Integrating the Theory of Planned Behavior and Bonding Social Capital to Examine Chinese Women’s Tampon Use Intentions

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Integrating the Theory of Planned Behavior and Bonding Social Capital to Examine Chinese Women’s Tampon Use Intentions

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ABSTRACT
This study integrates the theory of planned behavior with a structural approach to examining social capital to investigate how bonding social capital affected Chinese women’s tampon use intentions. Bonding social capital was operationalized as network closure, which included two main dimensions: density and hierarchy. Results from an online survey (N = 766) showed that network density was positively associated with attitudes toward, social norms about, and perceived behavior control around tampon usage, while network hierarchy negatively predicted attitudes only. Moreover, the indirect
effects of network density on tampon use intentions were mediated by descriptive norms and perceived behavior control. Examining women’s intentions to adopt a rarely used product in China, this study extended the theory of planned behavior into the realm of social capital in an understudied context. The findings provide practical implications for health communication practitioners in public education concerning feminine hygiene products and gynecological health.

Tampons are popular feminine hygiene products in Western countries, as more than 70% of menstruating Americans use tampons (Atkin, 2018). In China, however, only well-educated, middle-class, young women adopt this product (Mou et al., 2018). Barriers that hinder tampon usage in China include lack of pertinent knowledge, concerns of health risks, few tampon users in personal networks, and cultural factors (Cotton Incorporated, 2015; Ren et al., 2018). While the choice of whether to use tampons is a personal one, Chinese women deserve basic knowledge about feminine hygiene products so they can make the best choice for their own health and needs. In this sense, tampon promotion in China that educates women about the product could benefit women’s health, dignity, and quality of life (Y. Yang, 2016).

Previous research has suggested that female family members and friends are the most significant influences for girls selecting a feminine hygiene product (Ren et al., 2018), especially in terms of choosing whether to use tampons (Farage et al., 2011). Thus, tampon use may be affected greatly by strong ties that usually exist in a network with interconnected actors. Burt (2000) termed the extent to which an individual’s social contacts are connected network structure, including network brokerage and closure. Brokerage describes the network structure wherein one is connected to multiple unconnected people, whereas closure depicts the network structure wherein an individual links to contacts who are interconnected. Brokerage and closure are defined as generating mechanisms of a variety of social capital benefits (Burt, 2000). According to Bourdieu (1986), social capital refers to the resources embedded in one’s network resulting from relationships of acquaintance and recognition. The social capital produced by brokerage is known as bridging social capital and mainly includes heterogeneous information and worldviews (Shen et al., 2014). In contrast, closure generates bonding social capital, including trust and certain types of social support (Meng et al., 2016).

Social capital plays a noticeable role in health communication and health-related behaviors by providing beneficial resources (Lee & Kam, 2015). Bonding social capital generated from interconnected contacts positively predicts behaviors with apparent advantages to the individual who wields it (Limbu et al., 2018). However, the relationship between bonding social capital and health-related behaviors has never been examined from a network structure perspective. To fill this void, the current study aims to investigate how bonding social capital influences Chinese women’s tampon use intentions coupled with Burt’s (2000) network structure approach (a structural approach). We focus on bonding social capital because it is the primary form of social capital found in the context of tampon use, more so than bridging social capital (e.g., Ren et al., 2018).

This study also incorporates the theory of planned behavior (TPB) to achieve a better understanding of the link between social capital and a behavioral outcome. Extant literature has documented the specific roles of social capital in health-related behaviors, such as enhancing knowledge, clarifying
norms, and improving capabilities to perform behaviors (Kawachi et al., 2008). These functions correspond with the core constructs of the TPB: attitudes, subjective norms, and perceived behavior control (Fishbein & Ajzen, 2010). However, more research is needed to link the TPB and social capital to examine the psychological mechanisms underlying the effects of social capital on a behavioral outcome. Therefore, the present investigation employs a structural approach to examine how social capital affects Chinese women’s tampon use intentions through attitudes, subjective norms, and perceived behavior control. The findings add to the literature of social capital and the TPB. We also provide practical implications for health communication practitioners developing public education strategies concerning feminine hygiene products and gynecological health in China.

Literature review

Social capital and tampon use intention

Defined as resources stemming from social relationships (Adler & Kwon, 2002), social capital involves the exchange of beneficial resources among social actors at both individual and community levels. In other words, people can benefit from their social networks: they exchange information, learn from each other, and provide and receive support by which their behavioral outcomes may be influenced (Coleman, 1988). Consequently, social capital may alter or reinforce individuals’ health-related behaviors, including preventative health behaviors (Limbu et al., 2018), dental care use (Chi & Carpiano, 2013), and smoking (Mohnen et al., 2012).

To investigate how social capital affects behavioral outcomes, Burt (2005) focused on the individual’s structural position in a social network, given that social capital is “the advantage created by a person’s location in a structure of relationships” (p. 5). Burt (2005) identified brokerage and closure as two mechanisms through which social capital impacts individuals’ beliefs, attitudes, and behaviors. Brokerage refers to the network structure that facilitates bridging social capital comprising weak ties (Shen et al., 2014). Weak ties indicate loose connections occurring among people with different backgrounds, often associated with low frequency and intimacy (Granovetter, 1973). Generally speaking, network brokerage enhances heterogenous information and points of views (Shen et al., 2014). Walter et al. (2019) concluded that high degrees of brokerage were associated with exposure to nonredundant information, which, in turn, resisted normative pressure and promoted efficacy around cervical cancer detection in a Latin American community. In contrast, closure is another network structure that generates bonding social capital stemming from close relationships, such as family members and close friends (Coleman, 1988; Shen et al., 2014). In a dense group with bonding social capital, a group member’s attitudes and behaviors are likely to be influenced by trust, cooperation, and emotional and esteem support from other members (Meng et al., 2016). Kawachi et al. (2008) argued that distinguishing between bridging and bonding social capital would aid in understanding how social capital affects people in given social networks.

In the context of tampon use, research has found that girls regarded mothers and close friends as the most important influences when they choose tampons in both developed and developing countries (Farage et al., 2011; Ren et al., 2018). Similarly, Wang (2020) indicated that the bonding social capital provided by close connections plays a pivotal role in embracing tampons and challenging the social and cultural barriers of tampon use. Wang (2020) argued that tampon-related information was important
for women’s adoption of tampons, and the information exchanged among interconnected people was often consistent. Though limited, these studies have shown the potential association between closure-generated bonding social capital and tampon use intention. Such effects of bonding social capital were in line with Limbu et al.’s (2018) findings that for behaviors with apparent advantages, bonding social capital was positively associated with behavioral outcomes.

Put differently, bridging social capital formed by brokerage is less likely to be related to tampon use intention. Although the Internet, an important category of resources of bridging social capital, provides diverse information and opinions about tampons, the adoption rate of tampons in China has barely changed despite increased internet usage (Ren et al., 2018). Specifically, Ren et al. (2018) found that most Chinese women’s decisions on tampon usage concerned habits and perceptions learned from their close connections (i.e., bonding social capital). In light of these facts, bridging social capital created by brokerage has too little influence to affect tampon use intention in China. Therefore, we expect that bonding social capital predicts tampon use intentions among Chinese women.

To examine how bonding social capital affects Chinese women’s tampon use intentions, the theory of planned behavior (TPB) was employed and linked with network closure. The TPB explains how attitudes, subjective norms, and perceived behavior control influence behavioral intentions and behaviors (Fishbein & Ajzen, 2010). The more favorable an individual’s attitudes toward a behavior, the greater the social pressure the individual feels to perform the behavior, and the higher the individual’s perceived behavior control, the more likely it is she or he will perform the behavior (Fishbein & Ajzen, 2010). The TPB has been widely applied in health communication research to explain college students’ compliance with tobacco-free policies (Record, 2017) and to predict breastfeeding intentions among new mothers (Johnson-Young, 2019), condom use intentions among African American women (Guan et al., 2016), and children’s healthy food consumption (Yee et al., 2019). In terms of tampon use, Chang et al. (2015) found that attitudes and subjective norms about using tampons predicted tampon use intentions among female college students in Taiwan.

However, the link between social capital and the TPB has been relatively underexplored. The limited research in this line is built on the effects of social capital on behavioral change due to increased knowledge, conformity to social norms, and improved capabilities (Kawachi et al., 2008), which match the key TPB constructs (i.e., attitudes, subjective norms, and perceived behavior control) (Lee & Kam, 2015). Thus, Lee and Kam (2015) tested mediating roles of attitudes toward behavior, social norms, and perceived behavior control in social capital’s effect on family communication about drugs and found the mediation effect of attitudes only. Therefore, further research is required to explore more thoroughly the relationships between social capital and individuals’ behaviors using the TPB. Hence, the following hypothesis is proposed:

**H1**: Bonding social capital will be positively associated with Chinese women’s tampon use intentions.

The mediating roles of the key TPB constructs between bonding social capital and tampon use intention

*Attitudes toward behavior*

Attitudes toward behavior refer to the extent to which an individual favors a behavior, which is a contributing factor in behavioral outcomes (Fishbein & Ajzen, 2010). Health communication
researchers have revealed the positive association between attitudes and behavioral intentions in many contexts, including physical exercise intention (Paek et al., 2012), health information seeking intention (Niu & Willoughby, 2018), and condom use intention (Guan et al., 2016). Empirical evidence has shown that social capital influences individuals’ attitudes through multiple mechanisms (Lin, 1999). Specifically, Ware et al. (2009) found that social capital could change sick people’s negative attitudes toward health care around HIV/AIDS. Researchers have also explored the way that attitudes mediate the effects of social capital on behavioral outcomes. For instance, Lee and Kam (2015) found that parents’ attitudes toward talking about drugs mediated the effects of social capital on discussing drugs with their children. Similarly, Tatarko and Schmidt (2016) suggested an indirect impact of social capital on one’s intention to start a business, mediated by positive attitudes toward running a business. Accordingly, we propose the following hypothesis:

**H2**: Chinese women’s attitudes toward using tampons will mediate the effects of bonding social capital on their tampon use intentions.

*Subjective norms*

Subjective norms make up the social pressure individuals feel in relation to whether they should or should not behave in a certain manner (Fishbein & Ajzen, 2010). Some researchers have found that subjective norms are positively associated with behavioral intentions, such as in the case of green-buying (Ho et al., 2015), while other studies have not found that subjective norms influence behavioral intentions (e.g., Johnson-Young, 2019). In discussing these contradictory results, researchers have suggested that subjective norms may function differently in different contexts (Mo & Mak, 2009). In collectivist contexts, people are more likely to heed what their significant others approve, because they regard shared values as more important than personal needs (Niu & Willoughby, 2018).

More importantly, social norms could be another mediator between social capital and behavioral intention (Kawachi et al., 2008). There exists consistent evidence showing that social capital may affect behaviors through social norms. For example, Mohnen et al. (2012) found that a high level of social capital was negatively related to smoking in a community where most people disapproved of smoking. Van Rossem and Meekers (2011) also demonstrated that social capital promoted condom use in a normative environment where this behavior was widely approved. More recently, Walter et al. (2019) found that in the case of Pap tests, there existed a significant relationship between bonding social capital and behavioral intention, which was mediated by social norms.

Additionally, researchers have suggested distinguishing descriptive norms from injunctive norms (Lapinski & Rimal, 2005). Descriptive norms refer to the perceived prevalence of behavior among important referents, whereas injunctive norms are conceptualized as the perceived social approval for a behavior from others (Lapinski & Rimal, 2005). Their levels of social approval differ in relation to health behaviors (Park & Smith, 2007). Therefore, we posit following hypotheses:

**H3**: Chinese women’s descriptive norms about tampon use will mediate the effects of bonding social capital on their tampon use intentions.

**H4**: Chinese women’s injunctive norms about tampon use will mediate the effects of bonding social capital on their tampon use intentions.
Perceived behavior control

Perceived behavior control is a person’s perceived ability to conduct a given behavior, or the perceived ease or difficulty of performing that behavior (Fishbein & Ajzen, 2010). Some scholars have found a positive relationship between perceived behavior control and behavioral intentions related to physical exercise (Paek et al., 2012) and breastfeeding (Johnson-Young, 2019). However, other scholars have not found a positive association between perceived behavior control and behavioral intentions on actions such as seeking mental health information (Niu & Willoughby, 2018) and receiving the H1NI vaccine (Z. J. Yang, 2014). To explain these inconclusive results, Willoughby and Myrick (2016) argued that whether perceived behavior control predicts behavioral intention may depend on the specific context.

Regarding the link between social capital and perceived behavior control, there has been a dearth of research that provides clear empirical evidence. Kawachi et al. (2008) indicated that social capital can improve skills and capabilities to perform certain behaviors (i.e., perceived behavior control). Furthermore, scholars have suggested the mediating effect of perceived behavior control between social capital and behavioral outcomes. Tatarko and Schmidt (2016) found that social capital had a positive indirect impact on individuals’ intentions to start their own businesses through increased perceived behavior control. Thus, social capital can be positively associated with perceived control, which in turn may predict behavioral intention as demonstrated by previous studies. Consequently, we suggest the following hypothesis:

**H5**: Chinese women’s perceived behavior control about tampon use will mediate the effects of bonding social capital on their tampon use intentions.

Figure 1 provides the theoretical model tested in this study.

**Methods**

**Participants**

A Chinese survey company, Credamo, collected the data for this study. Credamo works similarly to MTurk in providing research services in China (Credamo, n.d.). After deleting missing data and outliers,
766 participants remained as the total sample for data analysis. To match the geographical distribution of the population suggested by China’s census data, 47.2% of the participants \((n = 369)\) came from northeast China, 42.0% of the participants \((n = 328)\) came from southeast China, 9% of the participants \((n = 70)\) came from southwest China, and 1.8% of the participants \((n = 14)\) came from northwest China. The average age of the participants was 28.25 years \((SD = 6.16)\), with a range of 18–55 years. With regard to education level, the majority of participants \((77.9%, n = 496)\) had completed a bachelor’s \((62.8%, n = 481)\) or post-graduate \((15.1%, n = 115)\) education, followed by those who had high school education \((13.0%, n = 100)\) and some college education \((9.1%, n = 70)\) (See Table 1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>%</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>28.25</td>
<td>6.16</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>364</td>
<td>47.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southeast</td>
<td>319</td>
<td>41.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southwest</td>
<td>70</td>
<td>9.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northwest</td>
<td>13</td>
<td>1.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>21</td>
<td>2.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school complete</td>
<td>8</td>
<td>1.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate or equivalent</td>
<td>71</td>
<td>9.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college but no degree</td>
<td>70</td>
<td>9.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four-year college/university degree</td>
<td>481</td>
<td>62.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some postgraduate education but no degree</td>
<td>38</td>
<td>5.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postgraduate degree</td>
<td>77</td>
<td>10.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Household Income (Unit: CNY)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 10k</td>
<td>34</td>
<td>4.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10k to less than 20k</td>
<td>53</td>
<td>6.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20k to less than 50k</td>
<td>85</td>
<td>11.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50k to less than 100k</td>
<td>155</td>
<td>20.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100k to less than 200k</td>
<td>198</td>
<td>25.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200k to less than 300k</td>
<td>103</td>
<td>13.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300k to less than 500k</td>
<td>85</td>
<td>11.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500k to less than 1 million</td>
<td>33</td>
<td>4.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 million to less than 2 million</td>
<td>13</td>
<td>1.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 million to less than 5 million</td>
<td>5</td>
<td>0.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 5 million</td>
<td>2</td>
<td>0.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Media Use</td>
<td></td>
<td>2.61</td>
<td>1.61</td>
<td></td>
</tr>
<tr>
<td>Cultural Identity</td>
<td></td>
<td>3.57</td>
<td>0.88</td>
<td></td>
</tr>
</tbody>
</table>

**Procedure**

After the study received IRB approval from a university Institutional Review Board in the midwestern United States, an online survey link was constructed on Credamo’s platform. A pretest survey was sent in January 2020, which recruited 100 qualified participants. Prior to answering the survey
questions, respondents received a consent form with detailed information about the study. Those who agreed to participate in this study then read the instructions and answered the questions. The average time to complete the pretest questionnaire was 25 minutes. In February 2020, the main study was conducted. To ensure data quality, participants who completed the questionnaire in much less than or much more than 25 minutes were excluded. Those who completed the survey received ¥10 (around $1.50) in online cash points through their WeChat Pay accounts. An attention-check item was included in the survey; none of the participants chose an incorrect answer for this question.

Measures
All items used for each main variable were adopted from previous research. The measures for the independent variable (bonding social capital) followed Burt (2000) and recent research (e.g., Walter et al., 2019). The items for the endogenous variables (mediators and tampon use intention) used either a 7-point Likert scale (1 = “strongly disagree” to 7 = “strongly agree”) or a 7-point semantic differential scale. The final items used for the measures and descriptive statistics among the main variables are provided in Tables 2 and 3.

Table 2. Descriptive statistics and correlations among main constructs

<table>
<thead>
<tr>
<th></th>
<th>M(SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Tampon Use Intention</td>
<td>5.40 (1.44)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Perceived Behavior Control of Using Tampons</td>
<td>5.73 (0.91)</td>
<td>.70***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Injunctive Norms of Using Tampons</td>
<td>4.93 (1.48)</td>
<td>.60***</td>
<td>.56***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Descriptive Norms of Using Tampons</td>
<td>5.01 (1.57)</td>
<td>.61***</td>
<td>.54***</td>
<td>.85***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Attitudes Toward Using Tampon</td>
<td>5.63 (1.13)</td>
<td>.64***</td>
<td>.66***</td>
<td>.68***</td>
<td>.65***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) Hierarchy</td>
<td>0.02 (0.03)</td>
<td>-.10**</td>
<td>-.08*</td>
<td>-.17***</td>
<td>-.19***</td>
<td>-.13***</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7) Density</td>
<td>0.37 (0.15)</td>
<td>.14**</td>
<td>.09*</td>
<td>.22***</td>
<td>.24***</td>
<td>.15***</td>
<td>-.51***</td>
<td>1</td>
</tr>
</tbody>
</table>

***p<.001, **p<.01, *p<.05.
Table 3. Composite reliability and construct validity of the TPB variables and tampon use intention (N = 766)

<table>
<thead>
<tr>
<th>Latent Variables</th>
<th>Measurement Items</th>
<th>Standardized Loading Estimate (β)</th>
<th>Explained Variance (R²)</th>
<th>Composite Reliability (CR)</th>
<th>Average Variance Extracted (AVE)</th>
<th>Average Shared Variance (ASV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes Toward Using Tampons</td>
<td>ATUT1: For me to use tampons for my period is __. Harmful 1:2:3:4:5:6:7 beneficial</td>
<td>0.88</td>
<td>0.77</td>
<td>0.93</td>
<td>0.73</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>ATUT2: For me to use tampons for my period is __. unpleasant 1:2:3:4:5:6:7 pleasant</td>
<td>0.88</td>
<td>0.77</td>
<td>0.93</td>
<td>0.73</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>ATUT3: For me to use tampons for my period is __. Bad 1:2:3:4:5:6:7 good</td>
<td>0.91</td>
<td>0.83</td>
<td>0.93</td>
<td>0.73</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>ATUT4: For me to use tampons for my period is __. Not helpful 1:2:3:4:5:6:7 helpful</td>
<td>0.89</td>
<td>0.74</td>
<td>0.93</td>
<td>0.73</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>ATUT5: For me to use tampons for my period is __. Inconvenient 1:2:3:4:5:6:7 convenient</td>
<td>0.75</td>
<td>0.56</td>
<td>0.93</td>
<td>0.73</td>
<td>0.48</td>
</tr>
<tr>
<td>Injunctive Norms of Using Tampons</td>
<td>INUS1: Most people who are important to me think that I should use tampons for my period.</td>
<td>0.86</td>
<td>0.73</td>
<td>0.89</td>
<td>0.74</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>INUS2: It is expected of me that I use tampons for my period.</td>
<td>0.87</td>
<td>0.76</td>
<td>0.89</td>
<td>0.74</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>INUT3: The people in my life whose opinions I value would approve of my using tampons for my period.</td>
<td>0.85</td>
<td>0.72</td>
<td>0.89</td>
<td>0.74</td>
<td>0.56</td>
</tr>
<tr>
<td>Descriptive Norms of Using Tampons</td>
<td>DNUS1: Most people who are important to me use tampons sometimes.</td>
<td>0.91</td>
<td>0.83</td>
<td>0.92</td>
<td>0.79</td>
<td>0.53</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>DNUS2: The people in my life whose opinions I value use tampons for their periods.</td>
<td>0.90</td>
<td>0.82</td>
<td>0.92</td>
<td>0.79</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>DNUS3: many people like me to use tampons sometimes.</td>
<td>0.85</td>
<td>0.71</td>
<td>0.92</td>
<td>0.79</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>Perceived Behavior of Control of Using Tampons</td>
<td>PBCUT1: For me to use tampons for my period would be possible.</td>
<td>0.81</td>
<td>0.65</td>
<td>0.89</td>
<td>0.73</td>
<td>0.41</td>
</tr>
<tr>
<td>PBCUT2: I am confident that I could use tampons if I wanted.</td>
<td>0.87</td>
<td>0.76</td>
<td>0.89</td>
<td>0.73</td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>PBCUT3: I am confident that I could deal with any problems I encountered when using tampons.</td>
<td>0.89</td>
<td>0.80</td>
<td>0.89</td>
<td>0.73</td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>Tampon Use Intention</td>
<td>TUI1: I intent to use tampons in the near future.</td>
<td>0.79</td>
<td>0.62</td>
<td>0.89</td>
<td>0.74</td>
<td>0.51</td>
</tr>
<tr>
<td>TUI2: I will try to use tampons soon.</td>
<td>0.92</td>
<td>0.85</td>
<td>0.89</td>
<td>0.74</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td>TUI3: I plan to use tampons for my following menstrual periods.</td>
<td>0.86</td>
<td>0.74</td>
<td>0.89</td>
<td>0.74</td>
<td>0.51</td>
<td></td>
</tr>
</tbody>
</table>
Bonding social capital
Following Shen et al. (2014), bonding social capital was operationalized as network closure and measured by self-reported data. Participants were instructed to write down three to five names of people with whom they had discussed topics related to menstruation. The questionnaire also asked participants to answer whether those people talked to each other. For the sake of confidentiality, participants were asked to provide people's first names or initials with phonetic notations instead of Chinese characters.

The computer program UCINET then performed a structural holes analysis with this information (Borgatti et al., 2002). According to Burt (2000, 2019), network closure is a mixture of three characteristics: size, density, and hierarchy. As determined by the study design, the variation of network size in this study was within a limited range (three, four, or five). Thus, the characteristic of network size was excluded, a decision that followed previous research (Walter et al., 2019). Thus, density and hierarchy were used as the measures of the independent variable.

Density and hierarchy are distinct dimensions with no consistent relationships between them (i.e., correlation), but each indicates one aspect of the network closure (Burt, 2000). Density indicates the extent to which people are directly connected ($M = .37$, $SD = .15$), showing the overall strength of connectivity among an individual's contacts. A higher density number indicates a higher level of network closure. Hierarchy, on the other hand, shows how the person whose network is being measured (i.e., ego) stands out as the source of connection ($M = .02$, $SD = .03$). When all contacts in one's network are only connected to the ego but disconnected to others, hierarchy achieves the highest level. When all contacts are interconnected, hierarchy does not exist. Therefore, a higher hierarchy number means a lower level of network closure.

Main endogenous variables
Attitudes toward using tampons were measured with five items using a differential scale (e.g., “For me to use tampons for my period is harmful (1) or beneficial (7)” ($\alpha = .94$, $M = 5.63$, $SD = 1.13$) (Ajzen, 2002). Subjective norms included descriptive norms and injunctive norms (Ajzen, 2002). Three items measured descriptive norms (e.g., “Most people who are important to me use tampons sometimes”) ($\alpha = .92$, $M = 5.01$, $SD = 1.57$). Injunctive norms were measured with three items (e.g., “Most people who are important to me think that I should use tampons”) ($\alpha = .89$, $M = 4.93$, $SD = 1.48$). Perceived behavior control was measured with three items (e.g., “I am confident that I could use tampons if I wanted”) ($\alpha = .79$, $M = 5.73$, $SD = 0.91$) (Ajzen, 2002). Tampon use intentions were measured with three items (e.g., “I will try to use tampons soon”) ($\alpha = .90$, $M = 5.40$, $SD = 1.44$) (Ajzen, 2002).

Control variables
Based on previous research, this study included education, income, media use, and cultural identity as control variables. First, education and income were controlled given Mou et al.'s (2018) suggestion that those who accept tampon usage in China are mostly well-educated and middle-class women. Second, media use has an impact on behavioral outcomes across populations (Slater, 2015) and, more relevantly, on health-related behaviors in China (Niu & Willoughby, 2018). Therefore, media use was measured by two items on a 7-point Likert scale ($r = .56$, $M = 2.61$, $SD = 1.61$) (Levenson et al., 2016). Third, cultural values (e.g., collectivistic culture in China) that may affect individuals’ subjective norms,
decision making, and behaviors, were measured using Cultural Identity Clarity Scale on a 7-point Likert scale ($\alpha = .75, M = 3.57, SD = 0.88$) (Usborne & Taylor, 2010).

Results
Dimensionality checks
Confirmatory factor analysis (CFA) was performed with the AMOS 25 program to analyze how well the measured variables represent the constructs (i.e., dimensionality checks) (Hair et al., 2010). The final CFA model achieved satisfactory goodness-of-fit indices according to Hu and Bentler (1999) criteria: $\chi^2 (104, N = 766) = 309.32, p < .001$, Comparative Fit Index (CFI) = .98, Standardized Root Mean Square Residual (SRMR) = .03, Root Mean Square Error of Approximation (RMSEA) = .05, 90% CI [.043, .054]. Construct validity and composite reliability of all measurement items were successfully achieved according to Hair et al.’s (2010) golden rule for construct validity (standardized loading estimate >.50, convergent validity: average variance extracted (AVE) >.50, discriminant validity: AVE > average shared squared variance (ASV)) and for composite reliability (CR > .70). Therefore, the CFA model was deemed acceptable for further analyses.

Hypothesis testing
To test hypotheses, structural equation modeling (SEM) was conducted. To validate the mediating roles of attitudes toward behavior (ATT), descriptive norms (DSN), injunctive norms (IJN), and perceived behavior control (PBC) between levels of network closure (density and hierarchy) and intentions to use tampons (ITUT), we conducted a bias-corrected bootstrapping procedure ($N = 10,000$) with 95% confidence intervals in the SEM (Byrne, 2016). The structural model included education, income, media use, and cultural identity as control variables (Figure 2).

Figure 2. Bootstrapping ($N = 10,000$) results of structural model of associations among social capital (network density and network hierarchy), attitudes toward using tampons, norms of using tampons, perceived behavior control of using tampons, and tampon use intention. Model fit indices: $\chi^2 = 467.92, df = 184, p < .001$, CFI = .97, TLI = .97, RMSEA = .05, PLCOSE = .92 [.041, .051], SRMR = .07.***p < .001, **p < .01, *p < .05, n.s.: nonsignificant

With regard to hypothesis testing for the direct association between levels of network closure (density and hierarchy) and ITUT ($H1$), neither density ($\beta = .02, p = .46, 95\% \text{ CI} [-.029, .079])$ nor hierarchy ($\beta = .00, p = .99, 95\% \text{ CI} [-.005, .051])$ were statistically significant for ITUT.
In terms of $H2a$, $H3a$, $H4a$, and $H5a$, the direct effects of participants’ levels of network closure (density and hierarchy) on ATT, DSN, IJN, and PBC were examined. Density was a significant predictor of ATT ($\beta = .11, p < .05, 95\% \text{ CI} [.105, .029]$), DSN ($\beta = .21, p < .001, 95\% \text{ CI} [.125, .286]$), IJN ($\beta = .19, p < .001, 95\% \text{ CI} [.112, .276]$), and PBC ($\beta = .11, p < .05, 95\% \text{ CI} [.020, .212]$). However, hierarchy was negatively and significantly associated with ATT only ($\beta = -.09, p < .05, 95\% \text{ CI} [-.155, -.015]$), not with other mediators, namely DSN ($\beta = -.09, p = .07, 95\% \text{ CI} [-.173, -.008]$), IJN ($\beta = -.09, p = .09, 95\% \text{ CI} [-.167, -.003]$), or PBC ($\beta = -.01, p = .88, 95\% \text{ CI} [-.094, .079]$). In addition, the mediating effects of DSN ($H3b$) ($\beta = .09, p < .001, 95\% \text{ CI} [.307, 1.167]$) and PBC ($H5b$) ($\beta = .08, p < .05, 95\% \text{ CI} [.108, 1.204]$) between density and ITUT were validated.

Regarding the control variables, media use was statistically significant for ITUT, $\beta = .14, p < .001, 95\% \text{ CI} [.092, .198]$, but education ($\beta = .05, p = .14, 95\% \text{ CI} [-.005, .103]$), income ($\beta = -.03, p = .38, 95\% \text{ CI} [-.075, .023]$), and cultural identity ($\beta = .02, p = .59, 95\% \text{ CI} [-.003, .056]$) were not found to be significant factors.

The structural model achieved an acceptable model fit: $\chi^2 = 476.92, df = 184, p < .001, \text{CFI} = .97, \text{TLI} = .97, \text{RMSEA} = .05, \text{PLCROSE} = .92 [.041, .051]$ and $\text{SRMR} = .07$. These model fit indices met the criteria of Hu and Bentler (1999) and of Hair et al. (2010).

**Discussion**

The purpose of this study was to explore how bonding social capital affected Chinese women’s tampon use intentions through attitudes toward behavior, subjective norms, and perceived behavior control. This study extended the theory of planned behavior (TPB) with a structural approach to, or generating mechanisms of, social capital as an antecedent. This study also provided quantitative evidence that corroborates factors predicting the adoption of tampon use among Chinese women, which previous research had suggested only qualitatively (Wang, 2020).

This study demonstrated that bonding social capital was positively associated with attitudes, injunctive norms, descriptive norms, and perceived behavior control around tampon use. The results supported theoretical discussions on social capital’s roles in health-related behaviors (Kawachi et al., 2008). In this study, menstruation-related social capital generated by network closure help to develop positive attitudes toward tampon use and enhance perceived social approval and behavior control of using tampons. According to Ren et al. (2018) and Wang (2020), bonding social capital in the form of social support may be one of the most important resources for tampon adoption. This social support, especially emotional and esteem support, might therefore function as the bridge to link social capital and the TPB constructs.

However, these links were demonstrated for only one characteristic of network closure: density (i.e., the overall strength of connectivity among contacts). Hierarchy, the alternative form of network closure, was negatively associated with attitudes toward tampon use. The more an ego becomes the primary source of connection in a network, the more likely she hears about nonredundant information from her contacts. With little fundamental education on feminine hygiene products, Chinese women may find it difficult to develop their own attitudes if they depend on heterogenous information from disconnected contacts. They may thereby hold less favorable attitudes toward tampon use. In other words, given that Chinese women lack scientific knowledge related to tampons (Cotton
Incorporated, 2015), the knowledge gap might even be exacerbated if they are exposed to nonuniform, confusing information.

The associations between network hierarchy and other TPB constructs (descriptive norms, injunctive norms, and perceived behavior control) were not statistically significant. These findings could be attributable to the insufficient network information that hierarchy reflects in an individual’s behavior. Focusing on the degree to which an ego stands out in a network (Burt, 2000, 2019), hierarchy does not offer sufficient information about the necessary characteristics of a given network that would link social capital with social norms and perceived behavior control. The unit of observation might provide another explanation. Studies (e.g., Burt, 2019) that found hierarchy to be a statistically significant factor have been conducted at the organization or community (as opposed to individual) level, in which hierarchy may provide more information. Future research should be conducted with varying units of observation to compare the nuanced roles of hierarchy.

More importantly, we found significant full-mediation effects of descriptive norms and perceived behavior control between density and Chinese women’s tampon use intentions, which indicates that bonding social capital does not have a direct impact on such intentions. The mediating role of descriptive norms is in line with previous research that adopting tampons is influenced by social capital from one’s close connections (e.g., Ren et al., 2018). Recall that descriptive norms are defined as the perception of a given behavior being performed by significant others (Lapinski & Rimal, 2005). In this study, participants reported a relatively high level of descriptive norms. When these women have frequent conversations in their dense, menstruation-related networks, they are likely to share personal experiences of using tampons with each other, thereby shaping tampon usage as a norm. Nonetheless, the finding is limited to descriptive norms, not injunctive ones. In other words, perceiving tampon use as a socially approved norm does not necessarily relate to tampon use intention. Unlike injunctive norms that emphasize general social approval, descriptive norms imply readily available social capital from significant others who also use tampons. In this sense, the nonsignificant mediation effect of injunctive norms may be explained by the original conceptualization of injunctive norms. Compared to descriptive norms, the concept of injunctive norms includes less information on the availability of social capital (e.g., trust, emotional, and esteem support), which is necessary for Chinese women to adopt tampons.

Additionally, it is worth noting the importance of bonding social capital in relation to the finding that perceived behavior control has a strong mediating effect. In this study, social capital in a dense network may instill a sense of efficacy and control in tampon usage. For instance, emotional and esteem support generated by network closure involve communicating confidence in others’ capabilities to perform certain behaviors (Meng et al., 2016), which ultimately would increase tampon use intention. Nonetheless, attitudes toward using tampons did not mediate the effect of density on tampon use intention. This nonsignificant effect could be explained by the association between positive attitudes toward a behavior and the relevant knowledge embedded in social networks (Lee & Kam, 2015). Information and knowledge link bonding social capital and attitudes toward using tampons, yet they are not sufficient enough to encourage Chinese women to overcome tampon-related barriers. Thus, the portion of attitudes toward behavior that was enhanced by tampon-related information and knowledge could not be linked to behavioral intention.
With regard to control variables, media use was found to be a unique predictor that was statistically significant in Chinese women’s tampon use intentions when controlling for the effects of main variables. Tampon-related information and discussions in media, as well as the normative environment shaped by media, may predict a stronger tampon use intention. This finding corresponds with previous studies suggesting a link between media use and behavioral outcomes in health communication literature (e.g., Niu & Willoughby, 2018).

Implications
The most notable theoretical contribution is that our study connects the TPB to social capital. In addition to adding evidence to this line of theoretical discussions, our study applies a structural approach to link generating mechanisms of social capital with the TPB. Based on specific contexts, some or all of the TPB constructs may explain the impacts of bonding social capital on behavioral outcomes. As such, this study provides a starting point for further integration of a structural approach to social capital with the TPB in health-related behaviors. Second, unlike previous studies measuring social capital with a single measure (e.g., Walter et al., 2019), density and hierarchy were used simultaneously as the measures of independent variable in this study. Because they reflect distinct characteristics of network closure, density and hierarchy affect the TPB constructs differently. As a result, our study suggests the necessity of including various aspects of personal networks, if possible, to conceptualize social capital theoretically and operationally. Furthermore, different findings between descriptive norms and injunctive norms revealed the importance of distinguishing between different types of social norms.

Practically, the findings shed light on the promotion of and public education about tampons, along with other lesser-known feminine hygiene products in China. Considering the role of bonding social capital in the adoption of non-traditional products related to menstruation, public health educators and health communication practitioners should make an effort to spark relevant conversations in dense networks. Moreover, message designers should provide information about descriptive norms and perceived behavior control around a given product. For example, indicating an increasing number of tampon users in China and addressing potential problems of tampon use may effectively promote the adoption of tampons. Lastly, this study suggests that media use is a positive predictor of tampon use intention. Therefore, using media can be a viable approach for health educators and media practitioners to promote tampons and other lesser-known feminine hygiene products in China.

Limitations and suggestions for future research
Certain limitations of this study should be noted. First, we did not test the exact role of social support in our model. Although the findings implied that social support might bridge social capital and the TPB constructs, the underlying mechanisms connecting social capital and behavioral change are unclear. Future research should explicitly examine the links between social capital, social support, and behavioral outcomes. Second, this study investigated social capital at the individual level. Although scholars have validated this approach (Burt, 2000; Walter et al., 2019), more findings might be produced by investigating community-level social capital. Third, the present study relied on cross-sectional data, which could not generate causality. To overcome this shortcoming, a longitudinal or experimental design is recommended. Third, this study focused on behavioral intentions, not actual behaviors. Research has found mixed results regarding the relationship between behavioral intentions
and behaviors (Sheeran, 2002). Future studies in this area should examine actual behaviors. Fourth, the generalizability of these results is limited to well-educated Internet users in China. More than two hundred million Chinese women are non-Internet users who have little access to online information about tampons (China Internet Network Information Center, 2019). Future studies should try to collect data based on probability sampling, including non-Internet users and less-educated women.

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Additional information
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Notes
1. According to China’s 2010 national population census, around 40% of Chinese people lived in northeastern China, more than 40% resided in southeastern China, around 10% lived in southwestern China, and less than 5% lived in northwestern China. Since some provinces are divided into different parts (e.g., Inner Mongolia, Shaanxi), the proportions were approximate.
2. The survey was created in English because the measures were built on previous research published in English. To enable participants to understand the survey, the questionnaire was translated and rigorously reviewed by bilingual graduate and undergraduate students, as well as a Chinese woman who did not attain higher education.
3. WeChat Pay is a popular and reliable tool for online payment in China.

References


