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MEDIA & COMMUNICATION STUDIES | RESEARCH ARTICLE

Daily life and women' stressors through a structural topic modeling application of online messages

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Abstract: Recently, women have increasingly been participating in online communities related to psychological health via Internet use to communicate their stressful events in daily lives to others who have suffered from similar experiences. To explore sensitive and relevant stressors among women and identify common types of stressor, we collected 54,195 documents posted from 10 February 2007, to 14 January 2020 from free discussion boards by age group (20s to over 50s) within the online community for women in South Korea (www.ezday.co.kr). Subsequently, we conducted the computer-assisted text analysis with structural topic modeling (STM) using 10,725 user-generated documents including negative emotional expressions about daily stressful events. Then, based on these results of latent daily stressor-related topics for aiding qualitative content analysis, the current study present multiple stressors as the cause of stress with eight topics (mismatch of expected role demands, problems/lack of communication, interpersonal discontinuity, physical and mental health, discomfort of living, role conflict in interpersonal relationships, problems with maintaining/choosing a career, and family caregiving burden). Consequently, our research suggests text-based analysis to better explore

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Kim Jungsu got his Ph.D. in Business Administration and works as a full-time researcher in the Institute of Defense Acquisition Program at Kwangwoon University, South Korea. He has an interest in multidisciplinary research on psychological explanations of social phenomena such as collective action and individual stress with big data analysis. Seongho Bae is Ph.D. candidate in Industrial and Organizational Psychology at Kwangwoon University and works for KOREAPOLYSCHOOL Inc. He has an interest in multidisciplinary research on high-stakes decisions for educational and personnel selection settings with machinary decision methods. Hyunjung Song got her M.A. in the Department of Management at Kwangwoon University, South Korea and works for Data Analysis Team at Kookmin Bank. Her research fields are machine and deep learning. Sukjun Lee is an Associate Professor in the Department of Management at Kwangwoon University, South Korea. His research fields are machine and deep learning and big data analysis.

Kim Jungsu

PUBLIC INTEREST STATEMENT

During a busy day, women confront various stressful events from school, work, home, and changes in their personal relationships and living conditions. While suffering repeated tension in their daily life, they are concerned about their mental and physical health. Thus, people openly share and sympathize their feeling and experiences with other stranger people, not a face-to-face person via participating specific online community recently. Especially, these activities has increased the need for understanding the contents of talking presented in a more comfortable conversation about stress to figure out real causes of stress in women. This study, therefore, performed a text analysis of real data that collected from specified online discussion board for 20 to 50 and over age group in Korea. By doing so, our study provide the representative types of stressors regarding the common causes of stress in everyday lives among women.

reactivity to stressors that women may disclose in everyday life by exploring the language of psychological stress expressed on social media.

**Subjects: Health Psychology; Mental Health; Health Communication**

Keywords: daily stressor; structural topic modeling; textual communication; online community

1. Introduction

Over the life span, people may experience stressors imposed by routine events in their daily life and may perceive multiple stressors stemming from environmental, social, or internal demands (Holmes & Rahe, 1967). Examples of stressful events are concerns about work, the provision of care for other people, a daily commute from work to home, and unexpected small occurrences (such as arguments with children). Such daily stressors are "minor negative experiences which occur quite frequently on a regular basis" (Stefanek et al., 2012). These impacts have been demonstrated to be better predictors of a meaningful stressor via the appraisal of these events and their significance over a day, several days, or a longer period (Crnic & Greenberg, 1990). The accumulation of life events may have a greater impact on mental health (Almeida et al., 2002; Matud, 2004; Sandanger et al., 2004). In this context, people may tend to disclose stressful life events to close others (e.g., friends, families) as a coping response (Tait & Silver, 1989) to avoid or resolve intrusive thoughts (Millar et al., 1988) that reinforce negative emotional responses to stressors. Recently, individuals have been able to use web platforms to resolve mental health problems (Gibson & Trnka, 2020); to exchange information, practical tips, and stories about their conditions, and to obtain social support from peers online (Kingod et al., 2017; Vannucci et al., 2017). For example, online discussion boards have emerged as a source of information and support for individuals seeking a community (White & Dorman, 2001), and they can play a role in providing social support to cope with stress (Cole et al., 2017; Durant et al., 2014).

Specifically, women perceive higher levels of stress than men for similar types of events and may also report different types and levels of daily stressors including more frequent and different stressors related to concerns (e.g., child-rearing, neighborhood environment). In this sense, prior studies have not only tried to classify daily stressors but also assessed exposure and reactivity to them by means of an individual's retrospective assessment of stressors through a variety of methods (e.g., surveys, checklists, diaries, or interviews) (Almeida et al., 2002; Hartsell & Neupert, 2019; Stawski et al., 2013). Although past studies have revealed relatively accessible and unsolicited personal stressors, there is a limit on assessing individuals' experiences because of their memory distortion in reporting specific stressors (Yang, 2020). Alternatively, some studies have explored stressors through online communities as a direct way of naturally exchanging experiences with other people. Yet, a few studies of daily stressors for women have been conducted with a qualitative content analysis, which is "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (Krippendorff, 2004) through subjective interpretation and meaning-making of textual data (Hsieh & Shannon, 2005) that indicate stressors. Examples include the experience of loneliness from leading a military life (Jennings-Kelsall et al., 2012), relational uncertainty owing to physical disease (Weber & Solomon, 2008), and financial concerns regarding healthcare support associated with pregnancy (Gui et al., 2017). However, when individuals mention a stressful life event, they frequently refer to their own emotional reactivity, particularly negative emotion words (e.g., hate, angry) (Liehr et al., 2004; Schoch-Ruppen et al., 2018). That is, the importance of context may be noticeable through the expression of negative emotions (Harvey et al., 2016). In this sense, an analytic approach is needed to identify various stressors from textual messages that may involve a woman's direct feelings and thoughts (Gooden & Winefield, 2007) in the context of life stress Figure 1.

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Figure 1. Overall research procedures.
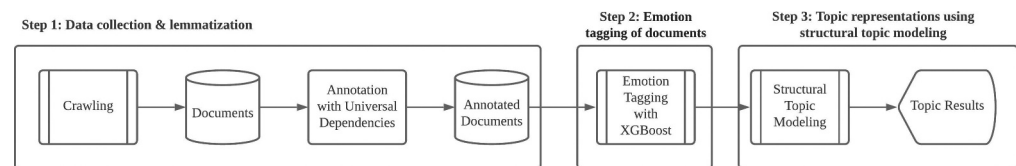
For the aforementioned reasons, we aim to classify types of stressors by focusing on individuals' words including negative emotion in documents generated by women (posted on online discussion boards) to further capture the contextual meaning of their own stressors in daily life. To efficiently identify semantic words from the actual context, we collect users' messages from the most popular online community board (www.ezday.co.kr) exclusively for women (organized by age group from women in their 20s to those over 50) in South Korea. For this purpose, we use data-driven approaches to identify the most important and relevant stressors among women with the aim of enriching existing work in the area of daily stressors. Specifically, we adopt XGBoost (Chen & Guestrin, 2016) as a machine learning algorithm; XGBoost enables the interpretable identification of negative emotion dimensions. We also perform structural topic modeling (STM) (Roberts et al., 2019), which makes it possible to generate a quantitative summary of stressor-related topics from a large number of texts. Through these analytic processes, our study suggests a replicable approach to identifying topics by using an individual's posted content to identify specific negative emotions from their daily life experience. Our findings provide important contributions to help analysts facilitate the automatic extraction of more fine-grained stressors using a nonintrusive method of collecting sensitive stressor-related content in daily life (Almeida, 2005; Eysenbach & Till, 2001).

2. Literature review

Despite the increased attention that has been given to stressors for women, information about stressors for women and variability of specific stressful encounters in daily life remains limited. Thus, we performed a systematic review to broadly review existing studies on daily stressors experienced by women using the following databases via the EBSCO search engine: Business Source Complete, Communication & Mass Media Complete, Computers & Applied Sciences Complete, Education Source, APA PsycARTICLES, SocINDEX, and MEDLINE. To identify more relevant research, we used the search keywords "((*stressor*) AND (*women* OR *female*))" with Boolean operators within titles in peer-reviewed articles over a period of 10 years (20,102,020). Initially, 170 publications were found: MEDLINE (n = 109), SocINDEX (n = 25), Education Source (n = 22), APA PsycARTICLES (n = 7), and Business Source Ultimate (N = 6). we selected 107 of 170 articles published in SSCI-listed journals in the Web of Science Core Collection. Then, 52 articles were excluded for the following reasons, included studies conducted on laboratory stressor (n = 6), male not only female individuals (n = 24), and non-human (animal) (n = 1); focused on using only statistical variable as total scores (n = 6); had non-relevant study objectives for women stressors (n = 9); were a briefing paper (n = 4) and usage of duplicate data (n = 1). In Table 1, we list the stressor-related context, participants, and types of stressors.

According to the occurrence of stressors at a particular period, most studies have shown multiple types of stressors about responses to the psychosocial environment (e.g., interpersonal relationships, economic concerns, and childcare) during pregnancy-related complications (prepartum, postpartum, and being unable to have babies), during work life, and during daily life. For instance, pregnant women mentioned at least one reason for stress: living in unsafety neighborhoods (Bastain et al., 2019; Bloom et al., 2012; Giurgescu et al., 2013), family conflict (Andrea et al., 2020; Dailey & Humphreys, 2011; Willer, 2014), and the financial burden of child-rearing (Eick et al., 2020; Gómez et al., 2015). Women workers have been found to experience multiple sources of stressors (low reward: (Wang et al., 2017); discrimination: (Holman, 2019); time pressures: (Enkhjav et al., 2020)) from disadvantaged socioeconomic status in racial-ethnic minority groups (Daley,

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Table 1. Overview of included in the literature review according to stressors-induced context, number of participants, type of stressor, and measurement				
Study	**Year**	**Context**	**Participants**	**Type of stressors**	**Measurement**
Andrea et al. (Andrea et al., 2020)	2020	pregnancy	364,588 (age 20 and over)	poverty-related antenatal stressors: economic hardship (moved to a new address, experienced homelessness, husband/partner lost their job etc.), relationship conflict (separated/divorced from her husband/partner, argued with her husband/partner more than usual, husband/partner said he didn't want her to be pregnant etc.)	archival data
Eick et al. (Eick et al., 2020)	2020	pregnancy	510 females (over age 18)	psychosocial stressors: poor neighborhood quality, caregiving, discrimination, financial strain, etc.	self-report survey
Enkhjav et al. (Enkhjav et al., 2020)	2020	workplace	101 female employees (age 18–40)	challenge stressors at work: time pressures, workload, job responsibility	self-report survey
Gilbert-Ouimet et al. (Gilbert-Ouimet et al., 2020)	2020	workplace	1,307 female (under or over age 45)	psychological work stressors: job strain, low social support	self-report survey
Hotton et al. (Hotton et al., 2020)	2020	NA	224 females (age 24–37)	socio-structural stressors: poverty, employment, incarceration, homelessness	self-report survey

(Continued)

Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Kazemi et al. (Kazemi et al., 2020)	2020	pregnancy	13 female who had given birth (age 18–39)	human-related stressors: personal factors (hearing about troubles, fear of therapies, fear of childbirth etc.), care staff-related factors (the presence of a large number of medical staff, misbehavior of care staff, and lack of attention to the patient's status); environmental stressors: environmental factors (noise, improper labor space), equipment-related factors (lack of equipment and facilities, fear of hospital equipment)	interview
Muasya (Muasya, 2020)	2020	NA	375 female teachers	role stressors: inadequate support from home, interruptions in the normal flow of work and family schedules (e.g., sick child), strain and time-related stressors at home (e.g., not enough sleep), strain and time-related stressors at work (e.g., workload)	open-ended questions
Um et al. (Um et al., 2020)	2020	refugee living	North Korean refugee females (over age 19)	migration-related stressors: premigration traumatic experience and postmigration, discrimination	self-report survey

(Continued)

Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Bastain et al. (Bastain et al., 2019)	2019	pregnancy	291 females (under age 20 to 40 and over)	social environmental stressors: neighborhood crime safety, interpersonal violence, unemployment, traffic-related air pollution	self-report survey
Holman (Holman, 2019)	2019	workplace	case of sexual minority	minority stressors: discrimination, anticipation of stigma, concealment of the minority identity	Interview
Martinez & Bámaca-Colbert (Martinez & Bámaca-Colbert, 2019)	2019	school	338 female students (early and middle adolescent)	peer stresors: interpersonal conflict with peers at school; school stressors: interpersonal conflict with school personnel	self-report survey
Rosemberg et al. (Rosemberg et al., 2019)	2019	hotel workplace	49 female hotel housekeepers (age 21–59)	work-related stressors: job strain; nonwork stressors: everyday experiences of discrimination	self-report survey
Van Bortel et al. (Van Bortel et al., 2019)	2019	workplace	182 female workers (age 20–63)	occupational stressors: work and agency (e.g., insecurity in relation to their employment), pervasiveness of financial need (e.g., financial concern for sustaining their families), family and obligation (e.g., obligation as the caregiver and bread-winner)	self-report survey
Kim et al. (YJ Kim et al., 2018)	2018	school life	374 female students (age 14–17)	family stress, friendship stress, school stress	self-report survey

(Continued)

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Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Muzny et al. (Muzny et al., 2018)	2018	lifetime	165 females (age 17–59)	psychosocial stressors: depressive symptoms, incarceration, intimate partner violence	self-report survey
Suzuki et al. (Suzuki et al., 2018)	2018	NA	middle-aged females (age 40–60)	relationship with husband, uneasiness about old age, health concerns, work-life balance, relationship with friends	self-report survey
Westcott et al. (Westcott et al., 2018)	2018	lifetime	876 female health professionals (over age 45)	work stress (e.g., excessive work); work-family spillover stress (e.g., too stressed to participate in after work activities); financial stress (e. g., difficulty paying monthly bills); traumatic life event (e. g., death of a child); everyday discrimination (e.g., poor service); intimate partner stress (e.g., conflict with a partner); neighborhood stress (e.g., neighborhood safety); negative life event (e. g., life-threatening illness)	self-report survey
Yalch et al. (Yalch et al., 2018)	2018	during military service	407 female military veterans (age 18–70)	traumatic stressors: military sexual assault, others (been wounded/injured, lost someone close to them, felt in danger of being killed, witnessed someone else killed/injured, etc.)	self-report survey
Bariola et al. (Bariola et al., 2017)	2017	workplace	476 females (age 40–71)	work-related stressors (e.g., job autonomy)	self-report survey

(Continued)

Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Chung et al. (Chung et al., 2017)	2017	workplace	583 female worker (age 30–49)	occupational stressors: job demand, job control, lack of social support, job insecurity, workplace mistreatment	self-report survey
Dao-Tran et al. (Dao-Tran et al., 2017)	2017	life	440 females (age 60–94)	life stressors: losing a loved one, abortion/miscarriage, serious money problems, serious physical/mental illness, experiencing a natural disaster	self-report survey
Harner et al. (Harner et al., 2017)	2017	during confinement	95 incarcerated females (age 23–81)	financial stressors: paying for medical care, performing physically demanding work for minimal pay, relying on others for financial support	interview
Rao et al. (Rao et al., 2017)	2017	life	120 homemaker and employed females	daily stresors: interpersonal problem, personal competency, cognitive stressors, environment hassles, varied stressors	self-report survey
Wang et al. (Wang et al., 2017)	2017	workplace	1,130 female nurses	occupational stressors: high extrinsic effort, low reward, overcommitment	self-report survey
Belknap (Belknap, 2016)	2016	life	10 females	migration stressors: economic hardship	interview
Jin et al. (Jin et al., 2016)	2016	pregnancy	22 females (age 24–41)	cross-cultural stressors: language, food, time consciousness, values, mental process and beliefs	self-report survey

(Continued)

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Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Lipsky et al. (Lipsky et al., 2016)	2016	NA	11,308 non-Hispanic White, 4,261 non-Hispanic African-American/Black, 3,640 Hispanic females (age 20 to over 70)	ethnic minority stressors: acculturation (adoption of dominant culture practices and values), discrimination	self-report survey
Brown et al. (Brown et al., 2015)	2015	disease specific	29 HIV-infected females (age 23–64)	disease specific stressors: disclosure of current status to others, medication adherence, discrimination from others general life stressors: substance (drug, alcohol) abuse, depression, childcare, difficulties of establishing/maintaining roma tic relationships, financial difficulties	focus group interview
Gómez et al. (Gómez et al., 2015)	2015	pregnancy	51 pregnant females (age 19–38)	everyday stressors: daily stressors (role overload, financial concerns, employment, interpersonal conflict), parenting concerns (children's overall well-being, not enough time to do things, problems with transportation)	self-report survey
Molina et al. (Molina et al., 2015)	2015	NA	470 females (age 18–26)	minority stressors: experienced social prejudice and stigmatizing (experienced stigma), knowing sexual orientation status (outgroup status), internalization of negative societal attitudes (internalized stigma)	self-report survey

(Continued)

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Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Andrews et al. (Andrews et al., 2014)	2014	daily	663 females (age 18 to 65 and over)	neighborhood stressors: neighborhood disorder (e.g., observing people selling drugs), exposure to violence (e.g., family member attacked)	self-report survey
Choi et al. (Choi et al., 2014)	2014	life	54 female drinkers (age 18–55)	life stressors: poverty, unemployment, marital disruption, relational abuse, violence	interview
Corney et al. (Corney et al., 2014)	2014	disease specific	10 single childless females (age 27–41)	partnership worries, fertility concerns, potential concerns about emotional and practical support from health professionals and other organizations	interview
Jaremka et al. (Jaremka et al., 2014)	2014	daily	50 female (age 30–65)	interpersonal stressors; non-interpersonal stressors	self-report survey
Lewis et al. (Lewis et al., 2014)	2014	NA	220 lesbian females (age 22–88)	sexual minority stressors: internalized homophobia, social con traints in talking with family/friends about one's minority sexual identity	self-report survey
Saint et al. (Onge et al., 2014)	2014	pregnancy	118,062 females (age under 20 to 35 and over)	social stressors: argument with a partner, a sickness of a close family member	self-report survey

(Continued)

Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Willer (Willer, 2014)	2014	pregnancy	233 females (age 22–44)	infertility stressors: infertility treatment (e.g., financial and emotional burdens), the experience of infertility (e.g., increased depression), relational challenges (e.g., difficulty of support from partners)	self-report survey
Ewen et al. (Ewen & Chahal, 2013)	2013	late-life	26 older females (mean age = 76)	late-life stressors: changes in living environment due to relocation housing	interview
Giurgescu et al. (Giurgescu et al., 2013)	2013	pregnancy	114 pregnant females (age 18–35)	chronic stressors: exposure to racial discrimination, living in poor neighborhoods	interview and survey
Johansson et al. (Johansson et al., 2013)	2013	mid-life	800 females (over age 38)	psychosocial stressors: physical illness in spouse, mental illness in mother, limited social contacts	predefined-checklist
Muñoz (Muñoz, 2013)	2013	immigrant	4 female students (age 20–23)	immigration stressors: lack of financial aid, lost internship opportunities	interview

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Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Yan et al. (Yan et al., 2013)	2013	military life	79 female veteran (mean age = 25.57)	interpersonal stressors: problems communicating with significant others, difficulties interacting with previously close relatives/friends; problem with infidelity deployment or military-related stressors: harassment, discrimination; health of self/others: mental/physical health problems; death of loved ones daily needs: inancial/housing/transportation concerns; civilian employment/school-related: having difficulty finding/obtaining a job	self-report survey
Bloom et al. (Bloom et al., 2012)	2012	pregnancy	24 pregnant rural female (age 18–34)	financial stress (e.g, lack of employment, transportation, affordable housing options), extended family interdependence, small-town gossip, isolation/lonliness, boredom	interview
Foster (Foster, 2012)	2012	while imprisoned	201 inmate women (age 22–54)	importation stressors: maternal childhood traumas (e.g, economic hardship, abuse); deprivation stressors: lack of contact with one's children	self-report survey

(Continued)

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Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Jennings-Kelsall et al. (Jennings-Kelsall et al., 2012)	2012	military family life	312 pages within 123 threads in discussion boards (August 10, 2006 to September 22, 2009)	socioemotional stressors: stuck in a state of flux, going through changes, relational uncertainty, loneliness, alienation; anxiety related to deployment relational stressors: issues of control and helplessness, concerns over privileging individual or relational goals, the matter of locus of blame	open coding
Kitsantas et al. (Kitsantas et al., 2012)	2012	pregnancy	34,161 females/untimely prenatal care initiation (age 12 to 33 and over)	life stressors: moving residence, having a sick family member, arguing with their partners, having bills they could not pay	self-report survey
Wooten (Wooten, 2012)	2012	military life	101 military service females (age 21–61)	pre-deployment stressors: physical abuse; childhood sexual abuse deployment stressors: life/family disruptions, sexual assault/harassment	self-report survey
Dailey & Humphreys (Dailey & Humphreys, 2011)	2011	pregnancy	119 females receiving prenatal care (mean age = 25)	social stressors: discrimination, trauma exposure, economic stress, social conflict	self-report survey
Humphreys et al. (Humphreys et al., 2011)	2011	life	217 females (age 18–79)	life stressors: lifetime trauma exposure (e.g, harassment at work, separated from children, miscarriage, drug/alcohol, friend murdered, maltreatment of someone else)	self-report survey

(Continued)

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Table 1. (Continued)

Study	Year	Context	Participants	Type of stressors	Measurement
Norris et al. (Norris et al., 2011)	2011	life	519 females (age 26–68)	postmigration stressors: demands of immigration related to loss, not feeling at home	self-report survey
Ajrouch et al. (Ajrouch et al., 2010)	2010	NA	736 female caregivers (mean = 30.8 years)	situational stressors: food insufficiency, neighborhood disorganization	self-report survey
Everett et al. (Everett et al., 2010)	2010	life	41 females (age 18–55)	social stressors: time commitments in balancing work and family responsibilities, role strain, finances, racism and sexism in the workplace	interview
Hinton & Earnest (Hinton & Earnest, 2010)	2010	daily	70 females: 33 young (age 18–24), 27 adult (age 25–44), 10 older females (over age 44)	economic constraint, workload demands, unsupportive marital relationships	focus group discussion, in-depth interview, participatory diagramming, narratives and storytelling
Ndlovu et al. (Ndlovu et al., 2010)	2010	living with HIV	6 HIV-positive females (age 23–58)	child-related stressors, housing-related stressors	interview
Pal et al. (Pal et al., 2010)	2010	pregnancy	89 infertile females (under age 42)	psychosocial stressors: personal history of abuse, family history of abuse (alcohol/recreational drugs)	self-report survey
Wiklund et al. (Wiklund et al., 2010)	2010	childhood and adolescence	40 females (age 16–25)	modernity (e.g., possibilities to choose and change rationality), gender orders (e.g., conflicting feminine positions), youth (e.g., failing adult and societal support)	interview

1996; Hacker, 1951). In particular, during military service, female soldiers reported specific stressors from events that put them at risk, such as sexual assault/harassment, or witnessing wounded/injured person as well as interpersonal stressors (e.g., difficulties interacting with close relatives and friends) (Yalch et al., 2018; Yan et al., 2013). In addition, women referred to stressors concerning socioeconomic problems because of sudden changes in the living environment (refugee, migration, immigration) (Belknap, 2016; Um et al., 2020). One's experience of living with specific diseases (HIV, breast cancer) may lead to a loss of normal status (establishing/maintaining romantic relationships: (Corney et al., 2014); housing: (Ndlovu et al., 2010)). In this sense, previous research has mainly explored stressors under specific events in women's lives.

On the one hand, many studies on the quality of women's lives have shown that persons may react differently to daily stressors in exposure and reactivity to these stressors depending on their age (Neupert et al., 2007; Stawski et al., 2008). In adolescence as the period of transition into adulthood, for instance, young women can be feel stress due to being on the border between childhood and adulthood (Wiklund et al., 2010) and interested in physical well-being (e.g., attractive body). During mid-life aging, they may be exposed to more stressful daily events and experience the increased risk of physical problems (e.g., menopause) while expanding the range of social roles (e.g., parental duties) in their work and family environments (Johansson et al., 2013; Suzuki et al., 2018). Furthermore, older adults can be less often exposed to daily stressors than are younger adults (Stawski et al., 2008), but they report higher levels of negative affect than do young people (Mroczek & Almeida, 2004). Unfavorable changes, such as sleep disturbance, due to menopause and physical symptoms arising from age (Bixler, 2009). When considering the context women continually perceive and interpret stimuli and information encountered in their daily lives, daily stressors are important to study in daily self-management because of their proximal and cumulative effects on individuals' health and well-being (Almeida, 2005). However, a small number of studies have presented a few types of stressors: interpersonal concerns/conflict about family members or neighbors (Andrews et al., 2014; Jaremka et al., 2014) and economic constraints (Hinton & Earnest, 2010). Addressing this gap in the literature, the purpose of this study is to present an exploratory examination of more detailed type of daily stressors among different age group in an online community and thus to provide the most common stressor for research on responses to stress in women.

3. Material and methods

3.1. Data collection and lemmatization
The methods were divided into three-steps to effectively extract and identify relevant topics including women's stressors from a large amount of unstructured text. The data collection and preparation procedure STM was as follows.

In Step 1, we first perform web crawling to construct a text database. As our data source, we select specific discussion boards (named 'ttolaetalk'), which individuals can freely post their messages ('talk') among same-age group ('ttolae') in the largest online community for women (www.ezday.co.kr) in South Korea. It consists of age groups of women (in their 20s, 30s, and 40s, and 50s and above) who talk about their daily lives (sharing small talk, advice, and information). Thus, this source is suitable for collecting text messages about various stressors arising from the daily lives of each age group. To effectively scrape user-generated messages, we program a crawler using R 4.0.3 programming and scrape publicly provided texts that were posted from 10 February 2007, to 14 January 2020. Then, we construct a data set of documents that includes contents with linking information (posting data, title, author ID, and the identifier for each age group's community board). Therefore, we gather 54,195 raw data (documents) (Table 2). Next, to systematically extract the syntactic dependencies of the words in each document, we adopt Korean linguistic annotation (lemmatization and part of speech tagging) using the Sejong Part-of-speech Tagged Corpus (Park & Tyers, 2019), which is a widely-used corpus for Korean and perform morphological analysis within UDPipe (Universal Dependencies) using the udpipe R

Table 2. Characteristics and description of the documents and lemma data sets			
	# of documents	Unique number of lemmas (NOUN)	Number of lemmas (NOUN)
Raw documents (w/o preprocessing)	54,195	—	-
Analyzable documents	54,000	281,008	2,637,532
Semantic documents	52,540	35,486	1,532,418
Interpretable documents	52,494	21,025	1,499,585
Preprocessing	10,725	12,051	232,084

Table 3. Performance of the emotion tagging model			
	Candidate Model 1	Candidate Model 2	Candidate Model 3
N rounds	56	510	895
Accuracy	.7	.75	.75
F1	.73	.75	.76
Precision	.65	.74	.74
Recall	.84	.77	.77
Balanced Accuracy	.70	.75	.75
Final Decision (Rank)	3	2	1 (Final model)

package 0.8.5 (Wijffels, 2020). Through these procedures, we choose analyzable documents (54,000) after excluding empty documents that were deleted by users and then semantic documents (52,540) including only discernable NOUN parts from the Korean dictionary.

In particular, to improve the quality of lemmas (e.g., removal of sparse words), the lemmatization was limited to identifiable lemmas with a character length exceeding 1 through a unique part-of-speech tag in the "Open Korean Dictionary" (a formal database operated by the National Institute of Korean Language, https://opendict.korean.go.kr).

Subsequently, for accurately predictive topic modeling, we remove uninterpretable texts (e.g., images and multimedia files regarding product advertisements) or well-known writing (e.g., poem, lyrics, or newspaper articles) with HTML from 52,494 documents using manually developed regular expression rule for the PostgreSQL database management system. We also exclude all non-Korean words and non-UTF-8-encodable characters (e.g., special characters, or symbols) in the text preprocessing. Through this process, we collect 10,725 documents after preprocessing. To do so, we capture analyzable sentences expressing negative emotions related to stressors from users' messages.

3.2. Emotion tagging of documents

In Step 2, we employ a sentiment lexicon approach, which can provide the classification of a list of positive and negative words by determining whether a given text belongs to a positive or negative sentiment orientation from a predominant sentiment-related corpus (Li et al., 2018). Specifically, to avoid biased sentiment annotation due to the influence of the context (e.g., community vernacular, user demographics), we use soft seed words (prior knowledge of sentiment words) considering domain-specific information based on the study (Li et al., 2018)'s. Examples of soft seed words in our study include the following: "gamdong" (impression) and "salang" (love) as positive words, and "choeag" (worst) and "jjajeung" (irritation) as negative words. To perform emotion tagging, we employ a sentiment dataset regarding a Korean emotion tagging corpus

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Table 4. LDA model fit indices for optimal topic number decisions					
K	Held out	Residual	Bound	lbound	em.its
3	−7.22592	28.62204	−1,583,848	−1,583,846	5
4	−7.03667	27.88790	−1,538,774	−1,538,771	83
5	−7.03094	28.83703	−1,534,534	−1,534,529	114
6	−6.97449	29.10335	−1,526,365	−1,526,359	174
7	−7.01444	29.77847	−1,530,279	−1,530,270	134
8	−6.95612	29.73823	−1,529,760	−1,529,749	173
9	−7.00276	29.99363	−1,518,843	−1,518,830	151
10	−6.96868	30.33250	−1,517,872	−1,517,857	138

(Park, 2015) and perform XGBoost (Kuhn, 2020) in the R statistical computing environment (Table 3). In addition, we derive the level of F1 value maximization, where the F1 value indicates the harmonic mean of precision (the fraction of all negative predictions that are actual negatives) and recall (the fraction of all actual negatives that are predicted to be negative) (Lipton et al., 2014).

3.3. Topic representations using structural topic modeling

To enhance our understanding of the daily interests related to women's daily stressors, it needs to be identified the topics that appear only with negative emotions. To that end, in Step 3 we perform STM (Roberts et al., 2013) applying a probabilistic text model using the stm 1.3.6 library (Roberts et al., 2019). This approach allows us to distinguish between different topics on the level of the user document, and it allows the inclusion of prior distributions of user categories (e.g., negative and positive emotion, age group) and topic-word distributions. To select appropriate models, we consider the K-related diagnostic statistics: the held out log-likelihood, the model likelihood (bound), the optimal number of topics (K) that penalized model likelihood (Lbound), and residual indices based on the optimal K condition (residual > 0) (Table 4). Specifically, we check the level of value (held out log-likelihood per word, model log-likelihood, K penalized model likelihood) maximization and the level of value (residual) minimization using mclust (Scrucca et al., 2016) to identify a homogeneous candidate number of K. As shown in Table 4, the most appropriate topic model (K = 8) was selected by popular measures based on the held-out likelihood (Petterson et al., 2010) in order to infer less semantically meaningful topics to discern more of the different stressful issues from real text (Chang et al., 2009).

4. Results

4.1. Identification and classification of topics

Table 5 lists the topics about daily stressors detected by the topic modeling algorithm. The second column indicates the age-group information for to each topic, and the third column contains the top FRequency and EXclusivity (FREX) words, which are the most prevalent in the harmonic mean of the probability of occurrence and exclusivity to a specific topic. The fifth column shows the proportions of the chosen topics as follows: Topic 1 (9.52%), Topic 2 (21.21%), Topic 3 (15.86%), Topic 4 (4.77%), Topic 5 (4.94%), Topic 6 (15.47%), Topic 7 (12.65%), and Topic 8 (15.58%). The sixth column presents the exemplar sentences for selected topics within each age group.

To illustrate more contextual meanings of topics related to stressor, labeling or interpretation of each topic are derived from how women are perceiving major factors causing their stress in the particular situations they are facing (Smith & Shinebourne, 2012) within exemplar sentences related to these top FREX words. By the interpretive process, In the seventh column, we assign labeling regarding the eight topics based on the top FREX words to provide more interpretable semanticity of the topics (Roberts et al., 2014) and the identification of stressors in previous studies (Almeida et al., 2002). To that end, we analyze representative sentences within documents

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Table 5. Topics identified and related exemplars

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
1	20s	taxi, elder sister, middle-aged man, age, mid, father, driver	3.02%	9.52%	I often use taxis because of the convenience they provide in going where I want to go. However, I went through something unpleasant this morning …I guess a taxi driver didn't know the exact location because he was not going to the right turn lane.	Mismatch of expected role demands
	30s	elder sister, age, younger sister, couple, mid, father, move	3.68%		My elder sister is doing postpartum care. (Currently) I quit my job and am looking for another one. Thus, my mother is telling me to do my elder sister's housework, and I did everything I could. But she doesn't appreciate it.	

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Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
	40s	elder sister, age, father, middle-aged man, bus, mid, couple	1.84%		Now, I'm in my 40s. I get really angry when I see people with bad manners in public, such as when they are talking on the bus or making a loud call on the phone. Especially, when I see someone cutting in line while waiting to pay at a supermarket or elsewhere, I get truly angry.	
	Over 50	menopause, age, father, test, hello, favor, worry	0.98%		My father-in-law is 60 years old and he suddenly collapsed for no reason. … Now, he can't walk and vomited without food. I don't know what's wrong.	
2	20s	friend, boyfriend, brother (called boyfriend), text message, contact, talk	7.92%	21.21%	I met someone on a blind date. However, as time passed, there was less contact from my boyfriend, and he rarely talked to me. Then a week later, he sent a short text message saying, "I'm sorry I couldn't contact you". It was really ridiculous.	Problems/lack of communication

(Continued)

Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
	30s	friend, contact, text message, call, person, brother (called husband), talk	7.94%		Oh, I feel very lonely after getting married. It wasn't like this before. I want to make a friend to talk.	
	40s	friend, contact, bride, text message, person, dawn, note	3.72%		I'm old enough to go through menopause. I just recall the memories of my friend in my hometown. But, I don't have any close friends at the moment.	
	Over 50	friend, person, hello, talk, mother, conversation, phone call	1.63%		Last night on my birthday, my husband and I argued while engaging in a conversation about different opinions. (And so) the next day, we came to work without breakfast. I'm still a little depressed.	

(Continued)

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Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
3	20s	person, regret, self, love, romantic relationship, alone	6.29%	15.86%	I'm in a long-distance relationship. I'm always lonely even though I often call my boyfriend because I'm a person who relies on him. … By the way, my boyfriend says we should break up due to the mismatch between each other's personalities.	Interpersonal discontinuity
	30s	company, love, self, thought, anymore, real, window	5.52%		My house is a two-story house. One day, the smell of tobacco came up from the window downstairs. … It's really annoying to see him face to face whenever I go out in the hot summer.	
	40s	regret, wind, time, feeling, world, self, life	3.21%		I feel regretful every day. My children say they're all grown up, so no more interference, and my husband wants his time. … I think I've done as much duty as I can in my parental role now.	

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Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
	Over 50	youth, wife, time, senior person, content, mind, anymore	0.83%		I feel like I'm still young. But when young people give up their seats to me, I feel embarrassed and uncomfortable.	
4	20s	skin, points, model, product, advertisement, event, cosmetics	1.69%	4.77%	I have a lot of worries about my skin condition. Suddenly, these days, I get pimples even if I'm stressed out.	Physical and mental concerns/problems
	30s	product, goods, points, redeem, cosmetics, skin, purchase	1.69%		I have a fever on my face. Well, it's so hard to find suitable cosmetics for my skin type.	
	40s	food, coffee, participation, effect, purchase, meal, intake	0.90%		It's been a while since I haven't been able to go to the bathroom. I'm having difficulty in passing stools.	
	Over 50	blood pressure, no charge, program, fee, precaution, doctor, medical care	0.49%		My blood pressure was supposed to drop to normal while I was taking medicine, but it didn't. Is that strange? The doctor is wondering, but he just tells me to take the medicine and to be careful.	

(Continued)

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Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
5	20s	cellphone, phone bill, telephone, lane, left turn, report, baby	1.84%	4.94%	My mom hates me staying out overnight. Even worse, if I don't get my mom's call while playing with my friends outside, I get scolded a lot for not answering the phone. I'm going crazy because it's so controlling.	Discomfort of living
	30s	disease, function, baby, treatment, member, afternoon, constipation	1.67%		I quit my job to have a baby as soon as I got married, but I can't get pregnant. Also, artificial insemination failed. Now, we will do in vitro fertilization, but I'm worried that it will cost a lot in the end.	
	40s	product, middle aged woman, personnel, camera, parking lot, usage, girl student	0.94%		Last night, the refrigerator in my house broke down and eventually the food I kept went bad. After-sales service personnel said they need to change the fridge because it's beyond repair. But I can't afford to pay for food and don't know what to do. I'm mentally stressed.	

(Continued)

Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
	Over 50	participation, family, case, treatment, e-mail, application, contact	0.49%		While my husband is being treated for dental implants, he says it hurts a lot. Also, it costs a lot of money and takes a long time. In this situation, I feel sad and tired with respect to the time and money, but I can't tell my husband about it.	
6	20s	female, marriage, bag, couple, investigation, date, glasses	5.31%	15.47%	I've had a boyfriend for over a year. I'm paying for almost all the dating expenses. As time goes by, I've started getting so angry and irritated.	Role conflict in interpersonal relationships
	30s	marriage, female, cellphone, new year, salary, exercise, middle-aged man	6.87%		I don't know why every day is like hell. The work I do is not fun and I live in lethargy every day. … I have to exercise to lose weight, and everything feels annoying.	

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Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
	40s	female, marriage, man, new year, exercise, treatment	2.65%		On new year's morning, my OO-year-old daughter wouldn't wake up no matter how much I tried to wake her up. And I was cooking steamed eggs in a stove. Finally, I hectically went to work in the morning. … My daughter contacted me later and nagged me that I didn't even turn off the gas stove. I think these are the lifestyle of women in their mid-40s. So, I don't feel excited yet in the new year.	
	Over 50	female, marriage, elder, autumn, man, hair, worry	0.64%		I'm the eldest daughter in a family with only daughters. … I've been living in luxury since I got married, but the financial situation has been ruined by the impact of the IMF (International Monetary Fund) crisis. Also, it's hard and exhausting because we can't rely on each other. The stress of being a member of my family is too much.	

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Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
7	20s	study, job, mother, father, grade, private educational institute, exam	4.41%	12.65%	I have obtained certification and am continuously preparing to get a job. But I'm not good at speaking foreign languages, so I will try to study and get a job next year. It's not going as well as I want and I'm not very sure.	Problems with maintaining/choosing a career
	30s	mother, husband, study, child, son, school, grade	5.26%		After I got married and gave birth to a child, I took almost two years off from work. Now, I'm tired, as I'm working again. But I'm irritated and worried about my child because of my husband, who's showings bad feelings about this decision.	

(Continued)

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Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
	40s	daughter, mother, private educational institute, husband, study, son, school	2.20%		I regret not being able to send my daughter to a high school for academically advanced students. I should have made my daughter study hard to get good grades since middle school. I regret not trying as hard to send her to the private institute as other ambitious mothers.	
	Over 50	son, child, university, parents, children, talk, graduation	0.77%		Until now, my children have been studying hard and have been healthy. So, they enrolled a famous university that is recognized by others, and they are about to graduate from it. However, I am worried that my eldest child has suffered from hypersensitive gastrointestinal disorders that cause indigestion due to poor health after interning abroad, and he has not been able to live a normal daily life.	

(Continued)

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Table 5. (Continued)						
#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
8	20s	today, company, weather, go to work, morning, day, tomorrow	4.02%	15.58%	I'm working two jobs, but I'm not sure if I can still work even when I'm pregnant. (Because) our company doesn't have maternity leave and it's so stressful.	Family caregiving burden
	30s	bride, go to work, today, morning, husband, leave the office, weekend	7.21%		I'm pregnant these days. I'm so tired that it's really hard to wake up in the morning. And after feeding my first child, I get going late every day and go to work. So, it would be nice if my mother-in-law, who lives with me, could help me a little in the morning. ... This morning I got annoyed with my child, and I got irritated with my husband.	
	40s	today, weather, evening, morning, go to work, day, insurance	3.47%		I sent my husband to work, my children to school, and took care of my parents-in-law going out. ... It's like this treadmill thing every day. It makes me annoyed every morning.	

(Continued)

Table 5. (Continued)

#	Age group	Top FREX words	Pro. (%) by each age group	Pro. (%) by each topic	Exemplar sentences in the topic documents	Topic label
	Over 50	evening, weather, morning, go to work, holiday, day, yesterday	0.88%		There's only one day left this year. Why do I always feel sorry about this time of year? I don't know what my life is. … They (family members) just wake up in the morning and then come home in the evening.	

topic numbers/pro: proportion of each topic in the entire document

containing topics and written emotional expressions (Smyth, 1998) in each age group (women in their 20s to those over 50). Additionally, we identify stressor diversity in situational meaning, which reflects individuals' responses to stimuli emerging from diverse life situations (e.g., role demands, households, and job and income security) in the context of daily life.

4.2. Intuitive meanings of stressor-related topics

A label (topic name) is assigned to each topic in Table 5. Topic 1, which we label "mismatch of expected role demands", means the disconfirmation of expectations for women's own social behaviors and those of other social participants (Biddle, 1986). Thus, a potential role conflict may exist in the differing expectations of people encountered. For instance, passengers using public transportation may think that workers such as taxi drivers should be responsible for service in their roles. And if not, dissatisfaction with a desirable role occurs. As an actual example, an incident concerning sexual harassment by a cabdriver was posted on a bulletin board for women in their 20s. Due to the rise in such incidents, it was thought that women might value topics about roles in social positions as follows: "The taxi driver kept asking me personal questions. Where are you going now, who are you going to meet at this late night, do you live alone, and so on. Also, next time we meet, we'll be friends!" Especially, due to the widening scope of women's lives in the natural life cycle, their roles have become diverse (e.g., mother, wife, daughter-in-law, coworker, neighbor), which may result in stress (Wiley, 1991). As lifespans increase, marriage can change the nature of the family establish in-law relationships; thus, women take on the new role of daughter-in-law. For instance, when a parent-in-law is ill, more caregiving is required, and a woman must carry out activities involved in providing daily comfort, or she must keep watch and seek assistance when necessary for the activities of her parent-in-law (Chao & Roth, 2000). In particular, the elder caregiving role is emphasized in the cultural expectations of Asian countries (e.g., China, Japan, South Korea, and Taiwan). Such demands can constitute physical and social stressors for women. Specifically, the topic 1 results with regard to women over 50 indicate that "the beginning stages of caregiving were very stressful for them and their families due to their lack of knowledge and their inability to quickly organize internal and external resources," as shown by existing research (Chao & Roth, 2000).

Topic 2, labeled "problems/lack of communication," is the most dominant topic related to women's daily stressors. In general, close relationships make people happy and satisfied with life (Regan, 2015). However, the possibility of life changes following the breakup of romantic relationships can be one of the worst events over people's lifetime, despite the positive aspects related to personal growth that come from the experience of relationship loss (Sprecher, 1994; Tashiro & Frazier, 2003). In developing interpersonal relationships, communication plays an important role in mutual activities (e.g., dating). However, romantic relationships and discrepancies in communication (e.g., avoiding an issue, arguing over an issue, or lying about an issue) between partners may lead to decisions about whether to terminate or continue the relationship (Honeycutt, 1985; Jang et al., 2002). According to social penetration theory, dyad relationships can be attained through the reciprocal disclosure of personal information (e.g., interests, hobbies) (Taylor, 1968). Furthermore, loneliness has an adverse effect on creating anxiety or depression and older women are vulnerable to relational losses. However, if women are dependent on attachment, their stressors are characterized by communication difficulties (e.g., absence of a communication partner) when they are stressed while caring for others (Krause-Parello, 2008). For example, the following was posted on a bulletin board for women in their 30s: "After returning home, my husband usually goes to bed at dawn watching TV or playing computer games. I try to talk to my husband, but I often feel ignored, and he does not pay attention to me when I'm talking."

Topic 3 is labeled "interpersonal discontinuity." The expression of negative feelings may occur when women lack interpersonal continuity and experience interruptions, or even discontinuities (e. g., changes in romantic involvement, residence, or aging) between persons in their daily lives. In regard to topic 2, unlike topic 1 (mismatch of expected role demands), when an individual perceives a violation of relational expectations from others, she may feel negative social emotions

such as distrust (Nesse, 1990). On the other hand, according to disengagement theory, in the case for old adults, interpersonal discontinuity occurs when people experience functional disability that relates to problems with carrying out activities of daily living or interpersonal goals (e.g., continuing a healthy life). Thus, it might increase subjectively perceived stress such as social loneliness (Heylen, 2010) regarding deficits in personal intimateness or confidence (Heylen, 2010).

Topic 4 is labeled "physical and mental health concerns/problems." The physical concerns (e.g., changes in facial appearance) expressed by women are associated with daily stress-related daily pain (e.g., fatigue; (Gremore et al., 2011)). Specifically, women's perceived body image is related to their psychological well-being and life satisfaction (Stokes & Frederick-Recascino, 2003). When a woman's self-esteem is threatened by negative stimuli from other persons (friends, neighbors, family), such stimuli may lead to self-enhancement, bolster favorable views about herself (including body image) and prevent threats to her self-esteem (Jarry & Kossert, 2007; Zhang, 2010). When suffering from the persistent development of physical concerns or problems (stimuli), women may take a fear-avoidance response to immediately escape from situations causing anxiety (Vlaeyen et al., 2016). Such a stimulus-response relationship may limit the ability to function normally in an individual's daily life. Furthermore, it causes depression (Samwel et al., 2006). Individuals who have increased difficulty with physical functioning show both increased depressive symptoms and reduced life satisfaction (Hsu, 2009).

Topic 5 is labeled "discomfort of living," witch reflects issues people face when trying to maintain a balance in their daily quality of life, while facing greater exposure to unexpected changes (e.g., service failures) in their living conditions. In this context, when a mother perceives the current environment as being more threatening or potentially dangerous than an actual situation, she will feel a sense of parental responsibility with respect to protecting her young children and have fearful or anxious reactions. In contrast, her children seek approval in self-identity control to match their perceptions of their goal with the standards they hold for themselves (Burke, 1991). Thus, feelings of discomfort might emerge under this discrepancy.

Topic 6 is named "role conflict in interpersonal relationships." It is likely to restrict the development of a normal or expected relationship. Especially, interpersonal conflict indicates salient negative events that relate to one of the strongest causes of daily stress (Bolger et al., 1989; Wickham et al., 2016) compared to the discomfort of living (Topic 5). In addition, women encounter more daily stress through the experience of perceived unfairness in traditional gender role orientations (e.g., household labor, childcare). Thus, in the Korean cultural context, they report gender role stress indicating, Hwa-Byung (HB), that is, "the chronic suppression of distressing emotions and the endurance of oppressive and traumatic experiences" (E Kim et al., 2014).

Topic 7 is labeled "problems with maintaining/choosing a career." While women fulfill their role obligations with respect to providing adequate family care (Ross & Huber, 1985), they worry about disruptions of their own lives, including economic pressure. As women grow older or their children grow up, they begin to establish themselves economically and professionally. Subsequently, they are under more pressure related to childcare and further undergo adjustment difficulties due to the imbalance in the role identity emerging from disadvantaged household positions (Gershoff et al., 2007). Such pressures may cause women to consider quitting their jobs. On the other hand, young women worry about job-seeking and uncertain futures (in unpredictable times), but they are expected to find work to develop themselves in order to be independent and successfully earn an income (Harris, 2003). In the transition period to adulthood, they experience negative mental health problems (Lippert & Damaske, 2019).

Topic 8 is labeled "family caregiving burden," which results in discomfort and strain because there is less time for self-care and relaxation while caring for family members (Mendez-Luck et al., 2008). That is, family caregivers can be "hidden patients" (Kelly et al., 2008). In particular, women are usually the caregivers of the family and are predominantly middle-aged or older (Nay, 2013).

Thus, such caregiving affects women's work and the financial situation of their families due to the loss of income or work interruption due to family matters (e.g., leaving work early, taking more days off to care for others) (Haddock et al., 2006; Lai, 2012).

In summary, based on the analysis of these topics, the results suggest multiple specific stressors for women. The results indicate how women express thoughts about stressful issues (context, object, or role) through this investigation into whether a topic about a specific stressor is connected with a particular age group while controlling the effect of the age group in analyzing the topic model estimated.

5. Discussion and implications

The present study explored the stressors from texts about daily life exchanging among women within an online discussion board in South Korea. The findings involving the various stressors within different age groups are similar with earlier research (e.g., (Almeida et al., 2002; Werner & Frost, 2000)). Consistent with previous studies, we also found the main types of stressors (e.g., interpersonal discontinuity, and role conflict in interpersonal relationships) including interpersonal and conflict events that can predict stress generation (i.e., (Eberhart & Hammen, 2009; Hammen, 1991)). However, our study was to show that the more representative stressors could derive from concrete topics by both semantically integrating keywords representing daily activities and analyzing posted documents about negative emotion associated with an individual's responses to stressful situations among women in their everyday lives. With concrete examples, the topic of "problems/lack of communications" (the highest proportion of types of stressor) highlights the chronicity of issues regarding life-related normative stressors (Werner & Frost, 2000) and represents type of miscommunication or inadequate communication in relation with arguments and tensions that having a negative impact on the quality of everyday life in the relational atmosphere (Almeida et al., 2002; Theiss & Estlein, 2014). Eventually, it will be a trigger of stress because of the shortage of support from others or lack of the possibility of utilizing resources for resolving the confronted stressor despite relatively the short persistence (Hobfoll, 2001; Koffer et al., 2016).

The further important analytical implication was an exploratory stress study on the daily stressor of women using publicly available data (Guntuku et al., 2018) from which daily life episode patterns can be extracted and real-life outcomes can be predicted (Kosinski et al., 2016). As particular examples (e.g., specific minor groups), females are unwilling to disclose their privacy experience (e.g., sexual orientation status, discrimination, or mental and physical health problems) to outsiders (Hinton & Earnest, 2010; Lipsky et al., 2016; Molina et al., 2015). Thus, we adopted computer-assisted text analysis techniques (lexical selection, classification, and natural language processing) to extract informative words from complex texts (Nelson, 2020; Nelson et al., 2018). It can partly compensate for the distortion effect of negative memories and retrieval bias (Itoh et al., 2019) or response bias (Ziegler, 2015) when using self-report measures of sensitive issues (Paulhus, 1984). As a result, this analytical strategy helps researchers apply practical recommendations to identify the real causes of stress in women.

Although the current study has a variety of strengths (e.g., computer-assisted text analysis, large number of data, controlling the bias retrospective response, etc.), the present research has potential limitations stemming from the population and the context that limit the generalizability of the study. First, we used unstructured text data posted by only limited Korean women adults in their 20s to over 50s in the particular online community. Thus, future studies need to consider the problem of generalization from a sample (i.e., elderly people) with relatively low online community usage (Selwyn et al., 2003) and selectively use senior-friendly websites as data sources to deal with the age differences in perceptions of online community participation (Arch, 2008). Moreover, it is necessary to seek a comparable volume of information (i.e., Twitter) regarding the textual communication of women in other countries, which can be compared to the latent topics of stressors in South Korea. Second, we suggested that the text analysis of online posts expressing negative emotion can help further understanding of the stress appraisal process (Lazarus &

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Folkman, 1984). But, there is still a possibility that the experience of daily stressors may vary depending on age differences in the frequency and nature of stressful life events (Mallers et al., 2005). And individuals' responses to daily events can vary due to the occurrence of unexpected environmental events (e.g., disasters, economic fluctuations). In this sense, people are exposed to a stream of continuous changes rather than a single event for a day, with a need for personal adaptation in life demands (i.e., multiple role demands; (Coverman, 1989)). For this reason, future research on should take into account the nature of the context that women continually perceive and interpret about stimuli and information confronted in their daily lives to further deepen understanding of the lived experiences of age groups and interpret the meaning of their response to stressful events.

In conclusion, individuals' adaptation to daily life is hindered by stress (Dohrenwend et al., 1984; Slavich, 2016), and people can undergo serious adversity through repeated exposure to daily stressors. In that respect, women may reveal their own intimate information (e.g., thoughts and feelings) and engage in self-disclosure to online peers, rather communicating face to face communication (Chen, 2012; Schouten et al., 2007), by posting on online discussion boards and thus finding their voice online while as the use of computer-mediated communication increases. Considering the recent changes, our study comes forth with an exploratory finding of the common types of daily stressors in women from messages posting an online community using the method of structural topic modeling to analyze text-based contents.

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