Paper Review #10

[CHI 2021] Effects of Support-Seekers' Community Knowledge on Their Expressed Satisfaction with the Received Comments in Mental Health Communities

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1. Introduction

Research Questions

How would support-seekers' **community knowledge** & **sought and received support** affect …

RQ1:

whether they will **reply or not.**

RQ2:

how they **express satisfaction** with each received comment.

Community Knowledge

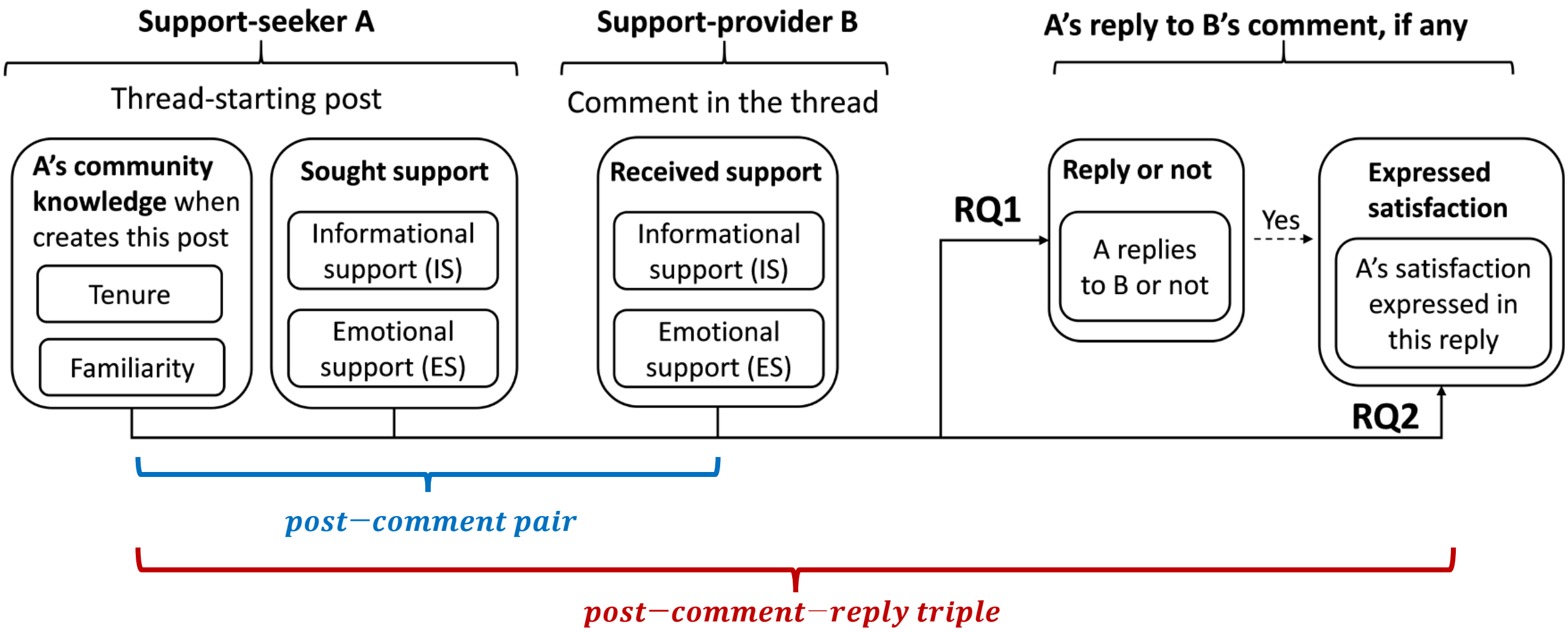
- Defined by members' **familiarity**, **awareness**, or **understanding** of things.

- In this paper, it measured by **members' tenure** in and **posting experience** with that community.

- Support-seekers with **more community knowledge** tend to express **less satisfaction** in their response. (but, **engage** more **actively** and **positively**!)

2. Method

Conceptual model



Dataset Description

	Number	Count of Support-Seekers	Targeted Dependent Variables	Targeted RQ
Post-comment pairs	590,158	124,837	Reply or not	RQ1
Post-comment-reply triples	155,067	57,881	Expressed satisfaction	RQ2

- **Collection Period**: Jan 2009 to Mar 2019

- **Crawling target site**: Reddit NoDepr (via Pushshift API)

- **Pre-process**: Remove …
  (1) support-seekers whose names are “[deleted]”
  (2) any of post-comment(-reply) pair(triple) containing “[deleted]” or “[removed]”

Developing Model to Assess Satisfaction

Labeling Satisfaction

- **1,000 randomly sampled triples** are labeled by **five workers from MTurk.**

- Workers answer **four questions** about **seekers' satisfaction in the reply**:
  (1) overall satisfaction
  (2) satisfaction with the received health information
  (3) change in sentiment
  (4) change of closeness to the other members of the community

(**7-point Likert scales**, **1** – Completely dissatisfied, decreased very much, **7** – Completely satisfied, increased very much)

Developing Model to Assess Satisfaction (Cont'd)

Labeling Satisfaction (Cont'd)

- **Composite satisfaction scale*** is highly reliable! (Cronbach's alpha=0.90)

(*avg. of the four ratings)

- Final label of expressed satisfaction: M=4.35, SD=1.05, min/max=1.40/6.65

- **Politeness score** is also measured, but not used.

Developing Model to Assess Satisfaction (Cont'd)

Predicting Expressed Satisfaction

- **Linear Regression model** is built. (using comments' **linguistic features**)

- **Model inputs**:
  (1) 65 features from the LIWC 2015 library
  (2) sentence/word count
  (3) Frequencies of word in various keyword sets ("trial", "thankful", etc.)

- **Pearson Correlation** between predicted and human-coded: **0.72**

Community Knowledge Measurement

- **Community knowledge** is quantified into **Tenure** and **Posting experience.**

- **Tenure**: **Timestamp** of Seekers' current post – seekers' first post/comment

- **Posting experience**: # of posts and comments created by the seekers in the community before the current post

Amount of Sought Support in Post

Annotating

- The amount of sought IS and ES are expressed in a **3-point scale**. (1 – small)

- **3 experienced annotators** rate 50 random samples separately.

- Judges are very reliable. (**Cronbach's alphas**: 0.91/0.81 for IS/ES)

- **The number of labeled posts by score**:
  1: 189/160, **2**: 127/199, **3**: 184/141 (for IS/ES)

Amount of Sought Support in Posts (Cont'd)

Training Models

- **Two classifiers** for sought IS and ES were trained, respectively.

- Use a set of **linguistic features** (e.g., LIWC, sentence/word count)

- **XGBoost**/**MLP** achieve the best result in predicting IS/ES.

(SVM, Multinomial Logistic Regression, Random Forest were also attempted.)

		Accuracy	Precision	Recall	F1-score
XGBoost	Sought Informational Support	0.70 (0.05)	0.69 (0.06)	0.68 (0.06)	0.68 (0.06)
MLP	Sought Emotional Support	0.65 (0.12)	0.66 (0.11)	0.65 (0.14)	0.64 (0.12)

Amount of Received Support in Comments

- Adopt the open-sourced models in previous work.*

- **Features**: (1) 64 features from the LIWC 2015 library
  (2) binary feature corresponding to the presence of URL(s)
  (3) word count (weighted by 60), sentence count (weighted by 10)

- **Predicting IS model**: **Random forest** model (**64% accuracy**)

- **Predicting ES model**: **XGBoost** model (**68% accuracy**)

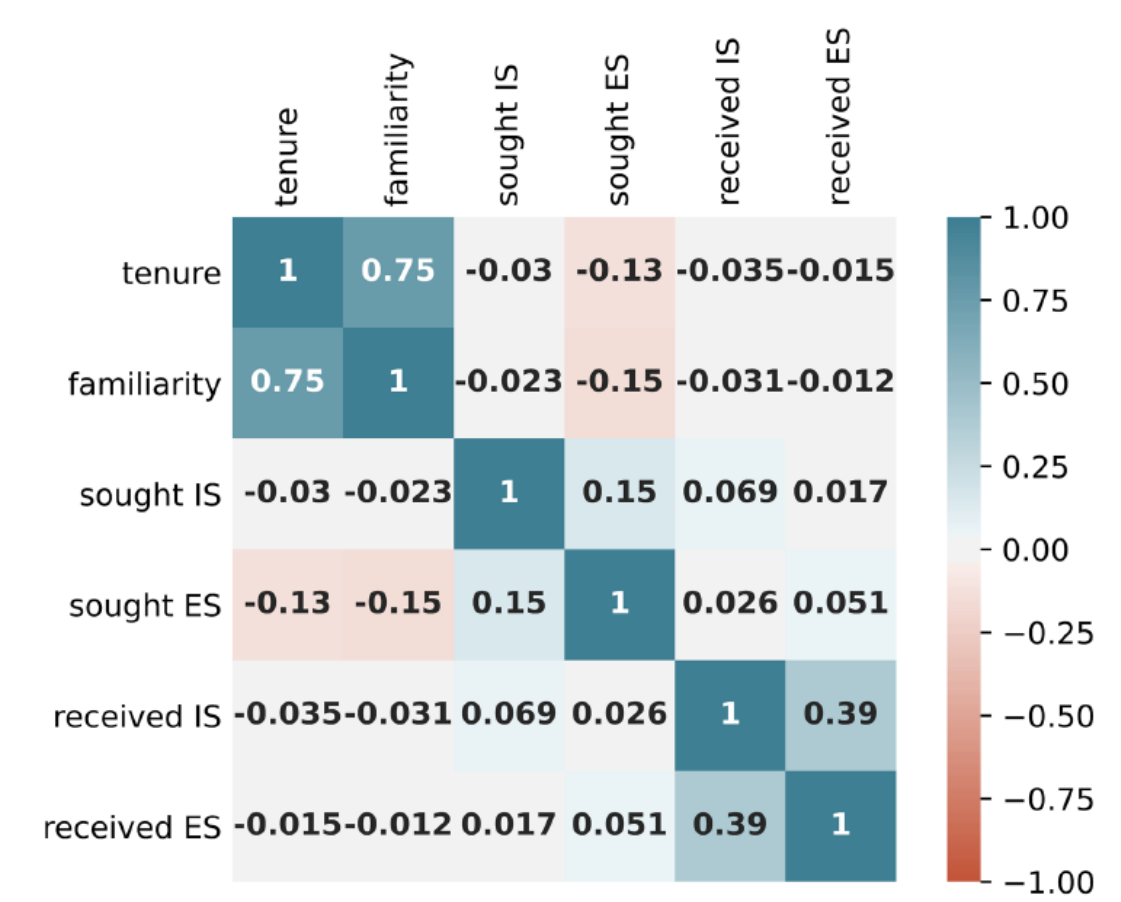
(* *Exploring the Effects of Technological Writing Assistance for Support Providers in Online Mental Health Community*, CHI 2020)

3. Result

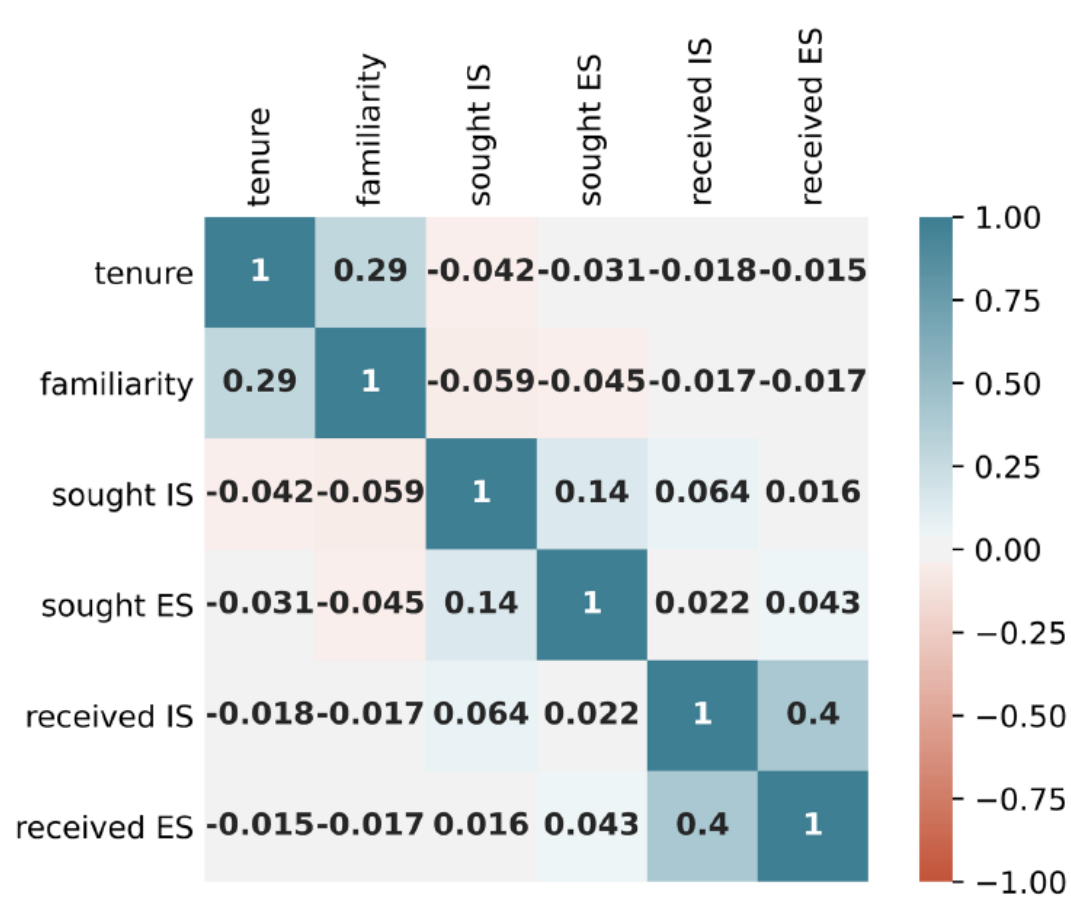
Statistics of variables (predicted)

		(RQ1) Dataset for replying or not (N = 590, 599)			(RQ2) Dataset for expressed satisfaction (N = 155, 174)		
	Variables	**Min / Max**	**Mean (SD)**	**Median**	**Min / Max**	**Mean (SD)**	**Median**
Community Knowledge	tenure (sec)	0 / 291M	16M (36M)	19M	0 / 272M	12M (24M)	1.5M
	posting experience (#)	0 / 3553	68.66 (340.21)	3	0 / 3553	36.60 (131.46)	4
Sought Support	sought IS	1 / 3	1.97 (0.88)	2	1 / 3	2.01 (0.87)	2
	sought ES	1 / 3	1.95 (0.79)	2	1 / 3	1.99 (0.78)	2
Received Support	received IS	1 / 3	1.74 (0.74)	2	1 / 3	1.84 (0.76)	2
	received ES	1 / 3	1.98 (0.66)	2	1 / 3	2.03 (0.68)	2
Seekers' Reply	reply or not	0 / 1	0.26 (0.44)	0	1 / 1	1 (0)	1
	satisfaction	-	-	-	-.56 / 8.17	4.31 (0.71)	4.22

Correlations (independent variables)



(A) Correlations between independent variables in RQ1 dataset for replying or not (*N = 590,158*).



(B) Correlations between independent variables in RQ2 dataset for expressed satisfaction (*N = 155,067*).

- **Variance Inflation Factor(VIF) score** < 5 → Reliable!

Analysis 1: Logistic Regression

Reply to the Received Comment or Not

Posting experience / tenure

Predictors	Models for RQ1 – Reply or not				
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Tenure	-.106***	-.102***	-.101***	-.098***	-.099***
Posting Experience	-.116***	-.110***	-.113***	-.108***	-.107***
Post Frequency	.024***	.025***	.025***	.026***	.026***
Seek IS		.047***		.037***	.037***
Seek ES		.044***		.041***	.041***
Receive IS			.157***	.154***	.158***
Receive ES			.023***	.021***	.020***
Seek IS x Receive IS				-.008**	-.008*
Seek IS x Receive ES				.006	.006
Seek ES x Receive IS				.004	.006
Seek ES x Receive ES				-.012***	-.013***
Tenure x Receive IS					.009
Posting Experience x Receive IS					.022***
Tenure x Receive ES					-.003
Posting Experience x Receive ES					-.011
Intercept	-1.042***	-1.043***	-1.048***	-1.049***	-1.050***
R Square	0.004	0.005	0.009	0.010	0.010

Table 4: Regression coefficients of RQ1 models for predicting whether support-seekers' would reply to the received comments or not. The numbers of users are 124, 837. **The numbers of observations are** 590, 158. **Here,** ***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$.

Analysis 2: Linear Regression

Support-Seekers' Expressed Satisfaction in the Reply

	Models for RQ2 – Expressed Satisfaction				
Predictors	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Tenure	-.005	-.004	-.003	-.003	-.002
Posting Experience	-.092***	-.092***	-.088***	-.089***	-.091***
Post Frequency	.000	.000	.000	.000	.000
Seek IS		.020***		.017***	.017***
Seek ES		-.025***		-.028***	-.028***
Receive IS			.013***	.011***	.010***
Receive ES			.080***	.081***	.079***
Seek IS x Receive IS				.018***	.018***
Seek IS x Receive ES				-.003	-.002
Seek ES x Receive IS				-.002	-.004
Seek ES x Receive ES				.005*	.004*
Tenure x Receive IS					-.011***
Posting Experience x Receive IS					-.002
Tenure x Receive ES					-.003
Posting Experience x Receive ES					-.019***
Intercept	4.305***	4.305***	4.298***	4.299***	4.300***
R Square	0.003	0.004	0.018	0.021	0.021

Table 5: Regression coefficients of RQ2 models for predicting support-seekers' expressed satisfaction in the replies to the received comments. The numbers of users are 57, 881. **The numbers of observations are** 155, 067. **Here,** ***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$.

Conclusion

- **Lower tenure or less posting experience seekers**: express satisfaction ↑

- **More experienced seekers,**
  When receiving IS: reply ↑ , express satisfaction ↓

- **Receiving IS/ES**: most valuable factor in **RQ1/RQ2**, respectively

- Compared with the results of studies on online cancer groups,
  people in OMHC tend to be more appreciative for **emotional support**.