaire is a good instrument for assessing life satisfaction.

Loneliness was assessed using the shorter UCLA Loneliness Scale through seven items, with an internal reliability of Cronbach's alpha of 0.780, which confirms that the scale is a good instrument for assessing participants' loneliness.

Statistical analysis

Categorical data were presented as absolute and relative frequencies. The normality of continuous variable distributions was tested using the Shapiro-Wilk test. Variables not following a normal distribution were described by the median and interquartile range (IQR), and non-parametric methods were applied for analysis. Differences in numerical variables between two independent groups were assessed with the Mann-Whitney U test (with a 95% confidence interval, CI). Spearman's correlation coefficient was used to examine the relationship between quality of life, life satisfaction, and loneliness scales across all participants, as well as within groups receiving and not receiving in-home support from healthcare professionals. Internal reliability of the scale was expressed using Cronbach's alpha coefficient.

All p-values are two-sided, with the significance level set at $\alpha=0.05$. Statistical analyses were conducted using MedCalc® Statistical Software version 20.014 and SPSS version 23.

Results

This study included 100 participants, with half receiving in-home support from healthcare professionals and the other half not. Of the participants, 64% are women, and 56% have lower vocational qualifications. Additionally, 37% of the participants do not live alone (they live with someone), 64% report being in good financial condition, and 55% rated their health as good.

Receiving in-home support from healthcare professionals was significantly more common among women, individuals aged 76 and over, those with lower vocational qualifications, individuals living with others, and those in poorer financial or health condition (Table1).

Based on self-assessment of financial needs, the majority of participants (25%) reported being financially dependent or fully reliant on others. Additionally, 16% indicated they lacked, or completely lacked, funds for basic needs, and 18% reported difficulty living due to financial constraints. In contrast, 58% stated that financial issues were not their primary concern, and an equal percentage reported not being financially dependent on others. However, 27% of participants expressed a need for additional financial assistance (Table 2).

The scale measuring the need for companionship revealed the following results: 42% of participants expressed a desire to socialize more frequently with younger individuals, and 36% reported lacking sufficient social contacts. Additionally, 34% stated that they wished to communicate more often with someone, even if only by letter or phone. A significant 71% of participants did not feel forgotten by others. Half of the participants expressed a desire for more frequent conversations, while 36% found it meaningful to discuss the purpose of life. Only 14% of participants wished to establish more friendships, whereas 43% indicated that they needed or completely needed more attention from others (Table 3).

Table 4 presents the need for activity through three items. Thirty-one percent of participants stated that they needed or strongly needed more organized recreational activities, while 74% expressed a desire to remain useful within their community. Additionally, 42% indicated a desire to continue learning and acquiring new knowledge (Table 4).

Table 1. *Participants according to characteristics*

	Number (%) of participants		Total	P*
	They have in-home support from health professionals	They have no in-home support from health professionals		
Sex				
Male	13 (26)	23 (46)	36	**0,04**
Female	37 (74)	27 (54)	64	
Age (year)				
65 – 75	24 (48)	37 (74)	61	**0,008**
76 and more	26 (52)	13 (26)	39	
Level of education				
Low	35 (70)	21 (42)	56	**0,02**
Middle	13 (26)	24 (48)	37	
High	2 (4)	5 (10)	7	
Live				
Alone	11 (22)	22 (44)	33	**0,006†**
With somebody	39 (78)	28 (56)	67	
Financial condition				
Good	24 (48)	40 (80)	64	**0,001**
Bad	26 (52)	10 (20)	36	
Health condition				
Good	20 (40)	35 (70)	55	**0,003**
Bad	30 (60)	15 (30)	45	
Total	50 (100)	50 (100)	100	

*χ^2 test, †Fisher's exact test

Table 2. *Self-assessment of financial needs*

	Number of participants			
	No	Partially	Yes	Totally yes
I lack funds for the most basic necessities of life	63	21	10	6
I live hard because of lack of money	66	16	11	7
Financial problem is the most difficult problem at my age	58	14	19	9
I am financially dependent on others	58	17	24	1
I need additional financial assistance	54	19	19	8

Table 3. *Self-assessment of the socializing needs scale*

	Number of participants			
	No	Partially	Yes	Totally yes
I want to hang out with younger people more often	34	17	42	7
I miss more social contacts	37	23	36	4
I want to communicate with someone more often, at least by letter or phone	32	26	34	8
I feel like everyone has forgotten me	71	17	10	2
I want to talk to someone more often	20	25	50	5
This would give me the chance to talk about the meaning of life	33	28	36	3
I want to make more friendships	26	24	44	6
I need attention from others	32 (32)	25	41	2

Regarding health needs, most participants (69%) reported that they do not require psychological help in coping with aging challenges. However, one-third expressed a desire for constant support due to their health conditions, and 40% wished to discuss their problems with someone. Additionally, 31% indicated a need for ongoing medical care.

Participants receiving in-home support from healthcare professionals rated their financial situation significantly lower than those not receiving such support (p=0.02). They also had significantly poorer health conditions, indicating greater health needs (p<0.001). However, no significant difference was found between the two groups in terms of need for activity or social contacts, nor in the overall quality of life assessment (Table 5).

The general assessment of quality of life over time was evaluated through three statements. Reflecting on their past, 24% of participants described it as very difficult and sad, 56% as challenging but overall satisfactory, and 20% as successful and happy. No significant differences were observed in past assessments based on receiving in-home support.

In assessing their present, 12% of participants described it as very difficult and sad, 79% as challenging but satisfactory, and 9% as successful and happy. Those receiving in-home support were significantly more likely to describe their present as very difficult and sad, while participants without support were more likely to consider it successful and happy (p=0.01).

Looking to the future, 14% of participants viewed it as very difficult and sad, 76% anticipated challenges but satisfactory outcomes, and 10% considered it potentially successful and happy. No significant differences between the groups were found in their future outlook (Table 6).

Thirty-five percent of participants reported that they somewhat or completely lacked social connections, 20% had not been close

Table 4. *Self-assessment of activity needs*

	Number of participants			
	No	Partially	Yes	Totally yes
I need more organized recreational activities	49	20	30	1
I want to continue to be useful in my community	11	15	56	18
I want to continue learning and acquiring new knowledge	41	17	37	5

Table 5. *Differences in individual scales and overall quality of life in relation to whether participants have in-home support from health professionals or not*

	Median (interquartile range		
	They have in-home support from health professionals	They have no in-home support from health professionals	*p**
Scale of financial needs	1,6 (1,2-2,4)	1,2 (1-1,8)	0,02
Scale of needs for companionship	2,4 (2-2,6)	2,1 (1,5-2,3)	0,007
Activity needs scale	2,3 (1,7-2,7)	2,3 (1,7–3,0)	0,34
Health needs scale	2,5 (2-2,8)	1,4 (1-1,8)	<0,001
Overall quality of life	2,9 (2,3–2,8)	2,6 (2,5–2,9)	0,09

*Mann Whitney U test

Table 6. *Distribution of participants according to past, present and future assessments in relation to in-home support from health professionals*

	Number (%) of participants		Total	*p*
	Have support	**Have support**		
When I think about my past, mostly everything was				
very difficult and sad	15 (30)	9 (18)	24	**0,37**
with a lot of problems, but satisfactory	26 (52)	30 (60)	56	
satisfactory and happy	9 (18)	11 (22)	20	
When I think about present it is				
very difficult and sad	9 (18)	3 (6)	12	**0,01**
with a lot of problems, but satisfactory	40 (80)	39 (78)	79	
satisfactory and happy	1 (2)	8 (16)	9	
I see the future as				
very difficult and sad	10 (20)	4 (8)	14	**0,12**
with a lot of problems, but satisfactory	37 (74)	39 (78)	76	
satisfactory and happy	3 (6)	7 (14)	10	

*χ^2 test, †Fisher's exact test

to anyone for a long time, and 29% did not share their opinions and ideas with others. Additionally, 24% stated that no one knew them well, and 19% felt that their social relationships were superficial, while 12% were unhappy about being so withdrawn. No statistically significant differences were found between the observed groups (Table 7).

Among all participants, as well as those receiving in-home support from healthcare professionals, higher life satisfaction was correlated with improved overall quality of life, greater fulfilment of activity needs, fewer financial needs, and better health status. Loneliness was less pronounced among participants who rated their social contacts positively. For participants without in-home support, only the life satisfaction and activity need scales showed a significant relationship with overall quality of life, with no significant association between loneliness and any other scale or overall quality of life. Lower levels of loneliness were associated with higher life satisfaction across all participants, particularly in the group receiving in-home support from healthcare professionals (Table 8).

Table 7. *Differences in life satisfaction and loneliness in relation to home health care*

Number (%) of participants				
	They have in-home support from health professionals	**They have no in-home support from health professionals**	**95% CI**	***p****
Life satisfaction	40 (33–47)	44 (37–49)	4 (0–7)	0,053
Loneliness	13 (10–16)	12 (10–15)	0 (-2–1)	0,85

CI – Confidence interval; *Mann Whitney U test

Table 8. *The connection between quality of life, life satisfaction and loneliness*

	Spearman's correlation coefficient Rho (p)	
	Life satisfaction scale	**Loneliness scale**
All participants		
Life satisfaction scale	-	**-0,303** (0,002)
Financial needs scale	**-0,267** (0,007)	0,115 (0,25)
Scale of needs for companionship	0,022 (0,83)	**0,282** (0,004)
Activity needs scale	**0,432** (<0,001)	0,002 (0,99)
Health needs scale	**-0,303** (0,002)	0,191 (0,06)
Overall quality of life	**0,472** (< 0,001)	0,035 (0,73)
Participants with health professionals' support		
Life satisfaction scale	-	**-0,321** (0,02)
Financial needs scale	**-0,358** (0,01)	0,187 (0,19)
Scale of needs for companionship	-0,030 (0,84)	**0,428** (0,002)
Activity needs scale	**0,489** (<0,001)	0,096 (0,51)
Health needs scale	**-0,390** (0,005)	0,269 (0,06)
Overall quality of life	**0,480** (<0,001)	0,087 (0,55)
Participant without health professionals' support		
Life satisfaction scale	-	**-0,280** (0,04)
Financial needs scale	-0,102 (0,48)	0,013 (0,93)
Scale of needs for companionship	0,194 (0,18)	0,132 (0,36)
Activity needs scale	**0,347** (0,01)	-0,067 (0,65)
Health needs scale	-0,078 (0,59)	0,074 (0,61)
Overall quality of life	**0,398** (0,004)	0,010 (0,95)

Discussion

Relatively little research has been conducted on the perception of self-determination in relation to quality of life among elderly individuals receiving in-home healthcare (30). Recent research in Germany confirms the importance of home care for the elderly in supporting their mental health and independent living (31). This is why home health care is increasingly important as an alternative to institutional care (32).

This research aimed to assess whether health support at home significantly impacts the quality of life among the elderly. The study included 100 participants aged ≥65, with half receiving in-home health support and the other half not. While significant differences were found in specific factors, such as financial, health, and socializing needs, no significant difference was observed in the overall quality of life assessment between the two groups.

Participants with in-home support from healthcare professionals rated their general quality of life somewhat lower than those without such support. Additionally, those receiving in-home health support were significantly more likely to describe the present as very difficult and sad, suggesting that this group consists of individuals who particularly need such support.

In the self-assessment of life satisfaction, most participants reported being satisfied, enjoying life, and maintaining a positive outlook, indicating a resilient spirit despite health challenges and advanced age. Participants without in-home health support expressed slightly higher satisfaction levels, which aligns with the finding that those requiring in-home support generally have poorer health, making this difference anticipated.

No difference was found in the feeling of loneliness. Obviously, the in-home support provided by healthcare workers does not fully satisfy their need for conversation and companionship, which indicates the alienation of the elderly in our society and the insufficient commitment of society to provide adequate support to the elderly living in the community. It is precisely the intention of modern geriatrics to keep the elderly in the community in the best possible physical, mental and social health.

No difference was found in feelings of loneliness between the two groups, suggesting that in-home support from healthcare workers does not fully meet the elderly's need for conversation and companionship. This points to the social isolation of older adults and highlights society's insufficient efforts to provide adequate support for elderly individuals living in their own homes. Modern geriatrics aims to keep the elderly in the community, supporting their optimal physical, mental, and social health.

When comparing the results of this research with studies on the quality of life of the elderly in Split, a notable similarity emerges. In both, financial status, age, and health significantly influence quality of life, while the need for social interaction and activity appears more prominent than financial or health needs. Although in-home services provided by healthcare professionals would be highly beneficial for the elderly, they cannot fully meet their needs for social engagement and other forms of activity (5).

In a survey conducted in the Rijeka area, elderly individuals reported a relatively high quality of life. Social activity emerged as the most crucial factor for life satisfaction among the elderly in this study, highlighting the importance of fostering social engagement as a key area where society can support older adults (3). A cohort study conducted in Japan on factors influencing the quality of life among elderly individuals receiving home care indicates that perceptions of quality of life tend to decline over the years, with high functional dependence being linked to lower quality of life perceptions (33), aligning with the results of this study. Conversely, Canadian research confirms the benefits of home care for the elderly, showing a higher level of life satisfaction and lower stress levels (34), a finding not reflected in this study. Additionally, research in Iran emphasizes the need to monitor the quality of life of the elderly within the community and provide societal support (35). It is essential to note that the effects of social support vary across different cultural contexts, as highlighted by studies conducted in Canada and Latin America (36).

This study has both strengths and limitations. A key advantage is the direct access to elderly individuals in their homes, with data collected by healthcare professionals, fostering better cooperation and trust. This approach led to higher participant motivation and concentration, making the findings more reflective of real conditions. However, a primary limitation is the relatively small sample size from a limited geographical area, which restricts the generalizability of the findings to a broader population. Consequently, the results do not allow for a reliable determination of the true impact of healthcare professional support on the quality of life for elderly individuals living independently. This highlights the need for broader research to identify effective strategies for improving the quality of life and overall satisfaction of elderly individuals.

Conclusion

Based on the obtained results, on a small sample of participants, it can be that there is no significant difference in the assessment of the overall quality of life between participants who have and those who do not have the support of health professionals in their homes. The result, that participants who have in-home support from health professionals have a significantly worse health condition, that is, they have greater health needs, is logical and proves that such a service is provided precisely to those who need it most. As for the self-assessment of life satisfaction, it is somewhat higher among those who do not need domestic help from healthcare workers, which is expected considering their better health and social condition. It is the same with the feeling of loneliness, which is slightly more pronounced in people whose house is occasionally visited by health professionals whose function is to provide health care in the user's home with a less pronounced social function. The results indicate the need of the elderly for social contacts and activities to be more involved in the life of the community. Therefore, it is necessary to implement different modality of social inclusion of the elderly, with the greatest possible involvement of volunteers in that process, which would raise their level of satisfaction with life and reduce the feelings of loneliness and uselessness.

Declarations

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Authors' contributions

ND and DP: study design; ND: data collection; ND, IS, DP data analysis and interpretation; IS writing the first draft of the manuscript. All authors were involved in revising the manuscript and gave final approval of the version to be published.

Ethics considerations

The study protocol was approved by the Ethics Committee of the Catholic University of Croatia (Class: 602-04/21-11/24, Reg. number: 498-03-02-06/1-21-02, date: March 29th 2021) and the Ethics Committee of the Virovitica-Podravina County Health Centre (Number: 2189-67/1-01-2371/2021, date: September 6th 2021).

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Competing interests

The authors declare no conflicts of interest.

Data sharing statement

The authors confirm that the data can be obtained by contacting the corresponding author.

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Beyond the Medicalization of Disability: A Review

Martina Vuk Grgic[1,2]

[1] Institute for Moral Theology
Department of Pastoral Care for
Persons with Disability
Diocese of Fribourg, Switzerland

[2] Catholic University of Croatia
Zagreb, Croatia

Martina Vuk Grgić
martina.vuk@unicath.hr
ORCID: 0000-0001-6829-3864

Corresponding author:

Martina Vuk Grgic M.A. PhD
Head of the Department of Pastoral
Care for Persons with Disability

Diocese of Fribourg
Boulevard de Pérolles 38
Fribourg, Switzerland

martina.vuk@kath-fr.ch

Abstract

This article aims to outline the ethical perspectives on disability discourse in medicine and nursing elucidating the necessity for a more multifaceted approach to disability and patients with disability within medical and nursing curricula. While advancements in medical engineering and pharmacology have enhanced independence and quality of life for people with disabilities, the approach to disability often results in arbitrary assumptions about disability as a concept and the objectification of people with disabilities in clinical settings. This article attempts to advocate for a more inclusive approach in medical and nursing education that incorporates an interdisciplinary understanding of disability and respect for personal experience of disability. It proposes an ethical framework that challenges contemporary views on the concept of disability and associated disability terminology in healthcare and medical education and promotes a holistic approach to the treatment of individuals with disability respectful of their experience of disability.

Keywords: disability, medical model, personalism, health-care curriculum

Introduction

Medicine and disability in context

Over the past four decades, there have been notable advancements in the inclusion and emancipation of individuals with disabilities in society. This, besides the political activism of people with disability, has been made possible by several practical advances in different fields. Advances in medical engineering, like the production of prostheses and wheelchairs, enable people with disability increased independence and mobility whereas medical and pharmacological treatment interventions grant better health and longevity improving people with disability's quality of life and well-being.

Yet, modern medicine, especially in the global West brings with its high-tech innovation practice a particular framework towards patient care and an objectifying view concerned with the cure of individuals (1). Inevitable challenges, prejudices, and misconceptions occur when it comes to understanding the concept of disability and the experience of disability itself. This is particularly present in the liberal ethical discourses of prenatal medicine suggesting the prevention or elimination of those with certain genetic malformations and cognitive and physical deformities (2,3). Moreover, the growing confusion of disability with an illness or a pathologic condition is present among medical staff and students (4,5), and the lack of experience with disability or encounters with a person with disability outside of clinical medicine and rehabilitation therapy is all too common (6,7). This could be one of the reasons many people with disabilities feel marginalised, disvalued or depersonalized within the context of clinical medicine (8,9,10).

All this entails that disability in some way is a challenge to medicine, medical and nursing education and the healthcare system as a whole. In what way can a multidisciplinary approach to disability remedy such a situation or contribute to a better understanding of disability? What necessary knowledge should a physician or nurse gain for a more holistic treatment of patients with a disability? Where is the line between the medical approach and the medicalization of disability? The recent literature in medical and nursing education has called for the implementation of a "disability-conscious" approach to education within the field of health professions inviting for the integration of disability studies, social models of disability, and the principles of disability justice into medical training (11,12).

Concerning this, the present article aims to offer an ethical, more comprehensive and balanced approach to disability and use of disability terminology which will go beyond the objectification of people with disability, surpassing one-sided views about disability and helping to combat social inequalities for people with disability in the clinical context. In the first part, the article critically assesses the assumption of the medicalization of disability. The second part presents the major views of disability and the multifaceted approach to disability definition. The article concludes by suggesting a more inclusive and holistic approach to disability within medical and nursing education, emphasizing the value of the personalist approach to disability as a unique criterion in medical decision-making.

Medicalization of disability

The history of disability outlines several approaches, treatments, ways of comprehending, and ways of using language to describe people with disability and give the meaning of disability (13). Disability was for a long time and in some societies even today understood as a supernatural phenomenon, a punishment, an individual pathology, a personal tragedy or a reason for a political and charity action (14,15). Very often due to their cognitive or physical impairment and non-typical behaviour and body looks, they have been labelled with stereotyping images and terms or have been stigmatised, institutionalised, and excluded (16,17). One of the most impactful frameworks of disability in the context of medicine is a view that associates' disability with a medical condition, illness or a lack of ability. Within the contours of this article, such approaches will be considered under the *umbrella* of the medicalisation of disability as it is not merely a medical model which medicalizes disability, but several practices and particular socio-cultural worldviews projected into a framework of medical education. This is a ground to justify the implication that the medicalisation of disability in such a perspective does not only include the framework of the medical model of disability. It also includes associated terminology, the vulnerablizing images and socio-cultural prejudices towards disabled person embodiment, and the distinction between the normal–pathological, disabled–abled binaries, as well as objectifying attitudes towards patients with disability. The next paragraph attempts to clarify such terminologies and approaches.

The medical model of disability

The medical model within the history of disability has been a dominant framework of ideas and knowledge that shaped and impacted certain perceptions and attitudes towards disability. The critical disability studies bioethicist Rosemarie Garland–Thomson claims that very often thinking about disabilities is overdetermined in our medical subjectivity which often means particular logic and practices (18). The primary characteristic of such logic implies medical reasoning about disability, that it is the treatment of disease (i.e. biological physical impairment) and includes the inspection of causes, signs and symptoms. As such, it goes by different names, like the individual model, biomedical pathology, or functional paradigm (19). The medical model reduces disability to either a medical category (an illness which requires cure and fixing), a problem of the individual (a deficiency or a tragedy which requires pity and help), or a functional deficiency (pathology which requires treatment). Accordingly, a person with a disability is considered a patient, a victim of tragic destiny or an ill or sick individual. This means that disability was perceived as an illness or pathology attributed to genetic and biological factors that give rise to specific bodily malformations. In other words, the burden of disability is put on an individual as a functional limitation (20) and the person's experience of disability was not of interest at this stage of treatment. The research surrounding the medical model of disability reflects the inhumane treatment that disabled individuals have endured throughout history, particularly in hospitals, rehabilitation centres, and other institutions (21,22). Such approaches often included the depersonalisation of disabled persons. In this sense, the disabled person is not seen as a person with dignity and possibility but is imprisoned to functional deficiency – seen as an individual with a vulnerable and handicapped physicality, as a patient or as an individual with a tragic condition. Besides the medical model being largely applied in clinical medical practice towards disabled individuals, it impacted the wider socio-cultural view towards disabled people present also in contemporary culture such as ableism, charity model, rehabilitation model, socio-cultural prejudices about disability, etc. This view has been often accompanied by a particular power of language and disabling images of one's embodiment.

Language and vulnerable corporeality

The power of language

In line with the medical model, the medicalization of disability was also accompanied by the use of specific language and stereotyping perceptions which consequently associated disability with tragic images, and people with disabled bodies with a vulnerable or abnormal corporeality.

The use of certain language and particular terminology serves the mainstream culture not only to demonstrate the asserted value we ascribe to others but also to convey a particular context in which certain expressions are used (23). Therefore, the use of disability terminology in a clinical, but also in a broader socio-cultural context, deserves attention as terminology and the politics of language for disability in a certain context demonstrate the perception of the person with disability and related construct for comprehending disability. It also illustrates the mentality connotations that come with the use of specific disability terminology. A significant number of terms for disability in the related context, including medical manuals, have been conceptualized according to biological or intellectual etiology (24). These include "crippled", "idiot", "mental patient", "lunatic", "freak", "weak-minded person", "mentally retarded", or "handicapped person". Additionally, due to their non-typical bodily appearances, individuals with disabilities were perceived as unreasonable, deformed, dysfunctional, and crippled. Terms such as loss, abnormality, restriction, or lack of ability go hand in hand with such a view. Other frequent images connected with disability on a social scale include wheelchair users, sickness, helplessness, cure, neediness, status of dependency and vulnerability, etc. These stereotyping images are not only a result of particular terminology and language but also related perceptions that disability as an illness is a medical condition and a person with a disability is a carrier of genetic malformation or a patient with an abnormal body appearance (25).

Vulnerable corporeality

Henry Stiker in his work on *History of Disability* asserts that the connection with the disabled body is not the same as with a sick body as often there is no healing. The person in a wheelchair or with physical impairment using prosthesis devices is a visible fact (26). Furthermore, the history of disability has been characterized by the utilization of the term 'vulnerability'. Due to their dependency status, perceived neediness, atypical functioning, and physical and intellectual disadvantage, disabled people have historically been marked as vulnerable (27,28.). Due to this, stereotyping images of people with disability frequently include the deployment of the term *vulnerable body*. In its initial formulation, the concept of vulnerable body is ascribed to people with disabilities due to their bodily appearance and non-typical, or beyond normal, bodily functionality. In the context of clinical medicine, the body of a person with a disability was considered outside the contours of the *bell curve* (29), or what has been measured as normal and typical. The complete personhood has been reduced to bodily functionality and form because it has been associated with images of a non-typical, broken, or vulnerable corporeality. The philosopher Susan Wendell, who embodies the experience of disability, claims that rejected or negative body images refer to those aspects of bodily life (e.g., disability), physical appearance (e.g., deviations from the cultural ideals of the body), and bodily experience (e.g., forms of bodily suffering) that cannot be controlled and that are deviating from the norm (30). In other words, having a disability means a departure from a certain calculus of the norm and non-compliance with a standardized bodily look. Besides the vulnerability being associated with a person with disability's bodily appearance, there is a set of social vulnerabilities which pertains to the identification of a person with disability on a broader socio-cultural scale. Such attitudes in addition to the natural form of vulnerability, contribute to the increase of vulnerablizing attitudes towards people with disability and give rise to social and emotional isolation, loneliness, poverty, and exclusion. Put differently, on account of their status as being dependent on others, their atypical functioning, and their physical appearances, disability (31) has been perceived as a condition that vulnerablizes disabled people on a socio-cultural scale in addition to their natural ontological vulnerability (32,33).

The perception from a history of medicalization, including medical models, exploitive language, and views on disabled bodies as presented in a discussion above, has shaped the responses and attitudes of not merely the medical practitioners but also the public health and medical and nursing education, as well as the mentality of an ordinary person towards disabled. These perceptions have also had a broader impact on the definitions of disability and the professional and mainstream discourse surrounding disability (34). Yet, the medicalization of disability has been the subject of considerable criticism. This creates the emergence of other views and perceptions of disability initiating a more broad, comprehensive, and non-objective picture of disability. The next section attempts to outline such views.

Going beyond the medicalization of disability – a multifaceted definition of disability

Social Model

The *Union of the Physically Impaired Against Segregation,* UPIAS (35) occurred as a response and reaction to the prevailing formula of seeing disability as merely a physical condition and a person's limitation. The UPIAS traces the roots of a social model of disability whose conceptual framework differs from a medical model and sees disability as a problem of society and a social barrier. Contrary to the medical model, the social model rationale is oriented towards people's experiences of disability and is critical of the medicalization of disability and the socio-cultural prejudices towards disabled people (36). Within this approach, the problem of disability is not located in an individual. Rather, the reduction of opportunities for disabled people is because of social and environmental barriers and attitudes such as exclusion, limited workplaces and transportation, as well as limited health care benefits (37).

The key insight of the social model is that it makes a distinction between disability and impairment. Disability, on the one hand, is a problem of society and a social construction regarding the disabled because society as a whole tends to stigmatize, judge, and exclude disabled people (38) by limiting spaces and stereotyping attitudes towards them. An impairment, on the other hand, is the physical disadvantage or restriction of activity due to a physical condition such as lacking a limb or having a defective limb, organ, or mechanism of the body (39).

Such an approach is helpful as it not only broadens the perception of disability from an objective towards a more subjective setting but includes people with disability to speak about their experience of disability in their own voice. Besides this, the social model has been highly impactful on societal changes, such as the inclusion of disabled people through political action and the distribution of human rights, but also into a broader setting of medical education such as the emergence of an inclusive medicine approach. However, the creation of rights and the constant battle against oppression turned disability into a political identity and created a new pride of being disabled. Related to this is the problem of over-emphasized social barriers and the fights for independence, autonomy, rights, and choice, eclipsing the importance of dependency, common belonging, charity, and the human need for the other person as universally accepted human values. Moreover, such a critique addressed the limitation of the social model and the strict separation between impairment and disability as unrealistic (40), which is why a new approach to a more comprehensive disability approach was required.

The bio-psycho-social model within disability definition

This overview of the conceptualizations of disability illuminates the transitions between the medical and social models. The discussion also outlines limitations in these approaches to disability which led to the emergence of the bio-psycho-social model as a new paradigm integrated into the WHO's 2011 definition of disability. According to this model, *disability is the umbrella term for impairments, activity limitations and participation restrictions, referring to the negative aspects of the interaction between an individual (with a health condition) and that individual's personal, environmental and contextual factors* (41). With its "workable compromise" between the medical and social models, the bio-psycho-social model was a ground for reassessing the definition of disability apart from a strict distinction between impairment and disability or, in other words, the medical and social model. It offers a comprehensive perspective on disability that encompasses social and psychological functioning, environmental factors, personal attributes, and contextual influences. This approach, in contrast to disability definitions, now employs a more elaborated definition locating disability beyond strict categorization, and instead looking at it as a human condition dependent on internal (biological, psychological) and external (social, environmental, cultural) factors.

With constant elaborations and the emergence of disability bioethics, the 2011 World report on disability evidenced a notable transformation in its disability definition. These definitions have been subject to multiple changes, which have been influenced by disability policy, different human rights movements, shifts in the economy and society, improvements in psychology and health sciences, etc. (42). Defining disability has also been a matter of interpretation among different academic disciplines (disability studies, the study of disability, medical sociology, social policy, law, etc.) whereas, the experiences of disability from disabled people themselves have provided a unique way of understanding disability as an embodied experience.

Thus, according to bio-psycho–social model, disability is an interaction between a person's environment, participation and activities, bodily functions, and personal features. This can be evidenced in the 2011 World report on disability where disability is a complex, dynamic, multidimensional, and contested condition of human life. This is to say that the WHO definition integrates bio-psycho-social aspects, indicating that disability is not merely a physical condition or societal barrier. Rather, disability is an umbrella term, a more integrative and applied concept that includes biological, psychological, social, and environmental perspectives.

According to recent (1st March 2023) data from WHO, an estimated 1.3 billion people – or 16% of the global population (1 in 6 persons) – experience a significant disability today. Besides disabilities being complex and sometimes difficult to define, the present and universally adopted terminology distinguishes between people with (physical) *impairment and intellectual disability*. Every other arbitrary terminology such as people with special needs, mentally retarded or handicapped should be avoided.

Moreover, the current approach to disability distinguishes between different types of disabilities: physical disability, intellectual disability, developmental disability, and nonvisible disabilities. Because it is a multidimensional concept influenced by culture, defining disability remains a complex task as often the notion does not demonstrate a univocal definition. Sometimes, disability can mean many things and at the same time nothing at all. (43). Disability in a medical context is still lacking epistemic reliability. However, it is important to emphasize that the present disability terminology places a person before his/her difficulty. This means that to indicate something as disability one should be reminded to use a person's first language before indicating a person's impairment (44). This for instance includes usage such as person with intellectual disability, *a person* with physical impairment, a person with hearing impairment, *a person* with vision impairment, etc.

Conclusions

The objective of this paper was to equip healthcare providers with the knowledge and skills to deliver more inclusive and empathetic care to patients with disability by recognising disability as an integral aspect of a patient's identity, rather than merely as *a concept* or a medical condition to be managed. This necessitates a comprehensive revision of evolving medical and nursing curricula (45) to incorporate training conducted by disabled individuals, thereby ensuring that healthcare professionals are adequately prepared to address the distinctive needs of disabled patients effectively. A significant number of scholars specialising in the field of disability studies have highlighted the absence of consideration given to personal experiences of disability within the context of medical practice. Deborah Marks, for instance, addresses that the subjective experience of patients with a disability facing diagnosis or treatment is often unconsidered (46). Therefore, for medical and nursing education the value of the personal experience of disability as an embodied experience would not only enable looking at the phenomenon of disability from another perspective but will expand the approach of clinical medicine to become more inclusive.

In what way then, does the outline of approaches and conceptions of disability in this study expand the comprehension of disability within the practice of medicine and nursing? One of the aims of this paper was to challenge and broaden the traditional framework of understanding disability in medical and nursing education. This extends beyond the individualistic view of disability and turns towards a more multifaceted definition of disability based on a bio-psycho-social model, emphasizing the holistic and personalistic approach towards the person with a disability and related care (47,48). Such an approach, in other words, aims to expand the nursing and medical profession curricula by moving towards a more integrative approach which will recognize disability not only as a concept, medical or social condition but also as a human experience. As the science of nursing and medical education is in constant development, it is essential to engage in collaborative efforts with other disciplines that address this subject matter, such as Disability studies, or Special Education, adopt a comprehensive and interdisciplinary approach to disability, and assess an individual's disability experience holistically. The initial step of a holistic approach in such a perspective suggests that an individual with a disability is regarded in their total personhood, and disability is viewed as a complex human condition that necessitates a multidimensional approach. This means that an individual with a disability is not simply a biological entity; rather, complete personhood encompasses psychological, social, spiritual, and metaphysical aspects. Additionally, each experience of disability is unique, and shaped by specific circumstances, socio-cultural context, and history. While physical impairment is a crucial aspect of the disability experience, it is essential to consider other factors and aspects of functioning as well as specific life circumstances and experiences. Such suggestions correspond to the recent discussions about disability in medicine and nursing which were processed in 2016 at *Michigan State University Centre for Ethics and Humanities in the Life Sciences* which underscored the necessity for a paradigm shift in how healthcare professionals conceptualize and engage with disability (49). The traditional medical model, also in such a context, is being increasingly challenged by perspectives that recognize disability as a form of diversity. The subjective experience of patients with disability brings not merely a new understanding of the world of disability, but opens up a possibility for new insights about the experience of disability. In such a perspective, *cognosco ergo sum* replaces a strict sense of *cogito*, which opens up a possibility for a dialogue between medical staff and a person with a disability, or her/his family as a proxy.

In addition, medical professionals, particularly those in nursing, can facilitate a more comprehensive understanding of disability and access to disabled patients by eliminating the barriers and biases associated with disability in a broader socio-cultural perception. This should not be interpreted as a means of rectifying or preventing the shortcomings of individuals with disabilities. Instead, it entails addressing the obstacles and biases within the medical or nursing practice itself, through self-critical epistemological communication about the concept of disability and expected direct interaction with people with disability.

Declarations

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Competing interests

The author declares no conflict of interest.

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Sports, Exercise and Mental Health among Individuals with Disabilities: A Cross-Sectional Study

Dragan Glavaš[1], Lara Puhovski[1], Krunoslav Matešić[1]

[1]University Department of Psychology
Catholic University of Croatia
Zagreb, Croatia

Dragan Glavaš
dragan.glavas@unicath.hr
ORCID: 0000-0002-5950-855X

Lara Puhovski
lara.puhovski8@gmail.com

Krunoslav Matešić
krunoslav@matesic@unicath.hr
ORCID: 0000-0003-3568-2892

Corresponding author:
Dragan Glavaš
Catholic University of Croatia
Ilica 244, 10000 Zagreb, Croatia
dragan.glavas@unicath.hr

Abstract

Background: Engaging in physical activity (PA) offers substantial benefits for both physical and mental health, which is particularly significant for vulnerable populations, including individuals with disabilities. Research indicates that PA can enhance mental well-being in these groups, though more studies are needed to fully understand this relationship.

Aim: The aim of this study was to examine the differences in mental health indicators among individuals with disabilities, comparing those who participate in sports and exercise with those who do not.

Methods: We conducted an Internet-based cross-sectional study in 2024, using a nonprobability (convenience) sample. Participants reported their involvement in sports and exercise and completed scales to assess psychological well-being, life satisfaction, and positive and negative affects.

Results: The study included 120 adults with disabilities, with an average age of 43.13 years. The findings indicated that categorised athletes, uncategorised athletes, and recreationally active individuals reported higher life satisfaction ($F(2,111)=8.60$, $p < 0.001$, $\eta_p^2=0.13$) and positive affect ($F(2,104)$, p=001, $\eta_p^2=0.12$) compared to physically inactive individuals, with categorised athletes reporting the highest levels of life satisfaction. Additionally, while negative affect was consistent across all groups, the results suggested that active uncategorised athletes and recreationally active individuals had higher psychological well-being than those who were physically inactive.

Conclusion: The study suggests that active participation in sports and recreational physical activities may play a significant role in enhancing the mental health of individuals with disabilities, potentially leading to greater life satisfaction and positive outcomes among athletes and recreationally active individuals. These findings support public health initiatives and policies that promote physically active lifestyles, which may contribute to improved mental well-being.

Keywords: physical activity, mental health, disabled persons, sports, life satisfaction, psychological well-being

Introduction

Physical activity (PA) is widely recognised for its numerous health benefits, impacting both physical and mental well-being. However, a review of the literature highlights that the relationship between PA and mental health is complex, with findings that remain inconsistent. A review published by the John W. Brick Mental Health Foundation reported that 89% of studies over the past thirty years support the positive role of PA in improving mental health (1). Conversely, some research indicates contrary findings, suggesting that excessive physical activity may result in exercise addiction (2), negative body image and eating disorders (3), mood deterioration (4), and overtraining syndrome, potentially leading to clinical depression (5,6). Moreover, research examining the correlation between PA and diverse measures of psychological well-being has yielded conflicting findings, both within the general population (7-10) and among those with disabilities (11-15). While these contradictory findings may suggest a gap in understanding the effects of physical activity on mental health and overall well-being, they primarily highlight the complexity of different types of physical activity, as well as the varied practices and motivations associated with engaging in physical activity.

Sport represents a structured and organised type of PA, embodying the most formalised expression of such activities. Although it often implies an element of competition, the competitive nature of sports can be difficult to define, as the field of sports encompasses a wide range of activities that extend beyond traditional competitive formats (16). As such, it provides promising research avenues that might yield new insights into the relationship between PA forms and mental health. This holds particularly true for participation in sports and general PA among individuals with disabilities. Some empirical insights indicate a link between sport and numerous aspects of health, especially for individuals with physical and mental impairments (17). Additional data on individuals with disabilities highlight the substantial potential of sports and recreational activities in enhancing mental health, providing psychosocial support, facilitating adaptation, and accelerating rehabilitation (11, 18, 19).

These insights are of both empirical and theoretical significance, especially given the numerous challenges individuals with disabilities face in participating in active sports and physical recreation. However, research on the participation of individuals with disabilities in sports and physical activity and its relationship with mental health remains limited.

In this study, we examined mental health indicators—specifically psychological well-being, positive and negative affect, and life satisfaction among categorized athletes, active uncategorized athletes and recreationists, and physically inactive individuals with disabilities. Based on various theoretical frameworks, including self-determination theory (20,21), self-efficacy theory (22), and dual-mode theory (23), alongside potential neurobiological systems and mechanisms influenced by PA (24-27), we hypothesised that categorised athletes, active uncategorised athletes, and recreationists would exhibit enhanced psychological well-being, life satisfaction, and positive affect, along with reduced negative affect, in comparison to inactive individuals with disabilities.

Material and Methods

Study Design

This was a cross-sectional study.

Ethics

This study was part of a broader research project titled "Physical Activity and Psychological Well-being: From Habit to Identity," which was funded by the Catholic University of Croatia and approved by the Ethics Committee of the Catholic University of Croatia (Document Class: 641-03/22-03/10; No.: 498-15-06-22-005).

The study adhered to the ethical standards established in the 1964 Declaration of Helsinki and its later revisions, as well as the General Regulation on the Protection of Personal Data (EU) 2016/679 (GDPR) and the

Law on the Implementation of the General Regulation on the Protection of Personal Data (NN 42/2018). Participants received information regarding the study's objectives, characteristics, protocol, and data analysis, and they were informed that they consented to participate by proceeding with the online form.

Participants

The target population of this study included individuals with disabilities in Croatia engaged in various levels of sporting activities, as well as physically inactive individuals with disabilities. The study's sample was convenient and consisted of individuals who received an invitation letter from the partner institutions to participate in the research project. Among the participants, 38 were categorised as active athletes within one of the athlete categories in Croatia, 22 were active but uncategorised athletes, 23 were actively engaged in recreational sports and exercise, and 37 reported no involvement in sports or exercise. Due to the small number of participants in the active uncategorised athlete and active recreational groups, as well as their similar levels of involvement in sports, we combined these groups into a single category for analysis (active uncategorised athletes and recreationists).

Procedure

A letter of invitation was composed, highlighting that the study targets all adult individuals with disabilities. It contained detailed information on the study, including its objectives and scientific and practical significance, and a link to the online questionnaire (created using the SurveyRock web platform). The Centre for Professional Rehabilitation in Zagreb invited its users to participate in the project and communicated this invitation to the Croatian Paralympic Committee, who subsequently motivated para-athletes to join the project. In the introductory section of the questionnaire, we emphasised the study's objective and provided participants with information regarding the confidentiality and anonymity of their data. Additionally, we indicated that the data would be assessed solely at the group level. We highlighted the possibility for participants to withdraw from the study at any point without facing any consequences. At the end of this section, we informed the participants that by continuing (clicking the "next" button), they were giving their consent to take part in the study. The duration required to complete the questionnaire was up to 15 minutes. The research took place from June 6 until the end of June 2024.

In the initial part of the questionnaire, following the identification of disability types, participants indicated whether they are active categorised athletes, uncategorised active athletes, active recreationists (engaged in recreative sports or exercise), or predominantly physically inactive individuals. Upon providing responses on their sports and exercise involvement, participants responded on the scales assessing mental health indicators and general sociodemographic questions.

Measures

Psychological well-being

Psychological well-being was assessed using a shortened version of Ryff's (28,29) psychological well-being scale. This version includes 18 items that assess six dimensions of well-being: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, self-acceptance, and overall psychological well-being. Participants rated statements, for example: "I am good at managing the responsibilities of daily life," using a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree), where a higher score reflects a greater sense of psychological well-being. The sum of all item ratings represents the total score. The overall scale demonstrated good reliability, as indicated by an internal consistency coefficient (Cronbach α=0.81).

Satisfaction with life

Life satisfaction was measured utilising the Satisfaction with Life scale (30). The scale consists of five items (e.g. In most ways, my life is close to my ideal) and asses overall judgment of life satisfaction. On a seven-point Likert scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”), respondents indicated the extent to which they agree with each item based on their overall perception of life satisfaction. The total score is the sum of all the ratings for each item. The internal consistency (Cronbach α=0.88) of the scale suggested high reliability.

Positive and negative affect

The short form of positive and negative affect in the past week was administered to assess participants’ positive and negative affect schedule (PANAS) scale (31). The short PANAS scale consists of 10 items, with five assessing positive (e.g. enthusiastic) and five assessing negative affect (e.g. upset). Participants indicated to what extent they felt as each item suggests on a scale from 1 (very slightly or not at all) to 5 (extremely). The scores for positive and negative affect were calculated by summing the ratings of five items for each subscale. The reliability (internal consistency) of the positive (Cronbach α=0.83) and negative affect (Cronbach α=0.88) subscales was highly satisfactory.

Data analysis

We used one-way ANOVA to examine mean differences in psychological well-being, positive and negative affect, and life satisfaction among active athletes, amateur athletes, active recreationists, and non-active individuals with disabilities. To explore differences between specific groups, we applied the Tukey HSD post hoc test.

Results

The study sample consisted of 120 adult individuals with disabilities aged an average of 43,13 years (SD=14,65, range 18 – 72).

The analysis of variance indicated that the difference in psychological well-being among the three groups of participants approached statistical significance (F(2,109)= 2.18, p=0.064, η_p^2=0.05). Post hoc analyses showed that active uncategorised athletes and recreationists exhibited greater psychological well-being than physically inactive individuals, with a lower level of statistical significance (p=0.064). The psychological well-being of categorised athletes was not statistically significant compared to that of physically inactive individuals (p=0.132) or uncategorised athletes and recreationists (p=0.976).

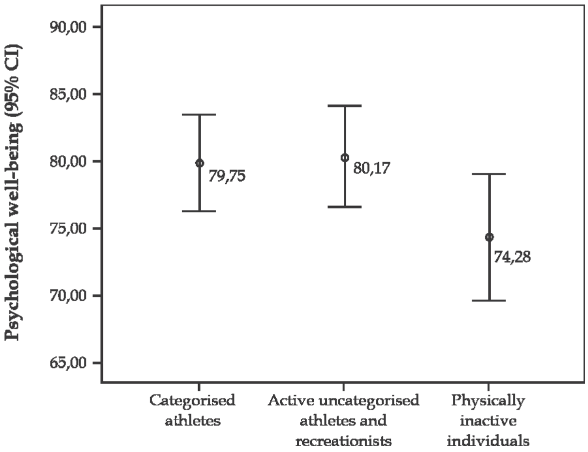

Figure 1. *Psychological well-being of categorised athletes, active uncategorised athletes and recreationists and physically inactive individuals with disabilities*

The results, furthermore, demonstrated a difference in life satisfaction among categorised athletes, active uncategorised athletes, recreationists, and physically inactive individuals (F(2,111)=8.60, p<0.001, η_p^2=0.13). Post hoc analysis revealed that physically inactive individuals expressed lower satisfaction with life than categorised athletes (p<0.001) and also compared to active uncategorised athletes and recreationists, albeit at a lower level of statistical significance (p=0.08). Additionally, at a lower level of statistical significance, categorised athletes demonstrated greater life satisfaction than active uncategorised athletes and recreationists (p=0.07) (Figure 2).

The results testing the difference in positive affect, showed that the positive affect between categorised athletes, active uncategorised athletes and recreationists, and physically inactive individuals varied significantly (F(2,104), p=001, η_p^2=0.12). Post hoc analysis

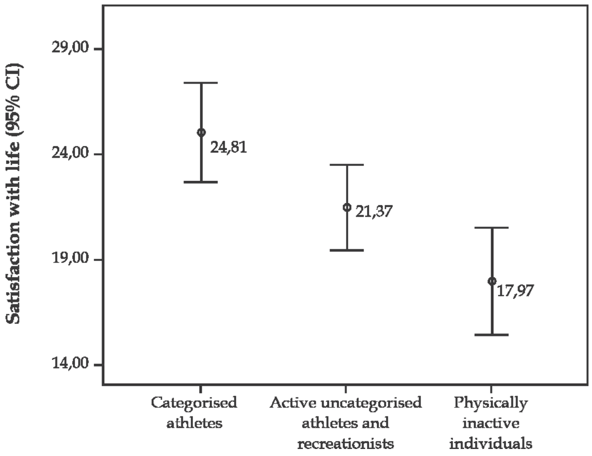

Figure 2. *Satisfaction with the life of categorised athletes, active uncategorised athletes and recreationists and physically inactive individuals with disabilities*

revealed a lower positive affect in physically inactive individuals relative to categorised athletes (p = 0.001) and active uncategorised athletes and recreationists (p=0.016) (Figure 3).

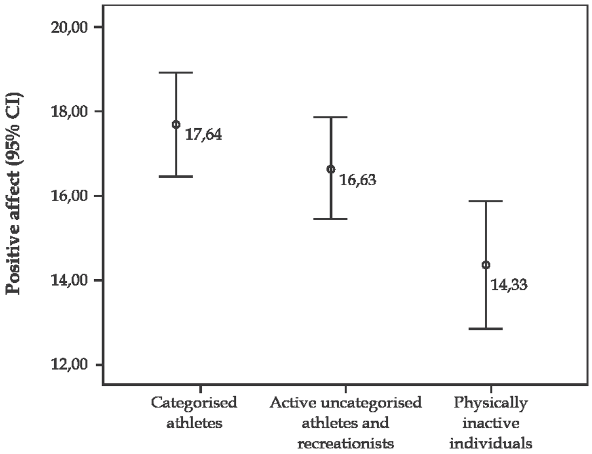

Figure 3. *Positive affect of categorised athletes, active uncategorised athletes and recreationists and physically inactive individuals with disabilities*

Finally, the results indicated that negative affect did not differ significantly among the three participant groups, suggesting that categorised athletes, active uncategorised athletes, and recreationists, as well as physically inactive individuals with disabilities, exhibited the same degree of negative affect (F(2,109)=0.65, p= 0.522, η_p^2=0.01) (Figure 4).

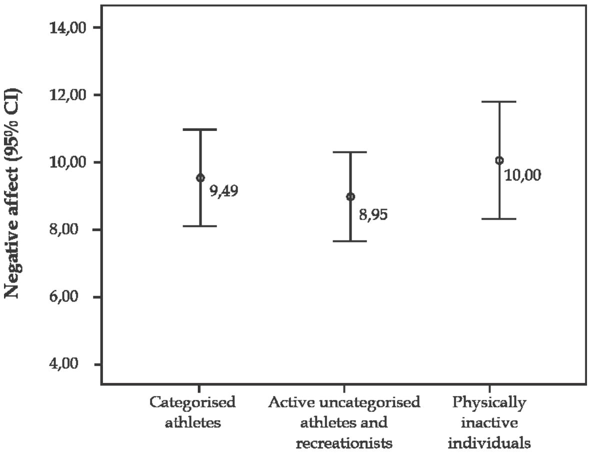

Figure 4. *Negative affect of categorised athletes, active uncategorised athletes and recreationists and physically inactive individuals with disabilities*

Discussion

This study examined differences in mental health indicators between three groups of individuals with disabilities depending on their involvement in sports and exercise. Specifically, we tested whether psychological well-being, life satisfaction, and positive and negative affect differ among categorised athletes, active uncategorised athletes and recreationists, and physically inactive individuals with disabilities.

The study's results confirmed the hypothesised increased life satisfaction and positive affect of categorised athletes, active uncategorised athletes, and recreationists compared to physically inactive individuals with disabilities. This finding aligns with empirical evidence indicating that physical activity may positively impact mental health (1). It also supports the theoretical assumption that intrinsic involvement in sports and physical activities can yield enjoyment and satisfaction (32,33), with the potential activation of neurobiological systems through increased physical activity. Specifically, increased PA facilitates the release of monoamine neurotransmitters (i.e., serotonin, dopamine, norepinephrine) (24,25), stimulates the endocannabinoid system (26), and activates brain-derived neurotrophic factor (27), resulting in improved emotional states, enhanced stress regulation, reduced anxiety, and overall well-being. Furthermore, our study's findings indicate that categorised athletes report higher life satisfaction compared to active uncategorised athletes and recreationists as well. This suggests that structured sports may be the factor that contributes to overall satisfaction by enhancing self-actualization, identity, and self-efficacy (22).

On the other hand, we did not confirm our hypothesis and find higher psychological well-being of categorised athletes compared to physically inactive individuals with disabilities, although results suggested that active uncategorised athletes and recreationists exhibit higher psychological well-being than physically inactive individuals with disabilities. This result might suggest an impact of additional demands inherent in competitive sports, which are absent in non-competitive activities, thereby generating further challenges for active athletes. Nonetheless, it is crucial to acknowledge that our findings indicate an increased likelihood for greater psychological well-being among active athletes in comparison to physically inactive individuals with disabilities. The hypothesis that categorised athletes and active uncategorised athletes and recreationists have a lower negative affect than physically inactive people was also not supported by our data. Although this result may be surprising considering the heightened positive affect observed in active athletes and recreationists, it is crucial to recognise that positive and negative affect represent independent dimensions of emotional experience rather than opposing extremes of a singular continuum (34).

Our findings are consistent with those of Popov et al., who found no significant correlation between weekly physical activity and negative affect (35). However, our data suggest that physically inactive individuals with disabilities may experience slightly higher levels of negative affect, though the effect size is small. This indicates the need for further research with larger sample sizes to better understand this relationship.

Our study offers valuable empirical data on the mental health of individuals with disabilities who engage in sports and regular physical activity, addressing a research area that currently lacks extensive data.

While our study has notable strengths, such as representing 43% of elite, categorized athletes with disabilities in Croatia (36), several limitations should be addressed in future research. A larger sample size is necessary, with clear distinctions between active amateur athletes at the competitive level and recreational athletes with disabilities. Longitudinal research designs could help clarify long-term impacts and potential causal relationships. Additionally, future studies should consider variables like the distinctions between individuals with congenital and acquired disabilities, as existing research shows inconsistent findings in this area (37-39). Additionally, social factors, including peer interaction, social support, and team cohesion, warrant examination due to their demonstrated correlation with mental health and well-being (15,40). Moreover, our prior research indicated that mindset and belief in the benefits of PA serve as an important mechanism influencing the effects of PA (41,42) and sports involvement (43) on mental health and psychological well-being, thereby suggesting a promising research direction for studies involving individuals with disabilities. These studies, along with the studies that elucidate determinants of sustainable PA (44), are also of immense value for practical implications, both for general public health and for health policies related to people with disabilities.

Identifying the sustainability factors of regular PA and understanding the mechanisms through which PA enhances mental health can provide essential insights for cultivating the knowledge, skills, and tools necessary to effectively harness the benefits of PA for the mental health of individuals with disabilities.

Conclusion

This study suggests that participation in active sports and recreational physical activities may benefit the mental health of individuals with disabilities, as indicated by increased life satisfaction and positive affect among categorized athletes, uncategorized athletes, and recreationally active individuals, compared to those who are physically inactive. The evidence from this study, therefore, supports public health initiatives and policies that encourage sports and physical activity engagement among individuals with disabilities. By promoting opportunities for self-actualization and fostering active lifestyles, such initiatives can contribute to enhanced mental health outcomes in this population.

Declarations

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”Physical Activity and Psychological Well-being: From Habit to Identity,” a research project financed by the Catholic University of Croatia, encompassed this study.

Authors’ contributions

DG: conceptualisation and study design; DG, LP: data collection; DG, KM: statistical analysis; DG, KM: data interpretation; DG, LP: writing the first draft of the manuscript, DG, KM; revising the manuscript for critical intellectual content, LP: editing the manuscript in line with journal’s guidelines. All authors approved the final version of the manuscript.

Ethics consideration

The Ethics Committee of the Catholic University of Croatia approved the study protocol (Document Class: 641-03/22-03/10; No.: 498-15-06-22-005). Upon receiving all the necessary information regarding the study and anonymity in compliance with the General Data Protection Regulation (GDPR), the participants provided informed consent prior to their participation in the study.

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Competing interests

The authors have nothing to disclose and no conflict of interest to declare.

Data sharing statement

The authors confirm that the date can be obtained by contacting the corresponding author.

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